

**INVITATION FOR BIDS
&
CONTRACT DOCUMENTS
FOR
City of Burlington
Vermont**



**Department of
Parks, Recreation & Waterfront**

City Hall Park Improvement Project

December 2018

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2019 & 2020 CITY OF BURLINGTON HOLIDAYS
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INVITATION FOR BIDS

Sealed bids from pre-qualified contractors shall be accepted until **2:30 pm, prevailing time on January 29th, 2019** at the City of Burlington at 645 Pine Street, Suite A, Burlington, in the office of the Department of Parks, Recreation, and Waterfront for construction of the project hereinafter described. Bid opening will occur immediately after the bid submittal deadline. The time of receiving and opening bids may be postponed due to emergencies or unforeseen conditions.

Sealed BIDS shall be marked in the lower left hand corner: ***“Bid Documents: Burlington – City Hall Park Improvement Project”***

Each BID must be accompanied by a certified check payable to the City of Burlington for five percent (5%) of the total amount of the BID. A BID bond may be used in lieu of a certified check.

This contract is subject to the Burlington Pre-Qualification of Construction Contractors, the Burlington Livable Wage Ordinance, Union Deterrence, and Outsourcing Ordinances. No bid will be accepted without a signed statement of intent to comply with these ordinances and a filled out Pre-Qualification of Construction Contractors Application.

LOCATION: The project is located within the City of Burlington City Hall Park, generally bounded by Main Street, St. Paul Street, College Street, and the back side of City Hall.

TYPE OF CONSTRUCTION: The scope of the work consists of the demolition of existing sidewalk, fountain, utilities; the reconstruction of concrete sidewalks, sidewalks with pavers, granite curbs, granite walls, lighting, tree planting, landscaping, irrigation system, fountain, lighting, electrical/Ethernet distribution, and drainage improvements. pavement markings, and signs.

CONTRACT COMPLETION DATE: The Contract shall be completed on or before **May 21, 2020**.

COST OF PLANS: Plans are available at Blueprints, Etc., 20 Farrell Street, South Burlington, Vermont 05403-6112. Tel: 802-865-4503. Fax: 802-865-0027. Cost of plans are \$175.00.

ENGINEERS ESTIMATE: For this Proposal the Engineers Estimate of the base bid is between \$3,000,000 and \$3,500,000.

PLANS, SPECIFICATIONS AND PROPOSAL MAY BE SEEN AT THE OFFICE OF:

1. City of Burlington, 645 Pine Street, Suite A, Burlington, VT 05401
2. Works in Progress, Inc. 20 Farrell Street, South Burlington, Vermont

PREBID CONFERENCE: A non-mandatory pre-bid conference will be held for the project at **3:30 pm prevailing time on January 17th, 2019** at the City of Burlington City Hall Building, Conference Room 12, 149 Church Street, Burlington.

STANDARD SPECIFICATIONS: This contract is governed by the VAOT 2018 STANDARD SPECIFICATIONS FOR CONSTRUCTION and with current special provisions, as modified by general special provisions.

QUESTIONS, REVISIONS, & ADDENDUM: During the advertisement phase of this project all questions shall be addressed solely to the Municipal Project Manager (MPM): Nina Safavi, Burlington Parks Comprehensive Planner, (802) 865-7248, 645 Pine Street, Burlington, VT 05401. Questions may also be sent to nsafavi@burlingtonvt.gov.

All questions must be submitted before January 22nd, 2019 at 5:00 PM. Questions received after this time may not be answered. Any revisions, addendums and answers to questions received by the due date for questions will be sent to bidders who received this Invitation by Blueprints, Etc. via email. In addition, revisions will be posted on the City's RFP web page <http://burlingtonvt.gov/RFP/>. It is advised that bidders sign up for the GovDelivery notification so that they will be notified of any changes to the RFP page. It is the responsibility of the bidder to ensure that a valid email is submitted to the plan distributor. The bidder shall acknowledge receipt of all addenda in the bid form.

PREQUALIFICATION OF CONTRACTORS: All bidders on this project shall be prequalified by the Vermont Agency of Transportation (VAOT) and City of Burlington.

The City of Burlington prequalification shall be submitted by interested Bidders a minimum of 5 days before the Bid Due Date unless they are already qualified with the City of Burlington under a prior project. A Prequalification Application is included with these Bid Documents. Please contact the project manager for questions.

For VAOT qualification questions please contact Contract Administration prior to the bid opening. For information contact Jon Winter at 802-828-2643.

WEEKLY CONSTRUCTION PROGRESS MEETINGS: The general contractor foreman shall attend a weekly construction progress meeting with the Resident Engineer, and city representatives. The design team and construction subcontractors shall be involved in these meetings as necessary and requested. The general contractor shall prepare an updated construction schedule documenting the upcoming construction activities. The Resident Engineer shall be responsible for securing a meeting location and preparing all meeting materials, notes, and action items.

INSTRUCTIONS FOR BIDDERS

Great Streets BTV – City Hall Park Improvement Project

1. Bid Preparation and Submission

- a. Bidders are expected to examine the specifications, drawings, all instructions and, the construction site. Failure to do so will be at the bidders' risk.
- b. All bids must be submitted on the forms provided by the municipality. Bidders shall furnish all the information required by the solicitation. Bids must be signed and the bidders name typed or printed on the bid sheet and each continuation sheet which requires the entry of information by the bidder. Erasures or other changes must be initialed by the person signing the bid. Bids signed by an agent shall be accompanied by evidence of the agent's authority. (Bidders should retain a copy of their bid for their own records.)
- c. All bid documents shall be sealed in an envelope which shall be clearly marked with the words "Bid Documents," the Invitation for Bids (IFB) number, any project or other identifying number, the bidder's name, and the date and time for receipt of bids.
- d. This solicitation requires bidding on all items, failure to do so will disqualify the bid.
- e. Unless expressly authorized elsewhere in this solicitation, alternate bids will not be considered.
- f. Unless expressly authorized elsewhere in this solicitation, bids submitted by facsimile (fax) machines, or electronically via the internet or email will not be considered.
- g. All blank spaces under the page(s) headed "Schedule of Items" must be filled in with ink or printer in both words and figures indicating the unit price for each respective bid item. The bid total shall also be entered in words and figures.
- h. In case of a discrepancy between a unit price written in words and one entered in figures, the price written in words shall govern.
- i. In the event of a discrepancy between a unit price and the calculated extension, the product based on the unit price bid and the mathematically correct summation of the products shall govern.
- j. In case of discrepancy between the bid total written in words and that entered as a figure, the adjusted figure shall govern.

- k. Bidders must be on the Plan Holders list as managed by Blueprints, etc.; failure to do so will disqualify the bid.

2. Explanation and Interpretation to Prospective Bidders

- a. Any prospective bidder desiring an explanation or interpretation of the solicitation, specification, drawings, etc., must request it in writing by the date listed for questions in the Invitation for Bids. Requests must be in writing. The only oral clarifications that will be provided will be those clearly related to solicitation procedures, i.e., not substantive technical information. No other oral explanation or interpretation will be provided, except for at the PreBid Conference. Any information given to a prospective bidder concerning this solicitation will be furnished promptly to all other prospective bidders as a written addendum to the solicitation, if that information is necessary in submitting bids, or if lack of it would be prejudicial to other prospective bidders.
- b. Any information obtained by, or provided to, a bidder other than by formal addendum to the solicitation shall not constitute a change to the solicitation.

3. Addendum to Invitation for Bids

- a. If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.
- b. Bidders shall acknowledge receipt of any addendum to this solicitation by identifying the addendum number and date on the bid form. Bids which fail to acknowledge the bidders receipt of any addendum will result in the rejection of the bid if the addendum (addenda) contained information which substantively changed the municipality's requirements.
- c. Addenda will be on file in the offices of the Municipality at least 5 days before the bid opening.

4. Responsibility of Prospective Contractor

- a. Contractors shall also be pre-qualified with the City of Burlington, applications for pre-qualification are included in the appendix documents and shall be submitted 5 working days prior to the bid opening. Pre-qualification applications for this project shall be submitted to the MPM.
- b. Contractors shall provide a 5-year work history with the bid.
- c. The Method of Measurement and Basis of Payment for all contract items shall follow the Vermont Agency of Transportation's ("VTrans") 2018 Standard Specification for Construction, unless modified in these Contract Documents.

- d. If a bidder submits a unit bid price of zero for a contract bid item, the bid will be declared informal.
- e. A bidder may submit a unit bid price that is obviously below the cost of the item. If the Municipality awards and enters into a contract with a Bidder that has submitted a unit bid price that is obviously below cost, the contractor shall be obligated to perform the work under such item as indicated in the contract documents and/or as directed by the Engineer.
- f. When Optional Bid Items are indicated in the proposal bidders shall bid on only one pay item in each group of options, leaving the other pay items in the group without a bid price. If a bidder enters more than one-unit price bid in a group of options, only the lowest total price will be considered as the basis of calculation for determining the low bidder and used in the contract.
- g. When “Alternate Bid Items” are indicated in the Proposal bidders must bid on all pay items in each set of “Alternate Bid Items”. Failure to bid on all of the “Alternate Bid Items” in the proposal may result in rejection of the bid.
- h. Contractor shall carry consistent unit pricing for item numbers that appear in both the Base Bid and Add Alternates where the Add Alternate work is performed concurrently with work in the base bid. Should a discrepancy exist between the unit cost of the two items, the value in the base bid shall be used when determining the contract amount in the Notice of Award. The exception to consistent unit pricing between the Base Bid and Add Alternates is any Lump Sum items may have unique unit pricing.
- i. In the event that a unit cost cannot be agreed upon, or when Extra Work is requested at the direction of the Owner or Engineer the following shall be used to determine said unit cost. Any additional costs for Public Liability Insurance and Property Damage Insurance that are required in the Contract will be allowed and reimbursed at the actual cost to the Contractor.
 - a. Labor. For all machine or equipment operators, other workers, and supervisors in direct charge of the specific operation, the Contractor shall receive the actual wages agreed upon before beginning the work and were paid to the workers performing the work, to which shall be added an amount equal to **10** percent for profit. If the Contractor elects to use employee(s) more skilled than required to perform the extra work, the Owner reserves the right to allow compensation for said employee(s) to be capped at 125% of the applicable Davis-Bacon wage rate of the base skill level required to perform the work.

Workers Compensation Insurance, Unemployment Compensation Insurance, and Social Security charges on labor items as paid by the

Contractor will be allowed. Other employee insurances (health, disability, e.g.) being paid by the Contractor just prior to the work being ordered will also be allowed, provided the Contractor submits an applicable notarized insurance rate schedule from its insurance agent. The Contractor shall submit an Owner form indicating all applicable insurances and overhead items for each employee involved in the extra work.

The Contractor will be allowed an additional **10%** of the actual wages paid to the employee as compensation for administration charges and any other additional costs. Additional cost or charge for the Superintendent shall not be allowed.

- b. **Materials.** The Contractor shall receive the actual cost including freight charges (both as submitted on original receipted bills) for all materials furnished and used. **Ten** percent shall be added thereto for overhead, profit and any other costs incurred in supplying the materials. Vermont sales tax shall not be included.
- c. **Equipment.** The Contractor will be reimbursed as described below. Equipment that is used shall be specifically described by year, manufacturer, model number, and any other information required to identify the appropriate hourly rate in the Rental Rate Blue Book published by Equipment Watch (“Blue Book”). In the event the Contractor elects to use equipment of a higher rental value than equipment suitable for the work, payment will be made at the rate applicable to suitable equipment.
 - a. **Contractor Owned Equipment.**
 - i. **Ownership Costs.** The Contractor will be reimbursed for its ownership costs for self-owned equipment at the rates agreed to before the work begins. These rates shall be on an hourly basis and shall not exceed the monthly ownership rates listed in the current Blue Book divided by 176. The rates will be adjusted for depreciation as computed and published in the Blue Book rate adjustment tables, but will not be adjusted as recommended on the Blue Book regional adjustment maps. The rates for ownership costs will be total reimbursement to the Contractor for all non-operating costs of the equipment, including depreciation, insurance, taxes, interest, storage, overhead, repairs, and profit. The maximum duration for reimbursement in a day shall not exceed eight hours unless the equipment actually is operated for more than eight hours on a particular day, in which case the rate shall be paid for all hours the equipment actually worked on that day.
 - ii. **Operating Costs.** The rates for operating costs include fuel, lubricants, other operating expendables, and preventative and

field maintenance. The Contractor will be reimbursed the amount derived as the product of the number of hours of actual use multiplied by the Blue Book estimated operating cost per hour. Operating costs do not apply to equipment idle time. Operating costs do not include the operators' wages. Except as otherwise provided, the rates to be used for computation shall be those in effect at the time the force account work is performed as reflected in the applicable publication of the Blue Book.

- iii. In the event that an ownership cost rate and/or an operating cost rate is not established in the Blue Book for a particular piece of equipment, the Engineer shall establish a rate(s) for that piece of equipment consistent with its costs and expected life. The Contractor shall make no charge for small tools that are considered as having a replacement value of less than \$500.
- b. Rented Equipment. In the event the Contractor does not own a specific type of equipment and must rent, the Contractor will be reimbursed the actual cost for the equipment, as submitted by invoice, for the time that the equipment is used to accomplish the work. Vermont sales tax shall not be included. The Agency reserves the right to limit the hourly rate to the maximum amount allowed by Blue Book in the event that the prime contractor is a subsidiary of, or has a close affiliation to, the firm supplying the rented equipment.
- c. Maximum Amount Payable. The maximum amount of reimbursement for the ownership cost of Contractor owned equipment or the rental cost of rented equipment is limited to the original purchase price of the equipment.
- d. Equipment Downtime. No rental cost or operating cost will be paid for downtime for either rented equipment or Contractor owned equipment.
- e. Transportation Costs. The Contractor will be paid for the reasonable documented cost of transporting both Contractor owned and rented equipment to the work location and back to its original location or a new location if the cost is less.
- d. When the Bid Proposal Form for a contract contains one or more pay items which have a quantity of one (1) and a unit price and total price entered, the Municipality has set a unit price in the event that such item is used. If such item is determined to be needed by the Engineer, the work will be performed by the contractor according to the contract documents at the unit price listed.

- e. When it is indicated in the contract documents that payment or costs of work and/or materials are incidental to one or more other contract items (but not to specific other items), such costs shall be included by the bidder in the price bid for all other contract items.
- f. The estimate quantities are not guaranteed but are given as a basis for the comparison of bids

5. Errors and/or Inconsistencies in Contract Documents

- a. By submitting a bid, a prospective bidder/contractor certifies that it shall report in writing to the Municipality any error or inconsistency discovered in the plans, proposal, specifications, or contract documents immediately upon discovery of such error or inconsistency.
- b. By submitting a bid, a prospective bidder/contractor certifies that it shall assert no claim, cause of action, litigation, or defense against the Municipality unless notice was provided to the Municipality in writing of any error or inconsistency found in the plans, proposal, specifications, and/or contract documents immediately upon discovery of such error or inconsistency.

6. Availability of Lands for Work, Etc.

- a. The lands upon which the work is to be performed, rights of way and easement for access thereto and other lands designated for use by the contractor in performing the work are identified in the contract documents. All additional lands and access thereto required for temporary construction facilities, construction equipment or storage of materials and equipment to be incorporated in the work are to be obtained and paid for by the Contractor. Easements for permanent structures or permanent changes in the existing facilities are to be obtained and paid for by the Municipality unless otherwise provided for in the contract documents.

7. Familiarity with Laws, Ordinances and Regulations

- a. By submitting a bid an entity certifies that it is familiar with all Federal, State and local laws, ordinances and regulations which affect in any way the materials, equipment, haul roads used in or upon the work, the conduct of the work, and the persons engaged or employed in the performance of the work to be performed pursuant to the contract.
- b. By submitting a bid an entity certifies that it shall forthwith report in writing to the Municipality any provision in the plans, proposal, specifications or proposed contract that the bidder/contractor believes is in conflict with or inconsistent with any Federal, State or local law, ordinance, or regulation.

- c. By submitting a bid a prospective Bidder certifies that if, during its investigation of the work in the process of preparing its bid, it discovers or encounters subsurface or latent physical conditions at a project site differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, it shall notify in writing the Municipality of the specific differing conditions immediately upon discovering or encountering the differing site conditions.
- d. An entity further certifies that if it fails to notify the Municipality of any differing site conditions as described above, it shall waive any and all rights that it might have to additional compensation from the Municipality for additional work as a result of the differing site conditions and that it shall not bring a claim for additional compensation because of differing site conditions.
- e. By submitting a bid a prospective bidder/contractor certifies that no claim or defense of ignorance or misunderstanding concerning Federal, State or local laws, ordinances and/or regulations will be employed by a bidder/contractor or considered by the Municipality in claims, litigation, alternative dispute resolution procedures, or other matters concerning the contract for which the bid is submitted.
- f. Prequalification of Construction Contractors. As defined by SUBPART B - RELATED LAWS, CHAPTER 21, ARTICLE V - Prequalification of Construction Contractors, Sec. 21-67 through Sec. 21-78. For all projects where total project cost is one hundred thousand dollars (\$100,000.00) or more.
- g. City Livable Wages Ordinance. As defined by SUBPART B - RELATED LAWS, CHAPTER 21, ARTICLE VI - LIVABLE WAGES, Sec. 21-80 through Sec. 21-87. For any contractor that has a service contract(s) with the City of Burlington where the total amount of the service contract or service contracts exceeds fifteen thousand dollars (\$15,000.00) for any twelve (12) month period, including any subcontractors of such contractor or vendor. Livable wage rates will change as of July 1st, 2018, Contractor and all subs will need to meet conditions of that change under this contract. Any change in the Livable Wage Rates that is more than \$0.05 will be eligible for consideration of a change order to compensate for the revised rates.
- h. City Outsourcing Ordinance. As defined by SUBPART B - RELATED LAWS, CHAPTER 21, ARTICLE VII - OUTSOURCING, Sec. 21-90 through Sec. 21-94. For any contract for services which involves any city funds and the total amount of the contract is fifty thousand dollars (\$50,000.00) or more
- i. City Union Deterrence Ordinance. As defined by SUBPART B - RELATED LAWS, CHAPTER 21, ARTICLE VIII – UNION DETERRENCE, Sec. 21-100 through Sec. 21-103. For Any contract for services which involves any City funds

and the total amount of the contract is fifteen thousand dollars (\$15,000.00) or more

- j. Erosion Prevention and Sediment Control Plan. As defined by CHAPTER 26 WASTEWATER, STORMWATER, AND POLLUTION CONTROL - ARTICLE III. STORMWATER AND EROSION CONTROL, Sec 96-160. Contractor shall be responsible for filing a Small Project Erosion Control Plan and maintaining practices identified in the approved plan.
- k. Excavations and Obstructions. As defined by Chapter 27 STREETS AND SIDEWALKS - ARTICLE II. EXCAVATIONS AND OBSTRUCTIONS, Sec 29-62. The Contactor shall be responsible to obtaining a no-charge permit for all locations identified in the Contract Documents where pavement and excavation is disturbed within the right-of-way.

8. Late Submissions, Modifications, and Withdrawal of Bids

- a. Any bid received at the place designated in the solicitation after the exact time specified for receipt will not be considered.
- b. Any modification or withdrawal of a bid is subject to the same conditions as in paragraph (a.) of this provision.
- c. The only acceptable evidence to establish the time of receipt at the Municipality is the time/date stamp of the Municipality on the proposal wrapper, or other documentary evidence of receipt maintained by the municipality.
- d. Bids may be withdrawn by written notice, or if authorized by this solicitation, by telegram (including mailgram) or facsimile machine transmission received at any time before the exact time set for opening of bids: provided that written confirmation of telegraphic or facsimile withdrawals over the signature of the bidder is mailed and postmarked prior to the specified bid opening time. A bid may be withdrawn in person by a bidder or its authorized agent if, before the exact time set for opening of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

9. Bid Opening

- a. All bids received by the date and time specified in the solicitation will be publically opened and total bid amounts read aloud. The time and place of opening will be as specified in the solicitation. Bidders and other interested persons may be present.

10. Rejection of Proposals

- a. A Proposal may be declared “Informal” and hence rejected if it shows any alteration of form, omissions, or additions not called for in the proposal, lacks proper signatures, is a conditional bid, has alternate bids unless required in the proposal, has irregularities of any kind, has changes to the printed content, is submitted on a form not furnished by the Municipality, is incomplete, fails to acknowledge receipt of one or more addendums, or includes a clause in which the bidder reserves a right to accept or reject the contract award.
- b. A proposal may be rejected at the time of bid opening or following analysis to confirm the proposal.
- c. If the bids received in response to this solicitation exceed the municipality’s available funding for the proposed work the municipality may reject the bid(s).
- d. The Municipality may reject all bids when deemed to be in the City’s best interest.
- e. The Municipality may reject an otherwise lowest bid when it is determined that another bid is more advantageous to the City.
- f. The Municipality may reject a bid not accompanied by any required bid security or by other data required by the bid documents.
- g. The Municipality may reject a bid which is in any way incomplete, irregular, amplified or qualified or otherwise not in compliance with bid documents in all material respects or reasonable interpretation thereof.
- h. The Municipality may reject any or all proposals, waive any or all technicalities, and/or advertise for new proposals if the municipality determines that the best interests of the Municipality, or the awarding authority, will be served.
- i. Bids which fail to acknowledge the bidders receipt of any addendum will result in the rejection of the bid if the addendum (addenda) contained information which substantively changed the Municipality’s requirements.
- j. The Municipality will decide whether any bid prices are unbalanced above or below a reasonable cost analysis value as determined by its Municipal Project Manager. Proposals in which bid prices are unbalanced, mathematically and/or materially, may be rejected at the sole discretion of the Municipality. For purposes of this subsection “mathematically unbalanced bid” and “materially unbalanced bid” shall have the same meaning as in 23 CFR Part 635 – Construction and Maintenance.
- k. Prospective bidders may be disqualified for various reasons including (a) Submission of more than one proposal for the same work by an entity under the same or different names, (b) Evidence of collusion among bidders, or (c) Any

other cause for suspension or debarment as detailed in the Vermont Agency of Transportation's policy and Procedures on Debarment, Code of Vermont Rules (CVR), Volume 8A, 14 010 004, pages 1-10.

11. Contract Award

- a. The Municipality will evaluate bids in response to this solicitation without discussions and, limited by the Municipality's rights under Section 10, Rejection of Proposals set forth above, awarding a contract to the lowest responsive and responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the municipality considering for following factors:
 1. Adherence to all conditions and requirements of the bid specifications.
 2. Total bid price (including any discounts), unit or extended price, and administrative cost of the City.
 3. Administrative cost of the City.
 4. General reputation and experience of the bidder including past performance with the City.
 5. Evaluation of the bidder's ability to service the City.
 6. Financial responsibility of the bidder to successfully meet the requirements of the contract.
 7. Delivery or completion date.
 8. Maintenance costs and warranty provisions.
- b. Opened proposals will be considered and submitted bids confirmed on the basis of the summation of the products of the quantities shown in each proposal's Bid Proposal Form multiplied by the unit prices bid. In the event of a discrepancy see clarification of sums under Instruction for Bidders.
- c. Prior to signing a construction contract, the successful bidder must submit a current Certificate of Good Standing from the Vermont Secretary of State's office.

13. Bid Guarantee

- a. All bids must be accompanied by a negotiable bid guarantee which shall not be less than five percent (5%) of the amount of the bid. The bid guarantee may be a certified check, bank draft, U.S. Government Bonds at par value, or a bid bond secured by a surety company acceptable to the U.S. Government and authorized to do business in the State of Vermont. Certified checks and bank drafts must be made payable to the order of the municipality. The bid guarantee shall insure the execution of the contract and the furnishing of a method of assurance of completion by the successful bidder as required by the solicitation. Failure to submit a bid guarantee with the bid shall result in rejection of the bid. Proposal guarantees of the two lowest bidders that have submitted proposals that comply with all the provisions required to render them formal will be retained until the contract and bonds have been signed by all parties. Bid guarantees submitted by

the remaining unsuccessful bidders will be returned as soon as practicable after bid opening. Should no award be made within forty-five calendar days following the opening of bids, forty-six if the forty-fifth day is a state holiday, all proposals may be rejected and all guarantees may be returned.

14. Contract Bonds

- a. A successful bidder entering into a contract for any portion of the work included in a proposal shall provide the Municipality sufficient surety in the form of; 1) a labor and materials bond, and 2) a compliance bond, both as required by 19 V.S.A. Section 10(8) and (9).
- b. Each bond shall be in a sum equal to one hundred percent (100%) of the contract awarded.
- c. The labor and materials bond shall guarantee the payment in full of all bills and accounts for materials and labor used in the work as well as other obligations incurred in carrying out the terms of the contract.
- d. The compliance bond shall guarantee the faithful performance and completion of the work to be done under the contract as well as compliance with all provisions of the contract.
- e. The form of the bond shall be that provided by the Municipality, and the surety shall be acceptable to the State. The bonds shall be procured from an insurance company registered and licensed to do business in the State of Vermont.

15. Signing the Contract

- a. The entity to which the Contract has been awarded shall sign the contract documents and return them to the Municipality within 15 calendar days from the date of the Notice of Award. No contract shall be considered effective until it has been fully executed by all parties.
- b. Failure to comply with any of the requirements of these provisions relative to signing the contract or failure to furnish the required surety within fifteen (15) calendar days after notice of award shall be just cause for the annulment of the award or of the contract and/or forfeiture of the proposal guarantee/bid bond. Further, if the award or the contract is annulled, or if the contract is not awarded due to inaction of the lowest responsible bidder that has submitted a proposal that complies with all the provisions required to make it formal, the proposal guaranty accompanying the proposal shall become the property of the Municipality, not as a penalty but as liquidated damages.
- c. If the award or the contract is annulled, the Municipality may award the contract to the next lowest responsible bidder that has submitted a proposal that complies with all the provisions required to make it formal or advertise a new request for bids for the contract(s).

- d. Failure by the contractor to sign the contract within the time provided by this Subsection shall not be reason for an extension of the contract completion date.

16. Taxes and Insurance Requirements

Taxes and insurance for this project shall be in conformance with Section 103 of the VTrans 2018 Standard Specifications for Construction. For this project the following limits for Commercial Liability and Automobile coverage apply:

a. Commercial Liability:

\$2,000,000	General Aggregate applying, in total, to this project only
\$2,000,000	Products/completed Operations Aggregate
\$1,000,000	Personal & Advertising Injury
\$1,500,000	Each Occurrence
\$250,000	Fire Damage Legal Liability
\$ 5,000	Med. Expense (Any one person)

b. Automobile Liability:

Bodily Injury	\$1,000,000	Each Person
	\$1,000,000	Each Occurrence
Property Damage	\$500,000	Each Occurrence
	OR	
Combined Single Limit	\$1,500,000	Each Occurrence

c. Workers' Compensation:

With respect to all operations performed, the Contractor shall carry worker's compensation insurance in accordance with the laws of the State of Vermont. Minimum limits for Employer's Liability:

- (a) Bodily Injury by Accident: \$500,000 each accident
- (b) Bodily Injury by Disease: \$500,000 policy limit
\$100,000 each employee

d. Professional Liability Insurance: (NOT APPLICABLE FOR THIS BID OR CONTRACT)

~~1. General. This applies only to those Contracts specifically identified as requiring Errors & Omissions (E&O) Insurance. The Consultant shall carry architects/engineers professional liability insurance covering errors and omissions made during their performance of contractile duties with the following minimum limits:~~

~~\$2,000,000 Annual Aggregate
\$2,000,000 Per Occurrence~~

~~2. Deductibles. The consultant is responsible for any and all deductibles.~~

~~3. Coverage. Prior to performing any work, the Consultant agrees to provide evidence of E&O insurance coverage defined under this Section. In addition, the Consultant agrees to attempt to maintain continuous professional liability coverage for the period of the agreement and whenever applicable any construction work related to this agreement, and for a period of five years following substantial completion, if such coverage is reasonably available at commercially affordable premiums.~~

e. Umbrella Liability:

\$1,000,000	Each Event Limit
\$1,000,000	General Aggregate Limit

f. Indemnification; Railroad Protective Liability Insurance (NOT APPLICABLE FOR THIS BID OR CONTRACT)

17. Prompt Pay Compliance

- a. Vermont's Prompt Pay Statute requires payment from primes to subs within 7 days of primes receiving payment. Vermont State Statutes, Commerce and Trade, T.9§4003 provides: "Notwithstanding any contrary agreement, when a subcontractor has performed in accordance with the provisions of its contract, a contractor shall pay a subcontractor, and each subcontractor shall in turn pay its subcontractors, the full or proportional amount received for each such subcontractor's work and materials based on work completed or service provided under the subcontractor, seven days after receipt of each progress or final payment or seven days after receipt of the subcontractor's invoice, whichever is later."

18. Preconstruction Conference

- a. After award of a contract under this solicitation and prior to the start of work, the successful bidder will be required to attend a preconstruction conference with representatives of the Municipality, its Resident Engineer, and other interested parties convened by the Municipality. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract. The municipality will provide the successful bidder with the date, time and place of the conference. Note: If the specific material testing and certification requirements are not included elsewhere in the contract documents, they will be provided to the contractor at the preconstruction conference.

19. Waste Borrow and Staging Areas

- a. The opening and use of off site waste, borrow and staging areas shall follow the provisions of Section 105.25 of the VAOT Standard Specifications for Construction, 2018 Edition.
- b. The Contractor and/or property owner shall obtain all necessary permits and clearances prior to using off site waste, borrow or staging areas. In addition, all off site waste, borrow and staging areas must be reviewed and approved by the VAOT Environmental Section prior to use. Application should be made at least 21 calendar days prior to planned utilization. No work will be performed at off site waste borrow or staging areas without written approval of the Engineer. The forms for either documenting an exempt site or applying for review of a site may be found on the VAOT web site at <http://www.aot.state.vt.us/TechServices/EnvPermit/erosionpreventionandsedimentcontrol.htm>

20. DBE Requirements

- a. There are no mandatory Contract goals for DBE compliance on this project. Bidders are advised, however, that a list of Subcontractors and approximate Contract Values will be required as part of the fully executed Contract for the successful Bidder as a means of evaluating DBE participation.

21. Indemnification

The contractor will indemnify and hold harmless the owner, the engineer, and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the work, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom, and is caused in whole or in part by any negligent or willful act or omission of the contractor, and subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

In any and all claims against the owner, or the engineer, or one or more of their agents or employees, by an employee of the contractor, or subcontractor, or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited on the amount or type of damages, compensation or benefits payable by or for the contractor or any subcontractor under workmen's compensation acts, disability benefit acts or other employee benefits acts.

22. Contract Change Orders

All changes affecting the Project's construction cost, length of time, or modifications of the terms or conditions of the CONTRACT, must be authorized by means of a written CONTRACT Change Order which is mutually agreed to by the OWNER and CONTRACTOR. The CONTRACT Change Order will include extra WORK,

WORK for which quantities have been altered from those shown in the BID Schedule, as well as decreases or increases in the quantities of installed units which are different from those shown in the BID Schedule because of final measurements. All changes must be recorded on a CONTRACT Change Order (which form is part of these CONTRACT Documents) and fully executed before they can be included in a partial payment estimate. Changes for WORK, quantities, and/or conditions will include any respective time adjustment, if justified. Time adjustments will require an updated Project Schedule with the Change Order.

When the Contract sum is, in whole or in part, based on unit prices, the OWNER reserves the right to increase or decrease a unit price quantity as may be deemed reasonable or necessary in order to complete the WORK contemplated by this CONTRACTOR. Overhead and Profit (OHP) will not be included in a unit quantity Change Order.

The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment to determine a mutually acceptable unit price as follows.

The unit price may be re-evaluated and adjusted under the following conditions:

- a. If the variation in the quantity of a particular item of Unit Price Work performed by CONTRACTOR differs by more than 25% from the estimated quantity of such item indicated in the Agreement
- b. If there is no corresponding adjustment with respect to any other item of Work; and
- c. If CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof; or if OWNER believes that the quantity variation entitles OWNER to an adjustment in the unit price.

Either OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

In addition, there may be added an amount to be agreed upon to cover the cost of general overhead and profit (OHP). The markup for OHP by the General CONTRACTOR may not exceed 10% if the General CONTRACTOR executes the WORK. If a SUBCONTRACTOR executes the WORK, the SUBCONTRACTOR's OHP may not exceed 10% of the cost of the actual WORK, and the General CONTRACTOR may not apply for more than a 5% markup for OHP on the actual WORK (not including the SUBCONTRACTOR's OHP).

In the event that a unit cost cannot be agreed upon, or when Extra Work is requested at the direction of the Owner or Engineer the following shall be used to determine said unit cost. Any additional costs for Public Liability Insurance and Property Damage Insurance that are required in the Contract will be allowed and reimbursed at the actual cost to the Contractor.

- a. Labor. For all machine or equipment operators, other workers, and supervisors in direct charge of the specific operation, the Contractor shall receive the actual wages agreed upon before beginning the work and were paid to the workers performing the work, to which shall be added an amount equal to **10** percent for profit. If the Contractor elects to use employee(s) more skilled than required to perform the extra work, the Agency reserves the right to allow compensation for said employee(s) to be capped at 125% of the applicable Davis-Bacon wage rate of the base skill level required to perform the work.

Workers Compensation Insurance, Unemployment Compensation Insurance, and Social Security charges on labor items as paid by the Contractor will be allowed. Other employee insurances (health, disability, e.g.) being paid by the Contractor just prior to the work being ordered will also be allowed, provided the Contractor submits an applicable notarized insurance rate schedule from its insurance agent. The Contractor shall submit an Agency form indicating all applicable insurances and overhead items for each employee involved in the extra work.

The Contractor will be allowed an additional **10%** of the actual wages paid to the employee as compensation for administration charges and any other additional costs. Additional cost or charge for the Superintendent shall not be allowed.

- b. Materials. The Contractor shall receive the actual cost including freight charges (both as submitted on original receipted bills) for all materials furnished and used. **Ten** percent shall be added thereto for overhead, profit and any other costs incurred in supplying the materials. Vermont sales tax shall not be included.
- c. Equipment. The Contractor will be reimbursed as described below. Equipment that is used shall be specifically described by year, manufacturer, model number, and any other information required to identify the appropriate hourly rate in the Rental Rate Blue Book published by Equipment Watch ("Blue Book"). In the event the Contractor elects to use equipment of a higher rental value than equipment suitable for the work, payment will be made at the rate applicable to suitable equipment.
 - i. Contractor Owned Equipment.
 1. Ownership Costs. The Contractor will be reimbursed for its ownership costs for self-owned equipment at the rates agreed to before the work begins. These rates shall be on an hourly basis and shall not exceed the monthly ownership rates listed in the current Blue Book divided by 176. The rates will be adjusted for depreciation as computed and published in the Blue Book rate adjustment tables, but will

not be adjusted as recommended on the Blue Book regional adjustment maps. The rates for ownership costs will be total reimbursement to the Contractor for all non-operating costs of the equipment, including depreciation, insurance, taxes, interest, storage, overhead, repairs, and profit. The maximum duration for reimbursement in a day shall not exceed eight hours unless the equipment actually is operated for more than eight hours on a particular day, in which case the rate shall be paid for all hours the equipment actually worked on that day.

2. Operating Costs. The rates for operating costs include fuel, lubricants, other operating expendables, and preventative and field maintenance. The Contractor will be reimbursed the amount derived as the product of the number of hours of actual use multiplied by the Blue Book estimated operating cost per hour. Operating costs do not apply to equipment idle time. Operating costs do not include the operators' wages. Except as otherwise provided, the rates to be used for computation shall be those in effect at the time the force account work is performed as reflected in the applicable publication of the Blue Book.
 3. In the event that an ownership cost rate and/or an operating cost rate is not established in the Blue Book for a particular piece of equipment, the Engineer shall establish a rate(s) for that piece of equipment consistent with its costs and expected life. The Contractor shall make no charge for small tools that are considered as having a replacement value of less than \$500.
- ii. Rented Equipment. In the event the Contractor does not own a specific type of equipment and must rent, the Contractor will be reimbursed the actual cost for the equipment, as submitted by invoice, for the time that the equipment is used to accomplish the work. Vermont sales tax shall not be included. The Agency reserves the right to limit the hourly rate to the maximum amount allowed by Blue Book in the event that the prime contractor is a subsidiary of, or has a close affiliation to, the firm supplying the rented equipment.
 - iii. Maximum Amount Payable. The maximum amount of reimbursement for the ownership cost of Contractor owned equipment or the rental cost of rented equipment is limited to the original purchase price of the equipment.

- iv. Equipment Downtime. No rental cost or operating cost will be paid for downtime for either rented equipment or Contractor owned equipment.
 - v. Transportation Costs. The Contractor will be paid for the reasonable documented cost of transporting both Contractor owned and rented equipment to the work location and back to its original location or a new location if the cost is less.
- d. Subcontracted Work. The Contractor shall receive the actual cost, as submitted on original receipted bills, for all extra and force account work subcontracted to others. **10** percent shall be added thereto for overhead, profit and any other costs incurred to perform the subcontracted work. However, the Agency reserves the right to use the force account procedures as depicted previously in this subsection in the event that the cost of reimbursable subcontracted work is deemed excessive. The compensation as herein provided shall be received by the Contractor as payment in full for Extra Work done on a force account basis. The Contractor's representative and the Engineer shall compare records of Extra Work on a force account basis at the end of each day. Copies of these records shall be made on Agency forms provided for this purpose and shall be signed by both the Engineer and Contractor's representative. All requests for compensation for Extra Work done on a force account basis, including original receipted bills to verify cost and freight charges for all materials, shall be submitted to the Agency as soon as possible; however, if the required request, invoices, and other documentation are not filed before 90 days have lapsed following final acceptance of the project, the costs associated with such Extra and force account work shall not be reimbursable.

23. Contract Documents

The following documents are included in this proposal and are effective for this contract. Proposal holders are reminded to check the contents of this proposal against the following index. In the event that you suspect or determine the proposal is incomplete, notify Nina Safavi, Burlington Parks Comprehensive Planner, 802-865-7248, 645 Pine Street, Burlington, VT 05401. Questions may also be sent to nsafavi@burlingtonvt.gov.

- A. Invitation for Bids
- B. Instructions for Bidders*
- C. Bid Proposal Form*
- D. Notice of Award
- E. Agreement
- F. Notice to Proceed
- G. General Conditions

- H. Project Special Provisions
- I. Example Performance and Payment Bond Forms
- J. Example Application for Payment
- K. Example Project Change Order Form
- L. Notice of Final Completion
- M. VTRANS General Special Provisions for All Projects, Dated August 8, 2018
- N. VTRANS Work Zone Safety and Mobility Guidance Document
- O. City of Burlington Livable Wage Ordinance
- P. City of Burlington Ordinance Forms
- Q. City of Burlington Pre-Qualification of Construction Application
- R. City of Burlington Holidays
- S. City of Burlington Erosion Prevention and Sediment Control
- T. City of Burlington Excavation Permit
- U. VTrans 2018 Standard Specifications for Construction (included by reference only)
- V. VTrans Standard Drawings (included by reference only)
- W. Technical Details and Plans

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BID PROPOSAL FORM
Great Streets BTV – City Hall Park Improvement Project

Proposal of _____ (hereinafter called Bidder),
organized and existing under the laws of the State of Vermont doing business as

—

(a corporation, a partnership, of an individual)

To the City of Burlington, Vermont (hereinafter called Owner)

The Bidder represents that this bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation. The bidder has not directly or indirectly induced or solicited any other bidder to submit a false bid. Bidder has not solicited or induced any person, firm or corporation to refrain from bidding and the bidder has not sought by collusion to obtain for himself any advantage over any other bidder or Owner.

The undersigned bidder proposed and agrees, if this bid is accepted, to enter into an agreement with Owner to furnish all materials and to complete all work as specified or indicated in the Contract Documents for the contract price and within the contract time indicated in this bid and in accordance with the Contract Documents.

Bidder hereby agrees to commence Work under this contract on the date of issuance of the Notice to Proceed and that the Final Completion date for this contract is May 21st, 2020.

Bidder acknowledges receipt of the following Addenda:

Bidder agrees to perform all the Work described in the Contract Documents for the following schedule of prices. Unqualified bids will not be accepted.

The Total Base Bid is the basis for contract award. All unit prices for the same item description shall be the same unit cost, no matter whether the quantities are in the Base Bid or Add Alternates. The City shall determine whether to include the Add Alternates in the contract based on final bid results and local funding limits.

BASE BID – BASIS OF CONTRACT AWARD

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
201.10	Clearing and Grubbing, Including Individual Trees and Stumps	LS	1	\$_____	\$_____
Unit Price in Words:					
201.15	Removing Medium Trees	EA	3	\$_____	\$_____
Unit Price in Words:					
201.15	Removing Large Trees	EA	16	\$_____	\$_____
Unit Price in Words:					
201.20	Removing Medium Stumps	EA	3	\$_____	\$_____
Unit Price in Words:					
201.21	Removing Large Stumps	EA	16	\$_____	\$_____
Unit Price in Words:					
203.15	Common Excavation	CY	4270	\$_____	\$_____
Unit Price in Words:					
203.32	Granular Borrow	CY	124	\$_____	\$_____
Unit Price in Words:					
204.20	Trench Excavation of Earth	CY	1800	\$_____	\$_____
Unit Price in Words:					
204.25	Structure Excavation	CY	22	\$_____	\$_____
Unit Price in Words:					
204.30	Granular Backfill for Structures	CY	70	\$_____	\$_____
Unit Price in Words:					
301.25	Subbase of Crushed Gravel, Coarse Graded	CY	46	\$_____	\$_____
Unit Price in Words:					
301.26	Subbase of Crushed Gravel, Fine Graded	CY	875	\$_____	\$_____
Unit Price in Words:					

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
301.35	Subbase of Dense Graded Crushed Stone	CY	900	\$ _____	\$ _____
Unit Price in Words:					
404.65	Emulsified Asphalt	CWT	1	\$ _____	\$ _____
Unit Price in Words:					
406.25	Marshall Bituminous Concrete Pavement	TON	30	\$ _____	\$ _____
Unit Price in Words:					
514.10	Water Repellant, Silane	GAL	95	\$ _____	\$ _____
Unit Price in Words:					
541.25	Concrete, Class B	CY	47	\$ _____	\$ _____
Unit Price in Words:					
601.2601	6" Drainage Pipe (SDR35 PVC)	LF	17	\$ _____	\$ _____
Unit Price in Words:					
601.2603	8" Drainage Pipe (SDR35 PVC)	LF	50	\$ _____	\$ _____
Unit Price in Words:					
601.2605	12" Drainage Pipe (SDR35 PVC)	LF	247	\$ _____	\$ _____
Unit Price in Words:					
601.2615	18" Drainage Pipe (SDR35 PVC)	LF	78	\$ _____	\$ _____
Unit Price in Words:					
604.20	Precast Reinforced Concrete Catch Basin with Cast Iron Grate	EA	2	\$ _____	\$ _____
Unit Price in Words:					
604.22	Sanitary Sewer Manhole	EA	3	\$ _____	\$ _____
Unit Price in Words:					
604.40	Changing Elevation of Drop Inlets, Catch Basins or Manholes	EA	1	\$ _____	\$ _____
Unit Price in Words:					
605.20	Underdrain Carrier Pipe (4 Inches)	LF	210	\$ _____	\$ _____
Unit Price in Words:					
605.95	Underdrain Flushing Basin	EA	2	\$ _____	\$ _____
Unit Price in Words:					

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
609.10 Unit Price in Words:	Dust Control with Water	MGAL	25	\$ _____	\$ _____
609.15 Unit Price in Words:	Dust and Ice Control with Calcium Chloride	TON	1	\$ _____	\$ _____
613.16 Unit Price in Words:	Riprap, Light Type	CY	2	\$ _____	\$ _____
616.41 Unit Price in Words:	Removal of Existing Curb	LF	1311	\$ _____	\$ _____
618.10 Unit Price in Words:	Portland Cement Concrete Sidewalk, 6 Inch	SY	775	\$ _____	\$ _____
618.30 Unit Price in Words:	Detectable Warning Surface	SF	80	\$ _____	\$ _____
620.55 Unit Price in Words:	Removal of Existing Fence	LF	164	\$ _____	\$ _____
628.35 Unit Price in Words:	PVC Sewer Pipe(SDR35)	LF	300	\$ _____	\$ _____
629.23 Unit Price in Words:	Seamless Copper Water Tube	LF	260	\$ _____	\$ _____
629.24 Unit Price in Words:	Ductile Iron Pipe, Cement-Lined	LF	360	\$ _____	\$ _____
629.35 Unit Price in Words:	Tapping Sleeve and Valve Box	EA	1	\$ _____	\$ _____
630.10 Unit Price in Words:	Uniformed Traffic Officer	HR	200	\$ _____	\$ _____
630.15 Unit Price in Words:	Flaggers	HR	1700	\$ _____	\$ _____
631.10 Unit Price in Words:	Field Office, Engineers	LS	1	\$ _____	\$ _____
635.11 Unit Price in Words:	Mobilization/ Demobilization	LS	1	\$ _____	\$ _____
641.15 Unit Price in Words:	Portable Changeable Message Sign	EA	4	\$ _____	\$ _____

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
649.11	Geotextile for Roadbed Separator	SY	80	\$ _____	\$ _____
Unit Price in Words:					
649.41	Geotextile for Underdrain Trench Lining	SY	410	\$ _____	\$ _____
Unit Price in Words:					
653.35	Stabilized Construction Entrance	CY	25	\$ _____	\$ _____
Unit Price in Words:					
653.40	Inlet Protection Device, Type I	SY	5	\$ _____	\$ _____
Unit Price in Words:					
653.41	Inlet Protection Device, Type II	EA	6	\$ _____	\$ _____
Unit Price in Words:					
653.20	Rolled Erosion Control Product, Type I	SY	50	\$ _____	\$ _____
Unit Price in Words:					
653.475	Silt Fence, Type 1	LF	948	\$ _____	\$ _____
Unit Price in Words:					
656.30	Deciduous Trees (Planting & Staking Only)	EA	18	\$ _____	\$ _____
Unit Price in Words:					
656.35	Deciduous Shrubs	EA	330	\$ _____	\$ _____
Unit Price in Words:					
656.41	Perennials	EA	770	\$ _____	\$ _____
Unit Price in Words:					
656.65	Landscape Watering	MGAL	267	\$ _____	\$ _____
Unit Price in Words:					
678.23	Wired Conduit (Ethernet/Event Power)	LF	2,750	\$ _____	\$ _____
Unit Price in Words:					
678.23	Wired Conduit (Site and Lighting Electrical)	LF	640	\$ _____	\$ _____
Unit Price in Words:					
678.25	Pull Box, Standard (10"x15")	EA	20	\$ _____	\$ _____
Unit Price in Words:					

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
678.25	Pull Box, Standard (18"x24")	EA	5	\$ _____	\$ _____
Unit Price in Words:					
900.608	Special Provision (Bioretention Soil)	CY	385	\$ _____	\$ _____
Unit Price in Words:					
900.608	Special Provision (Compost Mulch)	CY	75	\$ _____	\$ _____
Unit Price in Words:					
900.608	Special Provision (Horticultural Soil)	CY	255	\$ _____	\$ _____
Unit Price in Words:					
900.608	Special Provision (Landscape Mineral Mulch)	CY	10	\$ _____	\$ _____
Unit Price in Words:					
900.608	Special Provision (Peastones)	CY	10	\$ _____	\$ _____
Unit Price in Words:					
900.608	Special Provision (Stonedust)	CY	2	\$ _____	\$ _____
Unit Price in Words:					
900.608	Special Provision (Subbase of Drainage Aggregate)	CY	260	\$ _____	\$ _____
Unit Price in Words:					
900.608	Special Provision (Washed River Rock)	CY	10	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Soil Cells)	EA	136	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Yard Drain)	EA	3	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Bioretention Overflow Drain)	EA	2	\$ _____	\$ _____
Unit Price in Words:					

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.620	Special Provision (Bioretention B OutletStructure)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Runnel Drain)	EA	3	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Bench)	EA	23	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Bike Rack) In-Ground	EA	5	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Bike Rack) Surface Mount	EA	8	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Dog Waste Bag Dispenser Posts)	EA	2	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Drinking Fountain)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Current Transformer Cabinet)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Current Rated Meter)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Event Distribution Panel)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Main Distribution Panel)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Union Company Switch)	EA	2	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Light Pole Base)	EA	17	\$ _____	\$ _____
Unit Price in Words:					

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.620	Special Provision (Light Pole with Post Top Luminaire, Type P1)	EA	17	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Post Top Luminaire, Type P1A)	EA	2	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (In-Grade Uplight, Type P3)	EA	4	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (In-Grade Uplight, Type P4)	EA	5	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Bracket Mounted Luminaire, Type P5)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Lighting Control System)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Message Board Base Bid)	EA	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Tent Tie Down Hardware)	EA	24	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Big Belly Receptacles)	EA	2	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Tree Grates)	EA	4	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Outdoor Electrical & Communications Ground Boxes)	EA	20	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Grasses)	EA	693	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Bulbs)	EA	0	\$ _____	\$ _____
Unit Price in Words:					

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.620	Special Provision (Rain Gardens A, B & C Planting)	EA	2121	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Art Disc Placement)	EA	120	\$ _____	\$ _____
Unit Price in Words:					
900.640	Special Provision (Pedestrian Hand Railing)	LF	90	\$ _____	\$ _____
Unit Price in Words:					
900.640	Special Provision (Metal Landscape Edging)	LF	800	\$ _____	\$ _____
Unit Price in Words:					
900.640	Special Provision (Temporary Chain-Link Fence, 6 Feet)	LF	1725	\$ _____	\$ _____
Unit Price in Words:					
900.640	Vertical Granite Curb Type A, B, C	LF	890	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Arch Pipe Detention System)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Bollard & Rail Fence System)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Curb Inlet & Trench Drain)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Demolition and Salvage Existing Fountain & Amphitheater Wall)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Granite Block Seatwall at Ellipse)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Granite Stair)	LS	1	\$ _____	\$ _____
Unit Price in Words:					

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.645	Special Provision (Granite Veneer Wall Central Rain Garden)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Granite Veneer Wall College St. Terrace)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Granite Veneer Retaining Wall Main St & SW Corner)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Interactive Fountain System)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Irrigation System)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Lawn Restoration)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Misc Demolition)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Moveable Tables and Chairs)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Restroom Facilities)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Relocate Monument & Install New Flagpole)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Rain Garden A)	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Rain Garden B)	LS	1	\$ _____	\$ _____

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
Unit Price in Words:					
900.645	Special Provision (Rain Garden C)	LS	1	\$_____	\$_____
Unit Price in Words:					
900.645	Special Provision (Tree Protection)	LS	1	\$_____	\$_____
Unit Price in Words:					
900.645	Special Provision (Traffic Control, All-Inclusive)	LS	1	\$_____	\$_____
Unit Price in Words:					
900.645	Special Provision (Water Backflow Prevention and Vault)	LS	1	\$_____	\$_____
Unit Price in Words:					
900.645	Special Provision (Weathered Steel Seatwall)	LS	1	\$_____	\$_____
Unit Price in Words:					
900.645	Special Provision (Contaminated Soils Management) N.A.B.I.	LS	1	<u>\$ 225,000</u>	<u>\$ 225,000</u>
Unit Price in Words:					
900.670	Special Provision (Paver Type 2 and Type 3)	SF	4820	\$_____	\$_____
Unit Price in Words:					
900.670	Special Provision (Paver Type 4 and Type 5)	SF	3880	\$_____	\$_____
Unit Price in Words:					
900.670	Special Provision (Paver Type 6)	SF	410	\$_____	\$_____
Unit Price in Words:					
900.670	Special Provision (Pervious Pavers)	SF	3648	\$_____	\$_____
Unit Price in Words:					
900.675	Special Provision (Concrete With Integral Color A and B)	SY	624	\$_____	\$_____
Unit Price in Words:					
900.675	Special Provision (Granite Drainage Runnel)	SY	140	\$_____	\$_____
Unit Price in Words:					

Total Base Bid \$ _____

Total Base Bid Words (Basis of Contract Award) _____

Bidders must bid on all pay items in each set of Alternate Bid Items as well as Add Alternate Items. Add Alternate Item pricing shall include costs for additional work beyond that outlined in the base bid as described under each Add Alternate.

Alternate Bid Item No. 1 – Screen Fence System

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.620	Special Provision (Screen Fence System) Option A	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Screen Fence System) Option B	LS	1	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Screen Fence System) Option C	LS	1	\$ _____	\$ _____
Unit Price in Words:					

Add Alternate No. 1 – City Hall Uplights

Add Alternate No. 1 – City Hall Uplights will be full compensation for furnishing, transporting, handling, assembling, and placing the additional materials specified as described under special provision (Exterior Lighting). Work shall be in conjunction with other Special Provision (Exterior Lighting) items.

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.620	Special Provision (Bracket Mounted Luminaire, Type P2 and P2A)	EA	4	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (In-Grade Uplight, Type P3A)	EA	16	\$ _____	\$ _____
Unit Price in Words:					

Total Add Alternate No 1- City Hall Uplights \$ _____

Total Add Alternate No. 1 Words _____

Add Alternate No. 2 – Terrace Pavers

Add Alternate No. 2 – Terrace Pavers will be full compensation for furnishing, transporting, handling, assembling, and placing Special Provision (Paver Type 2) materials as described under special provisions. This work shall be in lieu of placing Special Provision (Concrete With Integral Color A and B) as described in special provisions at the location specified on plans. The quantity for Item 900.675 Special Provision (Concrete With Integral Color A and B) below is a reduction and should be accounted as such in the Add Alternate total.

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.675	Special Provision (Concrete With Integral Color A and B)	SF	(109)	\$ _____	\$ _____
Unit Price in Words:					
900.670	Special Provision (Paver Type 2)	SF	980	\$ _____	\$ _____
Unit Price in Words:					

Total Add Alternate No. 2- Terrace Pavers \$ _____

Total Add Alternate No. 2 Words _____

Add Alternate Bid Item No. 3 – Lawn Restoration- Sodding

Add Alternate No. 3 – Lawn Restoration – Sodding will be will be full compensation for preparing, maintaining, implementing lawn restoration, including but not limited to preparation of area, coordination with city arborist, removal of mulch, aeration, application of amendments, scarifying subgrade, topsoil, sodding, and watering, and for furnishing all labor, tools, materials, equipment, and incidentals to complete the work under Special Provision (Lawn Restoration - Sodding) as described under special provisions. This work shall be in lieu of placing Special Provision (Lawn Restoration – Topsoil & Hydroseed) as described in special provisions at the location specified on plans. The quantity for Item 900.645 Special Provision (Lawn Restoration – Topsoil & Seed) below is a reduction and should be accounted as such in the Add Alternate total.

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.645	Special Provision (Lawn Restoration – Topsoil & Hydroseed)	LS	(1)	\$ _____	\$ _____
Unit Price in Words:					
900.645	Special Provision (Lawn Restoration – Sodding)	LS	1	\$ _____	\$ _____
Unit Price in Words:					

Total Add Alternate No. 3- Lawn Restoration- Sodding \$ _____

Total Add Alternate No. 3 Words _____

Add Alternate No. 4 – Message Board

Add Alternate No. 4 – Message Board will be will be full compensation for furnishing and installation of message board (s) including furnishing all labor, tools, materials, equipment, and incidentals to complete the work under Special Provision (Message Board Add Alt) as described under special provisions. This work shall be in lieu of placing Special Provision (Message Board Base Bid) as described in special provisions at the location specified on plans. The quantity for Item 900.620 Special Provision (Message Board Base Bid) below is a reduction and should be accounted as such in the Add Alternate total.

Vtrans Item #	ITEM DESCRIPTION	UNITS	BID QTY	UNIT PRICE	TOTAL PRICE
900.620	Special Provision (Message Board Base Bid)	EA	(1)	\$ _____	\$ _____
Unit Price in Words:					
900.620	Special Provision (Message Board Add Alt.)	EA	1	\$ _____	\$ _____
Unit Price in Words:					

Total Add Alternate No. 4 – Message Board\$ _____

Total Add Alternate No. 4 Words _____

The lowest responsive and responsible bidder will be determined by the Total Base Bid. The above unit prices shall include all labor, materials, removal, overhead, profit, insurance, etc. to cover the finished work of the several kinds called for on the drawings and specifications.

THE ABOVE PROPOSAL IS HEREBY RESPECTFULLY SUBMITTED BY:

Contractor

By

Title

Business Address

City State

Date

ATTEST _____

LS = lump sum
EA = each
SY = square yard
SF = square feet
CWT = hundredweight
GAL = gallon
HR = hour

LU = lump unit
CY = cubic yard
LF = linear foot
TON = ton
MGAL = thousand gallons
LB = pound
MFBM = thousand feet, board measure

STATEMENT OF INTENT TO COMPLY

The Contractor and subcontractors on this project have read and understand the provisions of the City of Burlington's:

1. City Livable Wages Ordinance
2. Prequalification of Construction Contractors Ordinance
3. City Outsourcing Ordinance
4. City Union Deterrence Ordinance

as described in the Ordinance and the Administrative Policy statement.

The Contractor shall submit prior to the signing of the contract a completed Employment Plan, including wages to comply with the governing Ordinances. This Employment Plan shall have been approved by the Owner before the signing of the contract.

The Contractor and all subcontractors shall prepare and submit Monthly Compliance Reports no later than the first Thursday of each month following the month work is performed **OR** approved supporting documentation as appropriate to demonstrate adherence to the above referenced Ordinances with each pay request. The Owner shall be notified of any work suspension, the day work was suspended, and the day the work commencement is anticipated. This Compliance Report or documentation shall document the name, address, social security number and sex of each worker, job classification, and total hours worked each day on the project, total hours worked during this time period, rate of pay and gross earnings.

The Contractor and subcontractors shall comply with all Ordinances spelled out in the Contract Documents throughout the contract period.

(Signature of Authorized Official)

(Date)

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NOTICE OF AWARD

TO: _____

Project Description: _____

The Owner has considered the Bid submitted by you for the above described Work in response to its Advertisement for Bids dated _____, 20____, and Information for Bidders. You are hereby notified that your Bid has been accepted for items in the amount of \$ _____.

You are required by the Information for Bidders to execute the Agreement and furnish the required Contractor's Performance Bond, Payment Bond, and certificates of insurance within ten (10) calendar days from the date of the Notice to you.

If you fail to execute said Agreement and to furnish said Bonds within then (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of the Notice of Award to the Owner. Dated this _____ day of _____, 20____.

Owner City of Burlington

By: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged by _____

this _____ day of _____, 20____.

OWNER _____

BY _____

TITLE _____

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AGREEMENT

This Agreement, made this _____ day of _____, 20____, by and between City of Burlington, hereinafter called the "Owner," and _____ doing business as a _____ (an individual, a partnership, or a corporation), with its principal place of business in hereinafter called the "Contractor."

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

- A. The Contractor agrees to commence and complete the construction described as follows: City Hall Park Improvement Project, Burlington, Vermont.
- B. The Contractor agrees to furnish all the necessary labor, materials, equipment, tools, and other services of any nature whatsoever necessary to execute, complete, or deliver in a workmanlike manner the City Hall Park Improvement Project for the City of Burlington as described in the Specifications listed below, in this Agreement, and in the Bid Form attached hereto.
- C. The Contractor will commence the Work required by the Contract Documents on the date of issuance of the Notice to Proceed and will complete the same by May 21st, 2020 unless the period for completion is extended otherwise by the Contract Documents. The Contractor acknowledges that the date of beginning and the time for completion of the Work are essential conditions of the Contract Documents.
- D. The Contractor agrees to perform all the Work described in the Contract Documents and comply with the terms therein for the sum of \$ _____ or as shown in the Bid schedule.
- E. The term "Contract Documents" means and includes the following:
 - 1. Invitation for Bids
 - 2. Instructions for Bidders
 - 3. Bid Proposal Form
 - 4. Notice of Award
 - 5. Agreement
 - 6. Notice to Proceed
 - 7. General Conditions
 - 8. Special Provisions
 - 9. Example Performance and Payment Bond Forms
 - 10. Example Application for Payment
 - 11. Example Project Change Order Form
 - 12. Notice of Final Completion

13. VTRANS 2018 Standard Specifications for Construction
14. VTRANS General Special Provisions for All Projects Dated October 12, 2016
15. VTRANS Work Zone Safety and Mobility Guidance Document
16. City of Burlington Woman in Construction Ordinance
17. City of Burlington Livable Wage Ordinance
18. City of Burlington Ordinance Forms
19. City of Burlington Pre-Qualification of Construction Application
20. City of Burlington Holidays
21. City of Burlington Erosion Prevention and Sediment Control
22. Technical Details and Plans

- F. City Hall Park Improvement Project, Burlington, VT shall include all of the Work described in the Specifications, and this Agreement.
- G. Work under this Agreement shall be commenced immediately upon the receipt of the Notice to Proceed. The Contractor agrees to complete the work specified by May 21st, 2020. If the contract time is extended due to the negligence of the Contractor, the Contractor shall be held responsible for all associated engineering costs, such as resident inspection, testing, etc., incurred as a result of the extension. The Contractor agrees to pay as liquidated damages the amounts as defined in the Contract Documents if applicable.
- H. The Contractor agrees to bind every subcontractor by the terms of the Contract Documents. The Contract Documents shall not be construed as creating a contractual relationship between any subcontractor and the Owner.
- I. The Owner shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, Work performed, rate of progress of Work, interpretation of Drawings and Specifications, and all questions as to the acceptable fulfillment of this Agreement on the part of the Contractor.
- J. This Agreement and all of the covenants hereof shall insure to the benefit of and be binding upon the Owner and the Contractor respectively, their successors, assigns, and legal representatives. Neither the Owner nor the Contractor shall have the right to assign, transfer, or sublet its interest or obligations hereunder without written consent of the other party.
- K. In the event that the Contractor does not submit or has not submitted a progress payment to the Owner for work completed in the previous thirty (30) days, the Contractor shall nonetheless pay all Subcontractor's invoices for their accepted and completed work on the Contract, provided the work has been completed for more than thirty (30) days past the date the work was accepted.
- L. In the event that the Contractor is/has not submitted a progress payment to the Owner for work completed in the previous thirty (30) days; the Contractor will be

required to pay the Subcontractor's invoices for their accepted completed work on the contract that has been complete for more than thirty (30) days.

- M. The Contractor shall file with the Owner the following insurance:
The chosen contractor shall procure insurance to cover the below-listed requirements from an insurance company registered and licensed to do business in the State of Vermont and having an A.M. Best insurance rating of at least A-, financial size category VII or greater (www.ambest.com). Before the construction contract is executed, the Contractor shall file with the Owner a certificate of insurance executed by the insurance company or its licensed agent(s) stating that with respect to the contract awarded, the Contractor carries insurance in accordance with the following requirements:

1. Workers Compensation Insurance: With respect to all operations performed, the Contractor shall carry Workers Compensation Insurance in accordance with the laws of the State of Vermont. The Contractor shall also ensure that all subcontractors carry Workers Compensation Insurance for all Work performed by them.

Minimum limits for Employer's Liability:

- (a) Bodily Injury by Accident: \$500,000 each accident
- (b) Bodily Injury by Disease: \$500,000 policy limit, \$100,000 each employee

2. Contractors' Public Liability and Property Damage Insurance: With respect to all operations performed by the Contractor and subcontractors, the Contractor shall carry Public Liability and Property Damage Insurance providing all major divisions of coverage including, but not limited to:
Premises – Operations
Independent Contractors' Protective
Products and Completed Operations
Personal Injury Liability
Contractual Liability Applying to the Contractor's Obligations for Damage
Claims, Broad Form Property Damage
Collapse and Underground (CU) Coverage
Explosion (X) Coverage, unless this requirement is waived in writing.

- a) If the Public Liability Coverages are provided under a Commercial General Liability Policy, coverage shall be provided on an Occurrence form. Limits of Coverage shall be not less than:

\$1,500,000	Each Occurrence
\$2,000,000	General Aggregate Applying, In Total, To This Project Only
\$2,000,000	Products/Completed Operations Aggregate
\$1,000,000	Personal & Advertising Injury
\$ 250,000	Fire Damage

\$ 5,000 Med. Expense (Any one person)

b) If the Public Liability Coverages are provided under a Comprehensive, General Liability Policy, Limits of Coverage shall be not less than:

Bodily Injury: \$500,000 Each Occurrence, \$1,000,000 Aggregate
Property Damage: \$1,500,000 Each Occurrence, \$1,000,000 Aggregate
or: Combined Single Limit: \$2,000,000 Each Occurrence, \$2,000,000 Aggregate

3. Automobile Liability Insurance: The contractor shall carry Automobile Liability Insurance covering all motor vehicles, including owned, hired, borrowed and non-owned vehicles, used in connection with the project. Limits of Coverage shall be not less than:

Automobile Liability:

Bodily Injury	\$1,000,000	
Each Person	\$1,000,000	Each Occurrence
Property Damage	\$500,000	Each Occurrence

OR

Combined Single Limit	\$1,500,000	Each Occurrence
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4. Professional Liability Insurance (NOT APPLICABLE FOR THIS CONTRACT):

Umbrella Liability:

\$1,000,000	Each Event Limit
\$1,000,000	General Aggregate Limit

5. General Insurance Conditions: The insurance hereinbefore specified under parts 1-3 shall be maintained in force until acceptance of the project by the Owner.

Under part 2, Products and Completed Operations Coverage shall be maintained in force for at least one year after the date of acceptance of the project.

Each policy shall name City of Burlington as an additional insured for the possible liabilities resulting from the Contractor's actions or omissions. Umbrella Excess Liability Policies may be used in conjunction with primary policies to comply with any of the limit requirements specified above. Claims-made coverage forms are not acceptable without the prior written consent of the Owner. The Insurance Company shall agree to investigate and defend all claims against the insured for damages covered, even if groundless.

Each policy furnished shall contain a rider or non-cancellation clause reading in substance as follows:

Anything herein to the contrary notwithstanding, no cancellation, termination or alteration of this policy by the company or the assured shall become effective unless and until notice of cancellation, termination or alteration has been given by registered mail to City of Burlington at least thirty (30) calendar days before the effective cancellation, termination or alteration date unless all Work required to be performed under the terms of the contract is satisfactorily completed as evidenced by the formal acceptance by City of Burlington.

There shall be no directed compensation allowed the Contractor on account of any premium or other charge necessary to take out and keep in effect such insurance or Bond, but the cost thereof shall be considered included in the general cost of the Work.

The Contractor is responsible to verify and confirm in writing to the OWNER that:

- (a) All SUB-CONTRACTORS, agents or workers meet the minimum coverage and limits plus maintain current certificates of coverage for all SUB-CONTRACTORS, agents or workers. SUB-CONTRACTORS must comply with the same insurance requirements as the CONTRACTOR.
- (b) All coverage shall include adequate protection for activities involving hazardous materials.
- (c) All work activities related to the agreement shall meet minimum coverage and limits.

No warranty is made that the coverage and limits listed herein are adequate to cover and protect the interests of the CONTRACTOR for the CONTRACTOR's operations. These are solely minimums that have been developed and must be met to protect the interests of the OWNER.

- O. The Contractor shall indemnify and save the Owner harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, tools, and all supplies incurred in the performance of the Work. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived.

The Contractor and all Contract Documents between the Contractor and Subcontractors, shall comply with and fully conform to the provisions of Title 9, Chapter 102 "Construction Contracts" Section 4001 et seq. of Vermont Statutes Annotated.

P. The Contractor agrees to provide and pay for all materials, labor, tools, equipment, water, light, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete, and deliver the Work contained in the Drawings and Specifications within the specified time. Any penalty imposed by the State of Vermont due to excavation, movement, or erosion of the soils on the site during the life of the Agreement shall be the responsibility and expense of the Contractor.

Q. If the Contractor defaults or neglects to carry out the Work in accordance with this Agreement, the Owner may, after forty-eight (48) hours written notice to the Contractor and without prejudice to any other remedy it may have, make good such deficiencies.

The cost thereof shall be deducted from the payment then or thereafter due the Contractor or, at its option, the Owner may terminate this Agreement and take possession of the site and all materials, equipment, tools, construction equipment, and machinery thereon owned by the Contractor and may finish the Work by whatever method it may deem expedient. The Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of this Agreement exceeds the cost of finishing the Work, such excess shall be paid to the Contractor. However, if such expense exceeds the unpaid balance, the Contractor shall pay the difference to the Owner.

R. The successful Bidder, simultaneously with the execution of the Agreement, shall furnish a faithful Performance Bond in an amount equal to one hundred percent (100%) of the Agreement amount and a Labor and Material Payment Bond equal to one hundred percent (100%) of the Agreement amount; said Bonds shall be secured from a surety company satisfactory to the Owner.

S. PUBLIC RECORDS: The CONTRACTOR understands that any and all records related to and acquired by the City, whether electronic, paper, or otherwise recorded, are subject to the Vermont Public Records Act and that the determination of how those records must be handled is solely within the purview of City. The CONTRACTOR shall identify all records that it considers to be trade secrets as that term is defined by subsection 317(c)(9) of the Vermont Public Records Act and shall also identify all other records it considers to be exempt under the Act. It is not sufficient to merely state generally that the record is proprietary or a trade secret or is otherwise exempt. Particular records, pages or section which are believed to be exempt must be specifically identified as such and must be separated from other records with a convincing explanation and rationale sufficient to justify each exemption from release consistent with Section 317 of Title 1 of the Vermont Statutes Annotated.

T. PUBLIC RELATIONS: Whenever it is necessary to perform work in the field, particularly with respect to reconnaissance, the CONTRACTOR will endeavor to

maintain good relations with the public and any affected property owners. Personnel employed by or representing the CONTRACTOR shall conduct themselves with propriety. The CONTRACTOR agrees to inform property owners and/or tenants, in a timely manner, if there is need for entering upon private property as an agent of the CITY, in accordance with VSA Title 19 § 35 and §503, in order to accomplish the work under the Agreement. The CONTRACTOR agrees that any work will be done with minimum damage to the land and disturbance to the owner. Upon request of the CONTRACTOR, the CITY shall furnish a letter of introduction to property owners soliciting their cooperation and explaining that the CONTRACTOR is acting as an agent of the CITY.

- U. CIVIL RIGHTS and EQUAL EMPLOYMENT OPPORTUNITY: During performance of the Agreement, the CONTRACTOR will not discriminate against any employee or applicant for employment because of race, age, color, religion, sex, sexual orientation, gender identity, marital status, veteran status, disability, HIV positive status or genetic information.

The CONTRACTOR shall comply with the applicable provisions of Title VI of the Civil Rights Act of 1964 as amended, Executive Order 11246 as amended by Executive Order 11375 and as supplemented by the Department of Labor regulations (41 CFR Part 60). The CONTRACTOR shall also comply with the rules, regulations and relevant orders of the Secretary of Labor, Nondiscrimination regulations 49 CFR § 21 through Appendix C, and Regulations under 23 CFR§710.405 (b). Accordingly, all subcontracts shall include reference to the above. The CONTRACTOR shall comply with all the requirements of Title 21, VSA, Chapter 5, Subchapter 6 and 7, relating to fair employment practices to the extent applicable. A similar provision shall be included in any and all subcontracts.

- V. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors and assigns.
- W. Communication to the Residents and Businesses in the work areas in advance of scheduling closures of sidewalks, driveways and other access ways shall be the sole responsibility of the Contractor. Signing and creating temporary access ways shall also be the responsibility of the Contractor.
- X. The obligations of the City to make payments under this agreement during several fiscal years shall constitute a current expense of the City and shall not in any way be construed to be a debt of the City in contravention of any applicable constitutional, statutory limitation or requirement, or the City's charter, nor shall anything contained in the contract constitute a pledge of the credit or tax revenues, funds or monies of the City. The decision whether or not to budget and appropriate funds during each fiscal year of the City is within the discretion of the governing body of the City. The obligations of the City under the contract are subject to annual appropriations by the governing body of the City.
- Y. In the event no funds or insufficient funds are appropriated and budgeted for payments due under this contract, the City may elect to terminate this contract in accordance with this paragraph. The City's election to terminate must be exercised by delivering its prior

written notice of its intent to terminate together with a certified statement by an authorized official indicating that insufficient sums have been appropriated for the ensuing fiscal year of the City. Termination under this provision shall be effective upon the expiration of the applicable fiscal year of the contract and payment of all contract payments during that fiscal year.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in duplicate. One counterpart each has been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____,
(which is the Effective Date of the Agreement).

OWNER:
_____ City of Burlington _____

Signature _____

Title _____

Witness Name _____

Signature _____

Address for giving notices:

Owner
Designated Representative:

Name: _____

Title: _____

Phone(s): _____

CONTRACTOR:

Signature _____

Title _____

Witness Name _____

Signature _____

Address for giving notices:

Contractor
Designated Representative:

Name: _____

Title: _____

Phone(s): _____

City of Burlington ONLY:
Approved as to form and substance by the City Attorney Office:

Date

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NOTICE TO PROCEED

TO: _____ Date _____
(CONTRACTOR)

ADDRESS: _____

Contract: _____

Project: _____

OWNER'S CONTRACT NO. _____

You are notified that the Contract Times under the above contract will commence to run on _____ By that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement, the date of Final Completion is _____ and the date of readiness for final payment is _____.

In addition, before you may start any Work at the Site, you must

By: City of Burlington _____
(OWNER) (AUTHORIZED SIGNATURE)

(TITLE)

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by:

Contractor: _____ Date: _____

Name/Title: _____

Signature: _____

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SPECIAL PROVISIONS

STANDARD SPECIFICATIONS. The provisions of the 2018 STANDARD SPECIFICATIONS FOR CONSTRUCTION, as modified herein, shall apply to this Contract.

CONTRACT COMPLETION DATE. This Contract shall be completed on or before May 21st, 2020.

UTILITIES. The Contractor is advised to use caution when working around aerial or underground utilities to protect the facilities from damage.

Employees or agents of utility companies are to be allowed free and full access within the project limits with the tools, materials, and equipment necessary to install, operate, maintain, place, replace, relocate, and remove their facilities.

There will be no extra compensation paid to the Contractor for any inconvenience caused by working around and with the companies.

Act No. 86 of 1987 (30 VSA Chapter 86) (“Dig Safe”) requires that notice be given prior to making an excavation. It is suggested that the Permit Holder or his/her contractor telephone 1-888-344-7233 at least 48 hours before, and not more than 30 days before, beginning any excavation at any location.

Should the Contractor desire additional adjustments of the utility facilities for his/her convenience, proper arrangements shall be made in conformance with Subsection 105.07 of the Standard Specifications for Construction.

NOTICE TO BIDDERS. All temporary construction signs shall meet the following requirements:

- A. All sign stands and post installation shall be National Cooperative Highway Research Program Report (NCHRP) 350 compliant.
- B. As a minimum, roll up sign material shall have ASTM D 4956-01 Type VI fluorescent orange retroreflective sheeting.
- C. All post-mounted signs and solid substrate portable signs shall have ASTM D 4956-01 Type VII, Type VIII, or Type IX fluorescent orange retroreflective sheeting.
- D. All retroreflective sheeting on traffic cones, barricades, and drums shall be at a minimum ASTM Type III sheeting.
- E. All stationary signs shall be mounted on two 4.5 kg/m (3 lb/ft) flanged channel posts or 51 mm (2 inch) square steel inserted in 57 mm (2 ¼”) galvanized square steel anchors. No sign posts shall extend over the top edge of sign installed on said posts.

- F. Prior to placing temporary work zone signs on the project, the Contractor must furnish for the Engineer's approval a detail for temporary work zone signs on steel posts showing stubs projecting a maximum of 100 mm (4 inches) above ground level and bolts for sign post.
- G. Construction signs shall be installed so as to not interfere with nor obstruct the view of existing traffic control devices, stopping sight distance, and corner sight distance from drives and town highways.
- H. Speed zones, if used, should be a maximum of 16 kph (10 mph) below existing posted speeds. Temporary speed limit certificates must be approved by the City of Burlington City Council.
- I. An accessible sidewalk route must be available for pedestrians at all times when a sidewalk or roadway is closed. Provide a sign, "Sidewalk Closed Ahead", at both ends of the street when the sidewalk is closed. Only one sidewalk on a street can be closed at a time.

NOTICE TO BIDDERS. All retroreflective sheeting on permanent signs (signs to remain after the project is completed) shall be at a minimum ASTM Type III sheeting, unless otherwise shown on the Plans.

HIGHWAY PARKING RESTRICTIONS. Only such trucks and equipment as are necessary for the construction of this project will be permitted to stop or park on the shoulders or right-of-way of the highway. All trucks or equipment so stopped or parked shall be at least 1.2 m (4 feet) from the edge of the thru traffic lanes. Parking or stopping on the traveled portion of the roadway will not be permitted unless authorized by the Engineer to meet field conditions.

Private automobiles or workers will not be permitted to stop or park on the shoulders or right-of-way of the highway.

Each of the Contractor's trucks or equipment used for the construction of this project and permitted to park or stop as provided above shall be equipped with flashing light signals on the front and rear and the signals shall be operating at all times when parked or stopped on the highway unless otherwise authorized by the Engineer.

The flashing light signals shall be visibly distinct from and physically separate from the hazard warning system required by Federal and State motor vehicle laws and regulations. At least one of these flashing light signals shall be visible to traffic approaching from any angle at all times.

Qualified traffic control personnel shall be employed whenever the Contractor's vehicles or equipment (including that which belongs to the individual workers) enter or leave the traffic flow, including access to, from, and across the bike path. All movement, in or out of the traffic flow, shall be with the flow of traffic.

SECTION 101 – DEFINITIONS

101.02 DEFINITIONS, Certain terms in the Contract Documents that are listed below are hereby replaced or modified, and defined as follows:

ACTUAL COMPLETION DATE – Date noted in the Completion and Acceptance memorandum on which designated responsible Municipal personnel have reviewed the project and determined that all Contract work is complete and all Contract requirements have been met, generally considered to be the last day the Contractor performed physical work on any contract item.

AGENCY – Wherever the word Agency appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the City of Burlington, except when referenced to documents or publications.

BOARD – Wherever the term Board or Transportation Board appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Chief Administrative Officer for the City of Burlington.

CHIEF OF CONTRACT ADMINISTRATION – Wherever the term Chief of Contract administration appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean, the Local Project Manager.

CONSTRUCTION ENGINEER – Wherever the term Construction Engineer appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Local Project Manager and/or Full Time Employee in Responsible Charge.

DIRECTOR OF PROJECT DEVELOPMENT – Wherever the terms Director of Project Development, director of Engineering and Construction, Director of Construction and Maintenance, Director, or Chief Engineer appears on the plans, in any specification, or in the Contract, they shall be read as and shall mean; the Director of Parks, Recreation, and Waterfront for the City of Burlington.

DIRECTOR OF PROGRAM DEVELOPMENT – Wherever the term Director of Program Development appears on the plans, in any specification, or in the contract it shall read as, and shall mean; the Director of Parks, Recreation, and Waterfront for the City of Burlington.

ENGINEER – Wherever the term Engineer appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the City Engineer or Designer of Record.

FINAL ACCEPTANCE DATE – Wherever the term Final Acceptance Date appears on the plans, in any specification, or in the Contract, it shall mean the date that the Municipality signs the Final Completion Certificate.

MATERIALS AND RESEARCH ENGINEER – Whenever the term Materials and Research Engineer appears on the plans, in any specification, or in the Contract, it shall be read as, and shall mean; the Resident Engineer (RE).

PROPOSAL FORM – Whenever the term Proposal Form appears on the plans, in any specification, or in the Contract it shall be read as, and shall mean; the BID FORM unless specifically referenced otherwise in these Special Provisions.

REGIONAL CONSTRUCTION ENGINEER – Whenever the term Regional Construction Engineer appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Burlington Public Works Engineer or designated representative.

SECRETARY – Wherever the term Secretary appears on the plans, in any specification, or in the contract it shall be read as, and shall mean; the Burlington Parks, Recreation, and Waterfront Director.

STATE – Wherever the term State appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the State of Vermont.

ADD the following definitions:

ADDENDUM (addenda) – Contract revisions developed after advertisement and before opening bids.

ADVERTISEMENT – A public announcement, inviting bids for work to be performed or materials to be furnished.

AGREEMENT – The written instrument which is evidence of the agreement between the Municipality and the Contractor.

AWARD – The formal acceptance by the Municipality of a proposal.

BID – The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BID BOND – A proposal guarantees as outlined in the Instructions to Bidders for Contracts.

BIDDER – The individual, partnership, firm, corporation, or any combination thereof, or joint venture, submitting a Bid in accordance with the bidding requirements.

CALENDAR DAY – Any day shown on the calendar, beginning and ending at midnight.

CHANGE ORDER – A document recommended by the Engineer, signed by the Contractor and the Municipality, and approved by the Agency of Transportation authorizing changes in the plans or quantities or both, within the scope of the Contract, establishing the basis of payment and time adjustments for the Work affected by the changes.

COMPLETION – Completion of the project occurs when the Contractor has completed all work required by the Contract and has satisfactorily executed and delivered to the Engineer all documents, certificates and proofs of compliance required by the contract.

CONTRACT – The written agreement between the Municipality and a contractor setting out the obligations of the parties to the contract for the performance of the work described therein.

CONTRACT BOND(S) – The approved forms of security, signed and furnished by the contractor and the contractor’s surety or sureties, guaranteeing signatures on the contract, performance of and compliance with the contract, and the payment of all legal debts pertaining to the construction of the contracted project.

CONTRACTOR(S) – An entity that has Annual Prequalification status and/or an entity that has a contract with the Municipality to perform construction work, including but not limited to an individual, partnership, firm, organization, association, corporation, or joint venture; a representative, trustee, or receiver of a contractor appointed by any court of competent jurisdiction.

CONTRACT TIME – The time allowed for completion of the contract including authorized time extensions.

GENERAL SPECIAL PROVISIONS – Approved additions and revisions to the Standard Specifications for Construction.

GOVERNING BODY – Shall refer to the Board.

INCIDENTAL AND INCIDENTAL ITEM – These terms are used to indicate work for which no direct payment will be made. Such work is considered to be incidental to items having contract prices, and the bid prices submitted by the contractor shall be sufficient to absorb the cost of all work designated as incidental or as incidental items.

RESIDENT ENGINEER – An entity employed by the Municipality to perform supervisory duties including the oversight of testing services on the project and oversight and communication with the contractors foreman that the work is performed according to the specifications and other Contract Documents.

INVITATION FOR BIDS – An advertisement for receiving proposals for all work and/or materials on which bids are invited from prospective contractors.

LOCAL PROJECT MANAGER – A person or firm employed or appointed by the Municipality to provide administrative services for the project.

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

OWNER – City of Burlington.

PREQUALIFICATION:

Annual Prequalification – The Vermont Agency of Transportation process by which an entity is generally approved to bid on contracts advertised by the Local Project Sponsor. Depending on the project size annual prequalification may be the only prequalification necessary.

Contract Specific Prequalification – The process by which an entity is approved to bid on a specific contract determined by the Municipality to be of a size or scope to warrant more than an Annual Prequalification.

PREQUALIFICATION ADMINISTRATOR – An Agency of Transportation employee charged with administration of the prequalification process for the Prequalification Committee.

PROPOSAL – The offer of a bidder, on the prescribed form, to perform work and/or provide materials at the price quoted in the offer.

PROPOSAL FORM – The prescribed form on which the Municipality requires the Bid be submitted.

PROPOSAL GUARANTEE – The security furnished with a bid to ensure that the bidder will enter into a contract if the bidder's proposal is accepted by the Municipality.

SPECIAL PROVISIONS – Additions and revisions to the Standard Specifications for Construction, Supplemental Specifications, General Special Provisions, Plans, or other documents that are part of a particular contract.

SPECIFICATIONS – The compilation of provisions and requirements for the performance of prescribed work including the Standard Specifications for Construction, Supplemental Specifications, General Special Provisions, Special Provisions, Plans, and other documents that are part of a particular contract.

STANDARD SPECIFICATIONS – The Vermont Agency of Transportation book entitled 2018 Standard Specifications for Construction and the specifications included therein, as approved for general and repetitive use and application in Agency/Municipal projects.

SUBCONTRACTOR – An individual or legal entity to which the contractor sublets a part of the work included in the contract.

SURETY – An individual or legal entity acceptable to the Town executing the bond or bonds furnished by the bidder or contractor.

TESTING FIRM – An independent firm employed by the Municipality or Resident Engineer to perform all sampling and testing of materials as specified in the Contract Documents.

WORK – The furnishing of all labor, materials, equipment, and incidentals necessary or convenient to the successful completion of a project and the carrying out of all duties and obligations imposed by a contract.

WORKING DAY – A calendar day during which normal construction operations could proceed for a major part of the daylight hours, and specifically excluding Saturdays, Sundays, and those days of the standard work week on which holidays are celebrated.

END OF DEFINITIONS

SECTION 105 CONTROL OF WORK

105.09 CONSTRUCTION STAKES, Part (a) Initial Layout, (b) Layout of Subgrade and (c) Permanent Marking Layout delete these paragraphs in their entirety and replace with the following:

Horizontal and vertical control information for the project is shown on the project plans or shall be based on existing conditions. The information is sufficient to enable the Contractor to stake the project. The Contractor shall perform all staking requirements for the proposed work. The Contractor will be responsible for the accuracy and preservation of the staking.

105.20 CLAIMS FOR ADJUSTMENT, (c) Claims Procedure; Delete the second, third and fourth sentence and replace with the following:

Claims must be evaluated first by the Engineer and then by the Local Project Manager. Should a claim be ruled in favor of the Contractor, it will be allowed, in whole or in part, and paid as provided in the Contract. Should a claim be denied in whole or in part by the Local Project Manager the Contractor may appeal to the City of Burlington Director of Parks, Recreation, and Waterfront. Should a claim be denied in whole or in part by the City of Burlington Director of Parks, Recreation, and Waterfront, the Contractor may appeal to the Governing Body.

(d) Claims Documentation Requirements; In the first sentence, replace Construction Engineer with Local Project Manager.

105.21 PAYROLLS; Add:

(c) The Contractor shall submit certified payroll to the Local Project Manager with each pay request, payrolls of subcontractors shall also be certified and submitted with corresponding invoices for which payment is sought.

SECTION 106 – CONTROL OF MATERIAL

106.03 SAMPLES AND TESTS, Add the following paragraph to the beginning:

A qualified independent testing firm hired directly by the City of Burlington *or* indirectly by the City of Burlington through its Resident Engineer shall be responsible for all acceptance sampling and testing of materials and completed work. The Residential Engineer or Owner can request additional compact testing if they feel that the work is unsatisfactory to the specifications. The Contractor must correct findings if found unsatisfactory and pay for the requested testing.

The Contractor shall be responsible for their Quality Control. The cost of their Quality Control shall be considered incidental to the payment items in the bid. Any sampling, testing, retesting, and submission of reports and certifications by the Contractor as required by the contract documents and plans shall be considered incidental to the payment items in the bid.

Change the last word in the first paragraph from Agency to Municipality.

Delete the first sentence of the second paragraph and replace with the following:

Samples will be taken and testing performed by qualified personnel of the testing firm in accordance with the requirements of the latest edition of the Vermont Agency of Transportation's Quality Assurance Program and Material Sampling Manual for level 3.

Modify the last sentence of the third paragraph to read as follows:

Copies of all test results shall be forwarded directly to the Resident Engineer and the Contractor by the testing firm.

SECTION 107 – CONTROL OF MATERIAL

107.07 PUBLIC CONVENIENCE AND SAFETY

(a) General. The Contractor shall conduct all work so as to ensure the least possible obstruction to traffic. The safety and convenience of the general public and the residents along the highway within the construction area and the protection of persons and property shall be provided for by the Contractor as specified in Subsection 104.04.

SECTION 108 – CONTROL OF MATERIAL

108.12 FAILURE TO COMPLETE WORK ON TIME. Delete the DAILY CHARGE FOR LIQUIDATED DAMAGES FOR EACH WORKING DAY OF DELAY table and replace with the following rates:

Amount of Liquidated Damages.

1-15 DAYS OVER CONTRACT COMPLETION DATE: The Owner will deduct the cost to employ the Project Inspector and City personnel time up to a maximum of **\$500 per day**.

15+ DAYS OVER CONTRACT COMPLETION DATE: The Owner will deduct **\$1000 per day**.

Should the contract not be completed prior to the close of the asphalt plants or determination of the winter shut down for work. Then liquidated Damages charged to the Contractor shall be equal to the time of City Personnel directly accrued as it relates to this Contract. The count of for number of WORKING DAYS OF DELAY shall resume on April 1st of the following construction season.

SECTION 109 - SIGNIFICANT CHANGES IN THE CHARACTER OF WORK

- (a) General. At any time during work the Engineer reserves the right to make, in writing, changes in quantities and alterations in the work as are deemed necessary or desirable to satisfactorily complete the project. Changes in quantities and alterations in the work will not invalidate the Contract or release the Contractor's surety, and the Contractor shall perform the work as altered.
- (b) Significant Alteration/Change to Character of Work; Adjustment to Contract. If the alterations or changes in quantities significantly change the character of the work under the Contract, whether or not changed by different quantities or alterations, a monetary adjustment will be made to the Contract; loss of anticipated profits shall not

be included. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, an adjustment will be made as the Engineer determines to be fair and equitable.

- (c) Alterations/Changes Not Significant. If the alterations or changes in quantities do not significantly change the character of the work to be performed under the Contract, the altered work will be paid for as provided elsewhere in the Contract.
- (d) Significant Change Defined. The term “significant change” shall be construed to apply only to the following circumstances:
 - (1) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or
 - (2) When a major item of work, as defined, is increased in excess of 25 percent above or decreased below 75 percent of the original Contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of the original Contract item quantity; any allowance for a decrease in quantity below 75 percent shall apply to the actual amount of work performed.
- (e) Major Item Defined. A major item of work is any bid item that has a total bid value greater than 20 percent of the total bid amount of the Contract.

END OF SECTION 100

CITY OF BURLINGTON PROVISIONS

CONTRACT MILESTONES

Contract Milestones. Milestone dates and requirements shall be as follows:

- a) **November 22, 2019** Substantial completion with **85%** of work shall be complete. 85% completion shall incorporate all sidewalks and hardscape areas complete and open for public use.
- b) **May 21, 2020** **100%** of work shall be complete
- c) Work continued after **November 22, 2019 and/or May 21, 2020** shall be subject to accrue liquidated damages for portion of original contract amount as set forth by the GENERAL and SPECIAL PROVISIONS.
- d) "Work Complete" shall be based on the dollar value of fully completed and invoiced streets, where all contract requirements are completed including sign-off of each street and work segment by the Engineer.

AUTHORITY TO CLOSE STREETS TO PARKING. Under Section 20-63, City of Burlington Codes and Ordinances, the contractor under this contract may temporarily close streets to parking.

The following general conditions shall be met:

- a) In locations where parking is unmetered standard "No Parking" paper signs - (furnished by Owner, installed and maintained by the Contractor). In locations where parking is metered the Contractor shall be required to obtain meter bags from DPW at no charge for the bag fee, however the Contractor is responsible for paying any fees for lost or damaged bags/locks. In addition, Contractor will be responsible for all meter bag fees for bags used fifteen (15) days past the completion of work on the street where bags were permitted.
- b) Signs should be posted a minimum of one week ahead of the start of work for first work on the street, subsequent signage shall meet the conditions required by the Burlington Police Department listed in part e of this Section.
- c) Posted in conspicuous locations on streets where contract Work is to be performed. One or both sides of the street may be posted if the work warrants such action as determined by the contractor. "No Parking" signs shall be free standing on Contractor furnished stakes. Under no conditions will signs be affixed to utility poles, street signs or mail boxes.
- d) Signs shall be in place no later than 4:00 PM on the day preceding work to start, including holidays and weekends, and Police, Fire Departments, Green Mountain Transit (GMT), and Chittenden County Regional Planning Organization (CCRPO) traffic alerts shall be notified of the area.
- e) The Contractor is required to contact Burlington Police Department – Parking Enforcement by email no later than 6:00 PM on the day preceding work, or of posting with dates and times for the No Parking posting. Failure to notify BPD – Parking

Enforcement by the time listed will eliminate the feasibility of ticketing and towing violating cars under the City's parking restrictions. Notification shall be sent to John King (jking@bpdvt.org) or his designated representative.

- f) Prohibited parking will remain in effect until said signs are removed by the Contractor. This shall be as soon as work is completed.
- g) The signs shall state the date on which parking is prohibited, the time at which prohibited parking commences, and a note that says that prohibited parking shall remain in effect until said signs are removed.
- h) Uniformed Traffic Officers (UTO) will be require at all traffic signals affected by work even if signal and lane operations work in 'flash'.

RESTORATION OF EXISTING SURFACES. All existing street pavements, driveway aprons, and greenbelt areas disturbed by excavation and/or construction activities of the Contractor shall be restored to their original conditions or better. Street pavements shall be restored to existing asphalt thickness or as designated in the Contract Plans, whichever is greater. Driveway aprons shall be regraded and finished to match the grades of the new curb cut opening and promote proper drainage or surface runoff. Greenbelt areas shall be regraded to match the grades of the curbing using excavation and/or earth borrow as required and a minimum 4-inch layer of topsoil. Top soil shall consist of uniform natural sandy loam, free from lumps, clods, sods, stones larger than 3/4 inch in any dimension, sticks, wood, cinders, concrete or any foreign or undesirable materials. It shall be natural and fertile soils possessing the characteristics of good soil which produce heavy growth of crops, grass or other vegetation and shall be obtained from natural, well-drained areas. It shall be free of sub-soil.

- a) Acidity range from pH 5.0 to pH 6.0 inclusive. Disturbed areas shall be seeded and mulched to provide a vigorous growth of grasses to match the surrounding terrain. This growth of grasses is subject to the three (3) year guarantee period. Seed shall be fresh, clean seed of the latest crop, which meets the standards of the Federal Seed Act including percent pure seed, percent germination and percent weed content listed below. All seed shall be furnished in sealed standard containers of vendor with each container showing vendor name, weight percent of each grass seed, percent pure seed, percent germination, percent weed content, date of seed crop, and date of test. Seed shall be L.D. Oliver Seed Co., "Burlington Public Works Special Mix" with the following analysis, or an approved equal:

30%	Shortstop Turf-type Tall Fescue	90%	Germination
20%	Jasper Red Fescue	90%	Germination
20%	Creeping Red Fescue	85+%	Germination
20%	Fiesta II Perennial Rye Grass	90%	Germination

- b) Broadcast seed at 5 lbs./1,000 square feet.
- c) All such work must conform to the "Vermont Standards & Specifications for Erosion Prevention & Sediment Control, 2006", and as amended and all earthen material associated with, or disturbed by, the project shall be retained on the subject property. Bare earthen

material shall immediately be stabilized with erosion control netting and with topsoil, seed and mulch to establish vegetative cover.

WORKING HOURS. Working hours for this contract shall be 7am-7pm Monday through Friday, and 7am-5pm on Saturday. Work on Sundays and Holidays must be submitted to the Owner in writing or during a meeting a minimum of 48 hours prior to the date being requested. Work hour limitations include running/warming up of stationary construction equipment outside of the designated or approved work hours that exceed the Noise Ordinance limits for Quiet Hours as set forth in the City Ordinances.

- a) Martin Luther King, Jr. Day – Special permissions are required to work on the Martin Luther King, Jr. Day which is observed by the City of Burlington on **Monday, January 21, 2019.**
- b) President’s Day – Special permissions are required to work on the President’s Day which is observed by the City of Burlington on **Monday, February 18, 2019.**
- c) Town Meeting Day – Special permissions are required to work on the Town Meeting Day which is observed by the City of Burlington on **Tuesday, March 5th, 2019.**
- d) Memorial Day – Special permissions are required to work on Memorial Day which is observed by the City of Burlington on **Monday, May 27th, 2019.** No work shall be done from Friday May 25th at 12pm to Tuesday May 29th at 7am.
- e) Independence Day –Special permissions are required to work on Independence Day which is observed by the City of Burlington on **Wednesday, July 4th, 2019.** No work shall be done Monday July 3rd after 12pm without permission.
- f) Bennington Battle Day – Special permissions are required to work on the Bennington Battle Day which is observed by the City of Burlington on **Friday, August 16th, 2019.**
- g) Labor Day – Special permissions are required to work on the Labor Day which is observed by the City of Burlington on **Monday, September 2nd, 2019.**
- h) Columbus Day – Special permissions are required to work on Columbus Day which is observed by the City of Burlington on **Monday, October 14th, 2019.**
- i) Veteran’s Day Special permissions are required to work on the Veteran’s Day which is observed by the City of Burlington on **Monday, November 11th, 2019.**
- j) Thanksgiving Day Special permissions are required to work on the Thanksgiving Day which is observed by the City of Burlington on **Thursday, November 28th, 2019.**
- k) Christmas Day - Special permissions are required to work on the Christmas Day which is observed by the City of Burlington on **Wednesday, December 25th, 2019.**

- l) New Year's Day – Special permissions are required to work on the New Year's Day which is observed by the City of Burlington on **Wednesday, January 1st, 2020**.
- m) Martin Luther King, Jr. Day – Special permissions are required to work on the Martin Luther King, Jr. Day which is observed by the City of Burlington on **Monday, January 20th, 2020**.
- n) President's Day – Special permissions are required to work on the President's Day which is observed by the City of Burlington on **Monday, February 17th, 2020**.
- o) Town Meeting Day – Special permissions are required to work on the Town Meeting Day which is observed by the City of Burlington on **Tuesday, March 3rd, 2020**.
- p) Memorial Day - Special permissions are required to work on the Memorial Day which is observed by the City of Burlington on **Monday, May 25th, 2020**. No work shall be done from Friday May 22nd at 12pm to Tuesday May 25th at 7am.

SOIL CELLS INSTALLATION

- xx. DESCRIPTION. This work shall consist of installing soil cell(s) at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. MATERIALS. The soil cells shall be as provided by the City of Burlington and as provided by the manufacturer and shall meet the specifications outlined in the Plans. Any additional materials including geotextile fabrics and/or geogrids required by the manufacturer shall meet the soil cell manufacturers' specifications.
- xx. INSTALLATION. The soil cells shall be installed at the location indicated in the Plans, to the general configuration shown in the Plans, and in accordance with the manufacturer's specifications. All locations shall be field approved by the Engineer prior to installation.
- xx. MANUFACTURERS. The soils cells provided shall be from following manufacturer:

DeepRoot Green Infrastructure, LLC
101 Montgomery Street, Suite 2850
San Francisco, CA 94104
Product: Silva Cell 2
Tel.; (415)781-9700
Website: www.deeproot.com
- xx. SUBMITTALS. Working Drawings, cell layout plan, and pertinent data shall be submitted to the Engineer for approval in accordance with Section 105.
- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Soil Cells Installation) to be measured for payment will be the number of cubic feet of soil cells encapsulated horticultural soils in the complete and accepted work.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Soil Cells Installation) will be paid for at the Contract unit price per cubic foot. Payment will be full compensation for installing the soil cells, geotextile and/or geogrid wraps including any other materials and labor required by the manufacturer and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.605 Special Provision (Soil Cells Installation)	Cubic Foot

BIORETENTION SOIL

- xx. DESCRIPTION. This work shall consist of furnishing and placing bioretention soil at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. GENERAL. The intent of this item is to provide soil design for bioretention purposes. The soil must be permeable enough to allow runoff to filter through the media, while having characteristics suitable to promote and sustain a robust vegetative cover crop. In addition, much of the nutrient pollutant uptake (nitrogen and phosphorus) is accomplished through absorption and microbial activity within the soil profile. Therefore, the soil must balance soil chemistry and physical properties to support biotic communities above and below ground.

The mulch layer plays an important role in the performance of the bioretention system. The mulch layer helps maintain soil moisture and avoids surface sealing, which reduces permeability. Mulch helps prevent erosion, and provides a micro-environment suitable for soil biota at the mulch/soil interface. It also serves as a pretreatment layer, trapping the finer sediments that remain suspended after the primary pretreatment.

- xx. MATERIALS. The planting soil should be a sandy loam, loamy sand, loam, or a loam/sand mix (i.e., should contain a minimum 35 to 60% sand, by volume). The clay content for these soils should be less than 25% by volume (ETAB, 1993). Soils should fall within the SM, or ML classifications of the Unified Soil Classification System (USCS). A permeability of at least 1.0 foot per day (0.5"/hr) is required (a conservative value of 0.5 feet per day is used for design). The soil should be free of stones, stumps, roots, woody material over 1" in diameter, and brush or seeds from noxious weeds. Placement of the planting soil should be in lifts of 12" to 18", loosely compacted (tamped lightly with a dozer or backhoe bucket). The specific characteristics are presented in the table below.

Planting Soil Characteristics (Source MDE, 2000)

Parameter	Value
PH range	5.2 to 7.00
Organic matter	0%
Magnesium	35 lbs. per acre, minimum
Phosphorus (P2O5)	75 lbs. per acre, minimum
Potassium (K2O)	85 lbs. per acre, minimum
Soluble salts	500 ppm
Clay	10 to 25%
Silt	30 to 55%
Sand	35 to 60%

- xx. INSTALLATION. Bioretention soil shall not be placed when the soil or ground

is frozen, excessively wet, or otherwise in a condition detrimental to the work, as determined by the Engineer.

The bioretention soil shall be spread evenly to the depth as shown in the Plans. Where specified in the plans the bioretention soil shall be blended with rototilled native soil.

In order to reduce the potential Phosphorus discharge, Organic matter is not in the overall soil mix, but instead shall be side dressed at each plant at time of planting.

xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Bioretention Soil) to be measured for payment will be the number cubic yards complete in place in the accepted work, measure within the limits specified on the Plans or as directed by the Engineer.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Bioretention Soil) will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for performing the work specified and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (Bioretention Soil)	Cubic Yard

COMPOST MULCH

- xx. DESCRIPTION. This work shall consist of furnishing and placing compost mulch at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. MATERIALS. Mulch shall be composted Pine Bark Fines. Particles shall be no greater than 1/8-inch nominal thickness, 50% shall be one inch or less and no pieces shall exceed two inches in length. The mulch shall be free of wood chips and materials injurious to plant growth or the public.
- xx. INSTALLATION. Compost mulch shall not be placed when the soil or ground is frozen, excessively wet, or otherwise in a condition detrimental to the work, as determined by the Engineer.

The compost mulch shall be spread evenly to the depth as shown in the Plans.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Compost Mulch) to be measured for payment will be the number cubic yards complete in place in the accepted work, measure within the limits specified on the Plans or as directed by the Engineer.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Compost Mulch) will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for performing the work specified and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (Compost Mulch)	Cubic Yard

DRAINAGE AGGREGATE

XX. DESCRIPTION. This work shall consist of furnishing and placing drainage aggregate as shown in the Plans and as directed by the Engineer.

XX. MATERIALS. Gradation shall meet the requirements of Table 704.16A.

XX. CONSTRUCTION REQUIREMENTS. The surface where backfill is to be placed shall be prepared to a smooth condition free of debris, depressions, or obstructions which may damage the geotextile.

Geotextile fabric shall be placed if required by the Plans and in accordance with Section 649.

Drainage aggregate shall be placed in uniform layers of not more than 12 inches in thickness and compacted using plate compactors. The drainage aggregate shall not be placed directly by dumping from haul vehicles or by pushing material by bulldozers, graders, or other equipment. Placing shall be limited to the use of hand shovels, backhoes, front end loaders, or other similar types of equipment as approved by the Engineer.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Subbase of Drainage Aggregate) to be measured for payment will be the number of cubic yards installed in the complete and accepted work, measured within the limits shown on the Plans or as directed by the Engineer.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Subbase of Drainage Aggregate) will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for furnishing, transporting, handling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Excavation and geotextile fabric will be paid for separately under the appropriate Contract items.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (Subbase of Drainage Aggregate)	Cubic Yard

GRANITE CURB EDGING

XX. DESCRIPTION. This work shall consist of furnishing and installing granite curb edging including all excavation and concrete mud in accordance with the Plans and as directed by the Engineer.

XX. MATERIALS. Granite curb edging shall consist of 6" x 18" x segment length and shall meet the specifications outlined in the Plans. All granite curb shall be Woodbury granite.

Type A: Thermal face and top, natural back.

Type B: Thermal face both sides and top.

XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The granite curb edging shall be installed true to line and grade as shown on the Plans and in equal segments as detailed on the elevations or as directed by the Engineer.

The granite curb edging shall be installed at the locations indicated in the Plans, to the configuration shown in the Plans and details, and in accordance with the supplier's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all granite curb edging and maintain them in an undamaged condition until they are installed and accepted for payment.

xx. SUPPLIER:

Vermont Stone Art
14 N Main St, Barre, VT 0564
www.vermontstoneart.com

. METHOD OF MEASUREMENT. The quantity of Special Provision (granite curb edging) to be measured for payment will be on a linear foot basis in the complete and accepted work, at the location(s) indicated in the Plans.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (granite curb edging) will be paid for at the Contract lump sum price. Payment will be full compensation for installing granite curb edging and necessary concrete mud, excavation and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Granite Curb Edging Type A, B, C)	Linear Foot

LANDSCAPE MINERAL MULCH

- XX. DESCRIPTION. This work shall consist of furnishing and installing Landscape mineral mulch in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Landscape mineral mulch shall be as specified by the manufacturer and shall meet the specifications outlined in the Plans.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The stone mineral mulch shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The landscape mineral mulch shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the landscape mineral mulch and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. MANUFACTURER. The landscape mineral mulch shall be manufactured by Pike industries:

Pike Industries
3 Eastgate Park Road
Belmont, NH 03220
(800) 283-7453
www.pikeindustries.com

Product: ¾" - 1-1/2"

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Landscape mineral mulch) to be measured for payment will be the number of cubic feet Landscape mineral mulch system installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Landscape mineral mulch) will be paid for at the Contract cubic yard price. Payment will be full compensation for installing a landscape mineral mulch materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (Landscape Mineral Mulch)	Cubic Yard

PEASTONE

- xx. DESCRIPTION. This work shall consist of furnishing and placing peastone at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. MATERIALS. The peastone shall consist of washed crushed gravel or crushed stone and shall be reasonably free from dirt, deleterious material, and pieces that are structurally weak. The peastone shall meet the gradation requirements of the following table as determined in accordance with AASHTO T 27 and AASHTO T 11:

Sieve Designation	Percentage by Mass (Weight) Passing Square Mesh Sieves
19.0 mm (3/4 inch)	100
16.0 mm (5/8 inch)	90 to 100
4.75 mm (No. 4)	0 to 5

- xx. INSTALLATION. Peastone shall not be placed when the soil or ground is frozen, excessively wet, or otherwise in a condition detrimental to the work, as determined by the Engineer.

The peastone shall be spread evenly to the depth as shown in the Plans.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Peastone) to be measured for payment will be the number cubic yards complete in place in the accepted work, measure within the limits specified on the Plans or as directed by the Engineer.

- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Peastone) will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for performing the work specified and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (Peastone)	Cubic Yard

STONEDUST

- xx. DESCRIPTION. This work shall consist of furnishing and placing Stonedust paving at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. MATERIALS. The Stonedust shall consist of Whitcomb Sur-pack or approved equal.
- xx. INSTALLATION. Stonedust shall not be placed when the soil or ground is frozen, excessively wet, or otherwise in a condition detrimental to the work, as determined by the Engineer.

The Stonedust shall be installed in (2)2" lifts and compacted individually as shown in the Plans.

Stonedust to be contained by Metal Landscape Edging. See Metal Landscape Edging, Special Provision for details.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Stonedust) to be measured for payment will be the number cubic yards complete in place in the accepted work, measure within the limits specified on the Plans or as directed by the Engineer.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Stonedust) will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for performing the work specified and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (Stonedust)	Cubic Yard

WASHED RIVER ROCK

- xx. DESCRIPTION. This work shall consist of furnishing and placing washed river rock at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. MATERIALS. The washed river rock shall consist of washed local /regional rounded river stone and shall be reasonably free from dirt, deleterious material, and pieces that are structurally weak. The washed river rock shall range from 1-1/2" to 3" diameter.
- xx. SAMPLE. Provide sample for approval to Landscape Architect prior to ordering.
- xx. INSTALLATION. Washed river rock shall not be placed when the soil or ground is frozen, excessively wet, or otherwise in a condition detrimental to the work, as determined by the Engineer.

The washed river rock shall be spread evenly to the depth as shown in the Plans.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (washed river rock) to be measured for payment will be the number cubic yards complete in place in the accepted work, measure within the limits specified on the Plans or as directed by the Engineer.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (washed river rock) will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for performing the work specified and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (Washed River Rock)	Cubic Yard

EXTERIOR LIGHTING

- XX. SUMMARY. This Section includes light fixtures, lamps and ballasts requirements for the following:
- (a) Exterior lighting fixtures, with LED modules, components and drivers
 - (1) Light Emitting Diodes (LEDs)
 - (2) Fixture mounting shielding & accessories
 - (3) Pole
- XX. DEFINITIONS.
- (a) Average Rated Lamp Life (LED): The period of time after which 70 percent of its initial output will have declined which is normally targeted at 50,000 hours.
 - (b) Fixture/Luminaire: A complete lighting unit. Fixtures/luminaires include lamps, ballasts, drivers, and parts required to distribute the light, position and protect lamps, and connect lamps to the power supply.
 - (c) CCT: Correlated color temperature.
 - (d) CRI: Color-rendering index.
 - (e) LER: Luminaire efficacy rating.
 - (f) LED: Light Emitting Diode
 - (g) Pole: Luminaire support structure, including tower used for large area illumination.
- XX. SUBMITTALS.
- (a) General:
 - (1) Reviews of submittals are to establish general conformance to design intent and do not waive contract requirements. Contractor is responsible for all dimensions, quantities, mounting accessories, methods of construction, and compliance with the Contract Documents.
 - (2) Provide separate submittal product data/shop drawings for each fixture type clearly indicating the fixture type designation per the Contract Documents and all pertinent options and accessories. Do not group similar fixture types together on a single cut sheet. Submittals which do not indicate option data where multiple selections exist will be returned without being reviewed.
 - (3) The contents of the shop drawings shall be prepared by the Manufacturers. Shop drawings prepared solely by the Contractor will not be acceptable.
 - (b) Product Data: For each luminaire, pole and support component [X series], arranged in order of lighting unit designation. Submit manufacturer's data on features, accessories, finishes, and the following, in reproducible form:
 - (1) Physical description of luminaire, including materials, dimensions, effective projected area, and verification of

- indicated parameters. Submit dimensioned drawings of lighting fixtures.
- (2) Details of luminaire attachments and accessories.
 - (3) Details of installation and construction.
 - (4) Luminaire materials.
 - (5) Photometric Data: Supply complete photometric data for each fixture. Photometric reports shall be rendered by an independent testing laboratory developed according to methods of the Illuminating Engineering Society (IESNA) of North America as follows:
 - i. Luminaire description and dimensions, including ballast factor for fluorescent fixtures.
 - ii. Candela distribution data presented graphically and numerically in no more than 5 degree increments (5, 10, 15, etc.). Data developed for up and down quadrants normal, parallel and at 22.5, 45, 167.5 degrees to fixture axis if light output is asymmetric. Photoelectric relays.
 - iii. Zonal lumens stated numerically in 10 degree increments (5, 15, etc.) and fixture efficiency.
 - iv. Luminance table with data presented numerically, showing maximum luminance of the fixture at the shielding angles. Readings should be taken both crosswise and lengthwise in the case of fluorescent fixtures or fixtures with asymmetric distribution.
 - v. Coefficients of utilization table.
 - vi. Driver UL listing, volts, input and output wattage, drive current.
 - vii. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
 - (6) Lamp Module: All manufacturer data to include LED module information, including but not limited to:
 - i. Manufacturer of the LED module with part number or other device identifier.
 - ii. LED module drive current, voltage, power.
 - iii. LED module lumen depreciation curves, life, CCT, CRI at an ambient temperature of 25 degrees Celsius
 - iv. Board temperature of the LED module installed in the luminaire with proper heat sink, when the luminaire is operating at an ambient temperature of 25 degrees Celsius.
 - v. The color bin, CCT, and color shift variation of the LED module at the operating board temperature.
 - vi. Color rendering index at the operating board temperature.
 - (7) Materials, dimensions, and finishes of poles; details of handholes and wire entries, mast or bracket arms and connection to poles, wind load and deflection, corrosion resistance, and finishes.
 - (8) Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
 - (9) Anchor bolts for poles (for review by Civil Engineer).
 - (10) Manufactured pole foundations (for review by Civil Engineer).
 - (11) Anchor-bolt templates keyed to specific poles and certified by manufacturer.
- (c) Shop Drawings: Include scalable plans, elevations, sections, details, and attachments to other work

- (1) Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - (2) Design calculations (as requested), certified by a qualified professional engineer, indicating strength of mechanical connections.
 - (3) Wiring Diagrams: For power, signal, and control wiring.
 - (4) Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-6-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations by a professional engineer.
 - (5) Anchor-bolt templates keyed to specific poles and certified by manufacturer.
 - (6) Physical weights and dimensions.
 - (7) Methods of field assembly including mounting
 - (8) Components, features and accessories
 - (9) Warranty: Provide complete manufacturer's warranty information on all products provided. Sample of special warranty. Sample of special warranty.
- (d) Qualification Data: For qualified agencies (laboratories) providing photometric data for lighting fixtures.
- (e) Submittals or shop drawings lacking sufficient detail to indicate clear and complete compliance with contract documents shall be rejected. Include plans, elevations, sections, details, and attachments to other work.
- (f) Field quality-control reports.
- (g) Operation and Maintenance Manuals: For luminaires and poles, to include in emergency, operation, and maintenance manuals. Provide a collection of manufacturer recommended maintenance practices for each lighting fixture type including, but not limited to:
- (1) Tools required.
 - (2) Acceptable cleaners and recommended cleaning practices.
 - (3) Replacement parts list.
 - (4) Manufacturer service department contact information/Qualified Service Agencies.
 - (5) Submittal Data.
 - (6) Operation Data.
 - (7) Intended Operation Narrative.
- (h) "Approved Equal" specification status does not and shall not exempt the identified manufacturers from full and complete compliance with all criteria identified either in the specifications or as attributed to "prime specification" equipment with regards to photometric performance, brightness control, size, finishes, credentials or experience, etc. Consideration, acceptance or rejection of any proposed submittal provided for this Section shall rest solely upon the evaluation of the Lighting Designer/Engineer.
- (i) Samples: Submit for review one representative sample for each or any lighting fixture required under this Contract:

- (1) The samples must be actual working unit of fixtures to be supplied and shall be submitted complete with cord and plug, wired for 120 Volt operation.
- (2) After sample acceptance, the fixture shall be sent to the project for use as a standard. In the event the submission is rejected, the fixture will be returned to the manufacturer who shall immediately make a new submission which meets the contract requirements.
- (3) All substitutions shall be provided as samples for review and approval prior to fabrication

XX. QUALITY ASSURANCE.

- (a) Equipment Qualifications For Products Other Than Those Specified:
 - (1) At the time of submission provide written notice to the Owner of the intent to propose an "or equal" for products other than those specified. Make the "or equal" submission in a timely manner to allow the Owner sufficient time to review the proposed product, perform inspections and witness test demonstrations
 - (2) If products other than those specified are proposed for use furnish the name, address, and telephone numbers of at least 5 comparable installations that can prove the proposed products have performed satisfactorily for 3 years. Certify in writing that the owners of the 5 comparable installations will allow inspection of their installation by the Owner's Representative and the Lighting Manufacturer's Product Manager/Engineer.
 - i. Make arrangements with the owners of 2 installations (selected by the Owner) for inspection of the installations by the Owner's Representative. Also obtain the services of the Lighting Manufacturer's Product Manager/Engineer for the proposed products to be present. Notify the Owner a minimum of 3 weeks prior to the availability of the installations for the inspection, and provide at least one alternative date for each inspection.
 - ii. Only references from the actual owner or owner's representative (Security Supervisor, Maintenance Supervisor, etc.) will be accepted. References from dealers, system installers or others, who are not the actual owners of the proposed products, are not acceptable. Verify the accuracy of all references submitted prior to submission and certify in writing that the accuracy of the information has been confirmed
 - (3) The product manufacturer shall have test facilities available that can demonstrate that the proposed products meet the contract requirements.
 - i. Make arrangements with the test facility for the Owner's Representative to witness test demonstrations. Also obtain the services of the Lighting Manufacturer's Product Manager/Engineer for the proposed product to be present at the test facility. Notify the Owner a minimum of 3 weeks prior to the availability of the test facility, and provide at least one alternative date for the testing
 - (4) Provide written certification from the manufacturer that the proposed products are compatible for use with all other equipment proposed for use for this system and meet all contract requirements.

- (b) All lighting fixtures shall be manufactured, furnished, and installed in compliance with all government agencies having jurisdiction. All fixtures shall bear the appropriate UL (or ETL) and IBEW identifications.
- (c) Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.
- (d) Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- (e) Mockups: Provide exterior lighting fixtures for in situ mockups complete with power and control connections; the specific design requirements of several building conditions mandates the necessity of full scale on site mockups prior to final authorization (release) to fabricate.
 - (1) Obtain Owner's approval of fixtures for mockups before starting installations.
 - (2) Installation of all luminaire types subject to mockup requirements may not proceed until mockup is accepted by Owner.
 - (3) Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - (4) Approved fixtures in mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - (5) Include as part of the bid provision for complete mockups for the following fixture types:

TYPE	LOCATION	MAGNITUDE (extent)
P1	Park Interior	1 fixture as a completed assembly (including pole and luminaire)
P2	City Hall	1 fixture
P2A	City Hall	1 fixture
P3	BCA	1 fixture
P3A	City Hall	1 fixture
P4	Park Sculpture	1 fixture
P4A	Park Sculpture	1 fixture
P4B	Park Sculpture	1 fixture
P5	Flag	1 fixture

- (f) Underwriters Laboratories, Inc. (UL): Comply with applicable UL standards pertaining to exterior lighting equipment.
- (g) Manufacturers: manufacturers listed as "prime spec" or approved equal in the lighting fixture schedule (See drawing) shall be assumed capable of supplying the listed fixtures unless clearly written exceptions are set forth in their quotations. Any such exceptions

shall immediately be brought to the attention of the Architect/Engineer and the Lighting Designer. Manufacturers not listed (as prime or approved equal) must comply with the following:

- (1) Experience: Manufacturers shall have not less than five years' experience in design and manufacturing of lighting fixtures of the type and quality shown. Submission must include a list of completed projects and dated catalogue pages or drawings indicating length of experience.
- (2) Custom luminaires: Manufacturers shall submit a prototype (pre-fabrication sample) of each fixture for review by the Lighting Designer. Prototypes shall be sufficiently detailed and operational to allow evaluation of compliance with the salient features of the specification. Preliminary design or shop drawings shall not be accepted in place of prototype samples

xx. INDUSTRY STANDARDS.

- (a) Applicability of Standards: Except where more explicit or stringent requirements are written into the Contract Documents, applicable construction industry standards have the same force and effect as if found in or copied directly into the Contract Documents. Such industry standards are made a part of the Contract Documents by reference.
 - (1) Referenced standards (standards referenced directly in the contract documents) take precedence over standards that are not referenced but generally recognized in the industry for applicability to the work
 - (2) Unreferenced standards are not directly applicable to the work, except as a general requirement of whether the work complies with recognized construction industry standards.
- (b) Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with the latest standard in effect as of date of Contract Documents.
- (c) Conflicting Requirements: Where compliance with two or more standards or criteria is specified, and where these standards establish different or conflicting requirements for minimum quantities or performance quality levels, the most stringent requirement will be enforced, and henceforth provided by the Contractor unless the Contract Documents or the OMH specifically indicates otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent, to the Architect for a decision before proceeding.

XX. DELIVERY, STORAGE AND HANDLING.

- (a) Lighting fixtures shall be wrapped for protection during delivery, storage, and handling. Wet or damp wrapping shall be removed, and disposed of, to prevent staining finish.
- (b) Deliver materials in manufacturer's original, unopened, protective packaging.
- (c) Store materials in original packaging in a manner to prevent soiling and physical damage, prior to installation.
- (d) Handle in a manner to prevent damage to finished surfaces.

- (e) Where possible, maintain protective covering until installation is complete and remove such coverings as part of final cleanup.
- (f) Package aluminum poles for shipping according to ASTM B 660.
- (g) Store poles on decay-resistant-treated skids at least 12-inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- (h) Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.
- (i) Light poles and fixtures shall be wrapped for protection during delivery, storage, and handling. Wet or damp wrapping shall be removed, and disposed of, to prevent staining finish.

XX. WARRANTY.

- (a) Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
 - (1) Warranty Period for LED Entire Luminaires (fixture components can be field replaceable): Entire fixture shall carry a minimum 1 year warranty.
 - (2) Warranty Period for LED Entire Luminaires (fixture components cannot be field replaceable): Entire fixture shall carry a minimum 5 years warranty.
 - (3) Warranty Period for LED Modules and Drivers: five (5) years from the date of Substantial Completion.
 - (4) Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

XX. TECHNICAL & ADMINISTRATIVE REQUIREMENTS.

- (a) All information identified in the Contract Documents shall be considered to form a complete and integrated Specification for Lighting Fixtures.
- (b) Specifications and drawings are intended to convey the salient features, function and character of the fixtures only, and do not undertake to illustrate or set forth every item or detail necessary for the work. Minor details not usually indicated on the drawings nor specified, but that are necessary or normally required for the proper execution, completion, installation and operation of the fixtures, shall be included, the same as if they were herein specified or indicated on the drawings.
- (c) Omissions: The Owner shall not be held responsible for the omission or absence of any detail, construction feature, etc. which may be

normally required in the production of the lighting fixtures. The full and complete responsibility for accurately purchasing, fabricating and installing the lighting fixtures described herein to the fulfillment of those specifications including compliance with all regulatory bodies (i.e.: UL) shall rest solely with the Contractor.

- (d) The Contractor shall be solely responsible for verifying all fixture quantities, lengths and clearances required and shall inform the Architect/Engineer of job conditions at variance with fixtures as specified or detailed which affect installation or location at the time bid submission is made.
- (e) The Contractor shall be solely responsible for coordinating and expediting the timely procurement and delivery for all lighting equipment, lamps, ballasts and related components for the project.
- (f) The Contractor shall insure that the lighting fixture manufacturer shall keep on file and make available for review by the Architect/Engineer and the Owner complete Quality Control and Quality Assurance records for all phases of production for all lighting fixtures to be supplied under this project.
- (g) The Contractor shall be solely responsible for coordinating and expediting the timely procurement and delivery for all lighting equipment, lamps, ballasts and related components for the project.

XX. PRODUCTS GENERAL.

- (a) Provide fixtures designed and manufactured specifically for long term outdoor service. Make components, including nuts, bolts, rivets, springs, and similar parts, of corrosion resistant materials or of materials which will assure such resistance.
- (b) Provide wet location labeled outdoor fixtures for areas directly exposed to the elements. All upward aiming products shall have a minimum IP rating of 66 (IP66) or otherwise designated in the lighting fixture schedules.
- (c) Paint metal parts of fixtures with suitable weather and moisture-resisting paint equal to epoxy-based coatings.
- (d) Provide anodized aluminum for aluminum parts of exterior fixtures that are not specified as requiring a painted finish.
- (e) Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by a NRTL acceptable to authorities having jurisdiction.
- (f) Lighting fixtures shall be of rigid construction, dimensionally stable, and shall be assembled with secure fastenings. Ferrous parts shall be protected from corrosion by plating or shall be finished with high reflectance enamel with non-yellowing binder and high pigment to binder ratio, with semi-gloss finish. Ferrous parts shall be prepared for finish by industry standard finishing process (see Finishes). Non-ferrous metals (i.e. aluminum) unless otherwise noted be treated with a semi-gloss polyester powder coat enamel finish. Provide each fixture with lamps as indicated in the lighting fixture schedule.

- (g) All materials, accessories, and other related fixture parts shall be new and free from defects which in any manner may impair their character, appearance, strength, durability and function, and be effectively protected from any damage or injury from the time of fabrication to the time of delivery.
- (h) For steel and aluminum fixtures all screws, bolts, nuts and other fastening and latching hardware shall be cadmium or equivalent plated. For stainless steel fixtures, all hardware shall be stainless steel. Whenever possible all fasteners shall be captive type. Where indicated provide tamper resistant fasteners.
- (i) Include base template, 4 anchor bolts, cadmium-plated hardware and pole grounding lug, handhole, cast steel anchor base and bolt covers.
- (j) Pole foundations: As indicated [Refer to Civil Engineer's Drawings.]
- (k) Underground wiring:
 - (1) Type XHHW or THW installed in rigid PVC conduit.
 - (2) Provide all wiring runs with separate green equipment grounding conductor, and ground all pole bases.
 - (3) Fixture wiring shall be suitable for the temperature rating of the fixture; wiring through fluorescent channels shall be done with Type SFF2 wire unless otherwise noted on Engineer's drawings.
- (l) Metal Parts: Free of burrs and sharp corners and edges. All sheet metal work shall be free from tool marks and dents.
- (m) Casting: All aluminum, iron or composite casting shall be exact replicas of the approved patterns and shall be free of sand pits, blemishes, scales and rust, and shall be smoothly furnished. Tolerance shall be provided for any shrinkage of the metal castings in order that the finished casting will accurately fit in their designated locations. Unless otherwise noted, for cast aluminum components use copper-free 319 or 443 aluminum alloy only. For cast iron components use ASTM Spec A48-83 Class 30 gray iron.
- (n) Furnish and install yokes, brackets and supplementary supporting members needed to mount lighting fixtures to carrier channels or other structure.
- (o) Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
- (p) Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and/or methods recommended by the manufacturers of the metals being welded. Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth. All welds on or behind surfaces which will be exposed to view shall be done so that finished surfaces will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration. All welded surfaces shall be free of weld splatter and welding oxides.

- (q) Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- (r) Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
- (s) Exposed Fasteners: All fasteners at every product and assembly exposed to view or accessible with the inpatient environment shall be security torx tamper resistant and stainless steel.
- (t) Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- (u) Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- (v) Provide each fixture with lamps as indicated in the lighting fixture schedule.
- (w) Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - (1) White Surfaces: 90 Percent
 - (2) Specular Surfaces: 87 Percent
 - (3) Diffusing Specular Surfaces: 75 Percent
- (x) Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- (y) Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
- (z) Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

XX. SOLID STATE LIGHTING (LED) FIXTURES.

- (a) General:
 - (1) All fixtures shall conform with standards prepared by CIE, IES, UL, and other standards organizations as they apply to solid state lighting technologies. Including but not limited to:
 - i. TC2-46 CIE/ISO standards on LED intensity measurements
 - ii. TC2-50 Measurements of the optical properties of LED clusters and arrays
 - iii. TC2-58 Measurements of LED radiance and luminance
 - iv. TC2-63 Optical measurement of High-Power LEDs

- v. TC2-64 High speed testing methods for LEDs
- (2) LED Luminaires: Lighting fixtures shall conform to IES LM-79-08 and LM-80-08 standards. All fixtures shall be RoHS compliant
- (3) Luminaire performance claims shall be measured in accordance with the requirements of IEC/PAS 62612: Edition 1: 2009-06. The testing quantity for LED package lamps shall be a minimum of (20) twenty. The drive current and bin reference should be clearly documented. All manufacturer data to include:
 - i. Luminaire efficacy should be calculated from the initial lumen output of the luminaire that has reached thermal stability operating in an ambient temperature of 25 degrees Celsius and based on the total power of the LEDs and driver circuit.
 - ii. Definition of life shall comply with Clause 10 IEC/PAS 62612. Life shall be based on lumen depreciation and failure and shall consist of an endurance test. It shall be clearly noted which part of life and lumen deprecation has been measured and what part has been calculated or extrapolated.
 - iii. Lumen deprecation shall be clearly document the length of time a complete LED luminaire provided more than a percentage of the rated luminous flux under standard test conditions. For illuminating luminaires the percentage shall be >70%, indicated as L70 (>70%). For direct view luminaires the percentage should be >50%, indicated as L50.
 - iv. Thermal losses: The temperature of the p-n junction of the raw LED (die) (T_j) is to be measured at an ambient temperature of 25 degrees Celsius. In a luminaire the die will be operating at a higher temperature. All performance parameters are to measure the Junction Temperature and Board Temperature.
 - v. Thermal protection: All fixtures shall be provided with appropriate heat sink to maintain lamp life. Stated lamp life and output shall be measured and identified and documented with heat sink. Any variations from stated life or output without heat sink shall be clearly identified including Junction Temperature.
- (4) Drivers
 - i. Constant current Drivers [non-dimming]: All constant current drivers shall be UL 1310 class 2 including short-circuit protection, high-power factor, with either 12v or 24v input, unless otherwise noted. The driver shall operation on the voltage they are connected to, 120 or 277v input power. Variability in output shall not exceed 5% in load or 1% line levels. Driver shall be designed for use in -40 degree Celsius environments with a high temperature tolerance of +60 degrees ambient, 80 degrees Celsius case rating. Total harmonic distortions shall not exceed 20% with a current crest factor of 1.5 maximum. All drivers shall be field replaceable.
 - ii. Dimming Drivers: All PWM dimming drivers shall be UL 1310 class 2 including short-circuit protection, high-power factor, with either 12v or 24v input, unless otherwise noted. The light output of the LED shall be controlled either by DC voltage applied to the control input (0-10V)

with a maximum of 500 microamps per driver. The control equipment must not impose a voltage greater than 11.0V peak maximum on the driver terminals and the short-term transient voltage must not exceed 14 volts. Control equipment intended to control more than one driver must be capable of sinking the current supplied to the control bus by the maximum number of drivers specified for the control device. The control terminals for the driver shall be isolated from the power lines and suitable for use as Class II terminals. Maximum voltage drop not to exceed 0.2 volts. Variability in output shall not exceed 5% in load or 1% line levels. Driver shall be designed for use in -40 degree Celsius environments with a high temperature tolerance of +60 degrees ambient, 80 degrees Celsius case rating. Total harmonic distortions shall not exceed 20% with a current crest factor of 1.5 maximum. All drivers shall be field replaceable.

(5) Lamp Module:

- i. LED lamp modules shall be minimum CRI of 70 with tolerances as identified in Clause 7 IEC/PAS 62612.
- ii. White LED modules shall be available in 3500K and 4000K as identified in the lighting fixture schedule.

XX. LENSES.

- (a) All lenses, diffusers, and shielding media shall be properly and securely mounted within fixture assemblies. All fixtures with removable reflectors, louvers or baffles shall be supplied with safety chains.
- (b) All fixtures with removable shielding devices shall be supplied with safety chains.
- (c) Unless otherwise indicated, all plastic shielding, lenses and diffusers shall be clear 100% UV stabilized virgin acrylic or polycarbonate.
- (d) Unless otherwise indicated, all glass shielding, diffusers or lenses shall be clear tempered borosilicate glass.
- (e) Optical lenses shall be free from spherical or chromatic aberrations and other imperfections, which may hinder the functional performance of the lenses.
- (f) All lenses, louvers or other light diffusing elements shall be removable but positively held so that hinging or other normal motion will not cause them to drop out.

XX. LENSES.

- (a) All lenses, diffusers, and shielding media shall be properly and securely mounted within fixture assemblies. All fixtures with removable reflectors, louvers or baffles shall be supplied with safety chains.
- (b) All fixtures with removable shielding devices shall be supplied with safety chains.

- (c) Unless otherwise indicated, all plastic shielding, lenses and diffusers shall be clear 100% UV stabilized virgin acrylic or polycarbonate.
- (d) Unless otherwise indicated, all glass shielding, diffusers or lenses shall be clear tempered borosilicate glass.
- (e) Optical lenses shall be free from spherical or chromatic aberrations and other imperfections, which may hinder the functional performance of the lenses.
- (f) All lenses, louvers or other light diffusing elements shall be removable but positively held so that hinging or other normal motion will not cause them to drop out.

XX. FINISHES.

- (a) Painted surfaces shall be synthetic enamel with acrylic, alkyd, epoxy, polyester or polyurethane base, light stabilized, baked on at 350 degrees Fahrenheit minimum, catalytically or photo chemically polymerized after application.
- (b) White finishes minimum 90% reflectance (semi-gloss).
- (c) Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
- (d) Undercoat: Except for stainless steel all ferrous metal surfaces shall be given a five stage phosphate treatment or other acceptable base bonding treatment before final painting and after fabrication.
- (e) Unpainted non-reflecting surfaces shall be satin finished and coated with a baked-on clear lacquer to preserve the finish. Where aluminum surfaces are treated with an anodic process, the clear lacquer coating may be omitted.
- (f) Unpainted aluminum surfaces: Finish interior aluminum trims with an anodized coating of not less than 7 mg. per square inch, of a color and surface finish as selected by the Landscape Architect/Engineer. Finish exterior aluminum and aluminum trims with an anodized coating of not less than 35 mg. per square inch of a color and surface finish as selected by the Landscape Architect/Engineer.
- (g) Metal finishes: Provide finishes of the color and type indicated and having the following properties:
 - (1) Protection of metal from corrosion: 5-year warranty against perforation or erosion of the finish from weathering.
 - (2) Color retention: 5-year warranty against fading, staining, or chalking from weathering including solar radiation.
 - (3) Uniformity: Provide finish of uniform thickness and color, free from streaks, stains or orange peel texture.
- (h) Luminaire finishes: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finishes process and color of pole or support materials.

XX. LIGHTING STANDARDS.

- (a) Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.
- (b) Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
 - (1) Materials: Shall not cause galvanic action at contact points.
 - (2) Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
 - (3) Anchor-Bolt Template: Plywood or steel.
- (c) Brackets: Provide brackets, cantilevered and without underbrace of the sizes, styles and finishes indicated with straight tubular and section to accommodate the luminaire.
- (d) Pole-Top Tenon: Provide corrosion resistant steel tenon securely fastened to the top of the pole shaft fabricated to accept and rigidly support the luminaire.
- (e) Furnish and install yokes, brackets and supplementary supporting members needed to mount lighting fixtures to carrier channels or other structure. All pole-mounted luminaires shall mount via pole-top tenon to reduce vibration.
- (f) Structural Characteristics: Comply with AASHTO.
 - (1) Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of 110 mph, with a gust factor of 1.3.
 - (2) Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.
- (g) Pole bases shall be manufactured of 356.2 copper free cast aluminum alloy. Base shall maintain a minimal wall thickness of .250 inches. Pole shafts shall be manufactured of 6063 extruded aluminum alloy with a minimum yield strength of 55,000 PSI and the ability to withstand wind loading of 100 miles per hour (with a 1.3 gust factor). All external surfaces shall receive polyester powder coat grey finish. All external fasteners shall be stainless steel and tamper-resistant. Formed concrete foundation shall be class B, 3500PSI concrete, and nominally 1'-6" diameter x 8'-0" deep unless otherwise noted.

XX. POLES: STEEL.

- (a) Steel Poles: 12 Foot Height, 5-inch SCH 40 steel pipe (5 9/16" O.D.) shaft on 8-inch (8 5/8" O.D.) SCH 40 steel pipe pedestal.
- (b) Designed for 177 km/h (110 MPH) constant velocity wind load per AASHTO, and 31bf/sq. ft. ice load.
- (c) Ornamentation: two pieces wrap around castings, cast ductile iron per A.S.T.M. A536-84, grade 65-45-12

- (d) Pole foundations: As indicated
- (e) Finish: galvanized steel then powder coat-river texture black
- (f) Number and size of anchor bolts as recommended by lighting standard manufacturer. Galvanized nut, lockwasher and flatwasher with each bolt.
- (g) Template for setting anchor bolts.
- (h) Access door: secured with 1/4"-20 HEX head bolt (18-8)
- (i) Ground provisions: 1/4"-20 UL listed ground stud located opposite handhole (by pole manufacture).
- (j) Base cover attached to base with vandal resistant fasteners.

XX. EXECUTION PREPARATION.

- (a) Before installing any Work, lay out the proposed course for the conduits, location of lighting standards, etc. and have same approved.

XX. INSTALLATION: LUMINAIRES.

- (a) The Contractor shall furnish and install lighting fixtures as noted on the drawings.
- (b) Setting and Securing: The Contractor shall set lighting fixtures plumb, square, and level with structure and walls, in alignment with adjacent lighting fixtures, and secure in accordance with manufacturers' directions and approved shop drawings. Conform to the requirements of NFPA 70Adjust luminaires that require field adjustment or aiming.
- (c) Support: Fasten luminaires securely to indicated structural supports; and check to ensure that the required degree of freedom is provided to allow alignment or aiming of the fixtures for indicated light distribution.
 - (1) Mounting, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
- (d) Mounting: Mounting heights specified or indicated are to bottom of fixture for suspended, ceiling mounted and wall mounted fixtures. Obtain approval of the exact mounting for lighting fixtures on the job before installation is commenced and, where applicable, after coordinating with the type, style, and pattern of the existing wall and ceiling condition.
- (e) Coordination: The Contractor shall communicate with other trades as appropriate to properly interface, schedule and coordinate installation of lighting fixtures with other work.
- (f) Grounding: The Contractor shall ground non-current-carrying parts of electrical equipment. Where the copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

- (g) Grounding: Provide equipment grounding connections using branch circuit equipment and connected sufficiently tight to assure a permanent and effective ground.
- (h) Installation of fixture locations shall be in strict accordance with the intent of the contract drawings and approved shop drawings, specifications and drawings.
- (i) Installation of fixture locations shall be in strict accordance with the intent of the contract drawings and approved shop drawings, specifications and drawings.
- (j) Adjust photosensors to prevent false operation of relay by artificial light sources.
- (k) Clean lighting fixtures of dirt and debris upon completion of installation.
- (l) Protect installed fixtures from damage during remainder of construction period.
- (m) Fixture locations: Do not scale electrical drawings for exact location of the lighting fixtures. In general, the architectural site/landscape plans indicate the proper locations of lighting fixtures, unless otherwise noted on architectural plans.
- (n) Unless otherwise shown on the Contract Drawings, lighting fixtures and/or fixture outlet boxes shall be provided with hangers to adequately support the complete weight of the lighting fixture.
- (o) The Contractor shall provide all hangers, rods, mounting brackets, supports, frames, earthquake clips and other equipment normally required for the proper, safe and distortion-free installation in the various surfaces in which they appear. Determine surface types from the Contract Drawings.
- (p) Instructions: Each lighting fixture shall be packaged with complete illustration and instructions showing how to install. Install lighting fixtures in strict conformance with manufacturer's recommendations and instructions.
- (q) The Contractor shall rigidly align continuous rows of lighting fixtures for true aligned appearance.
- (r) The Contractor shall support all lighting fixtures independently of ductwork or piping.
- (s) Splices in internal wiring shall be made with approved insulated "wire nut" type mechanical connectors, suitable for the temperature and voltage conditions to which they are subjected.
- (t) All wire utilized for connections to or between individual lamp sockets and lamp auxiliaries (i.e., wires which do not constitute "through circuit" wiring) shall be suitable for temperature, current, and voltage conditions to which it is subjected.
- (u) The Contractor shall install reflector cones, baffles, aperture plates, light controlling elements for air handling fixtures and

decorative elements after completion of ceiling tiles, painting and general cleanup.

- (v) All pendant mounted lighting fixtures within the same area shall be installed plumb, and at a uniform height from the finished floor. Adjustment of desired height (if required) shall be made during the installation phase. Unless otherwise shown on the Contract Drawings, stems and canopies shall be matched to the associated lighting fixtures.
- (w) Use fastening methods and materials approved by manufacturer.
- (x) Adjust luminaires that require field adjustment or aiming. Where included, adjust photoelectric device to prevent false operation of relay by artificial light sources.
- (y) Where fixtures are wall-mounted and protrude from the wall surface, provide additional structural support within the wall framing to accommodate the extra moment force created by the fixture.
- (z) Where fixtures are wall-mounted and protrude from the wall surface, provide additional structural support within the wall framing to accommodate the extra moment force created by the fixture.
- (aa) Adjust aimable lighting fixtures to provide required light intensities.
- (bb) Replace blemished, damaged or unsatisfactory fixtures as directed by the Owners' representative.

XX. INSTALLATION: LIGHTING STANDARDS.

- (a) Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.
- (b) Pole installation shall be level and plumb to mounting surface. Follow manufacturers' recommendations and instructions for installations.
- (c) Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:
 - (1) Fire Hydrants and Storm Drainage Piping: [3 feet].
 - (2) Water Gas, Electric, Communication, and Sewer Lines: [3 feet].
 - (3) Existing Trees: [10 feet] from tree trunk.
- (d) Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
 - (1) Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
 - (2) Grout void between pole base and foundation. Use non-shrink or expanding concrete grout firmly packed to fill space.
 - (3) Install base covers unless otherwise indicated.
- (e) Poles and Pole Foundations Set in Concrete Paved Areas: Install poles with minimum of 6 inch- (150-mm-) wide, unpaved gap between the

pole or pole foundation and the edge of adjacent concrete slab. Fill unpaved ring with [pea gravel] to a level 1 inch (25 mm) below top of concrete slab.

- (f) Raise and set poles using web fabric slings (not chain or cable).

XX. INSTALLATION OF INDIVIDUAL GROUND MOUNTING LUMINAIRES.

- (a) Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast luminaire finish.
- (b) Into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Division 02 Section "Cast-in-Place Concrete for Site Work".

XX. CORROSION PREVENTION.

- (a) Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- (b) Steel Conduits: Comply with Division 26 Section "Raceway and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

XX. GROUNDING.

- (a) Ground metal poles and support structures according to Division 16 Section "Grounding and Bonding"
- (1) Install a minimum of a 3/4" diameter by 8' copper grounding electrode for each pole, unless otherwise indicated, and installed as indicated on Contract Drawings.
 - (2) Install grounding conductor pigtail in the base for connecting luminaire to grounding system.
- (b) Ground nonmetallic poles and support structures according to Division 16 Section "Grounding and Bonding".
- (1) Install a minimum of a 3/4" diameter by 8' copper grounding electrode for each pole, unless otherwise indicated, and installed as indicated on Contract Drawings.
 - (2) Install grounding conductor and conductor protector.
 - (3) Ground metallic components of pole accessories and foundations.

XX. RACEWAY AND BOXES.

- (a) Galvanized rigid conduit shall be used under buildings, within five feet of entrances to buildings, in pole foundations, under paved areas and walkways and within 18" horizontal of exterior junction boxes.
- (b) Provide pull line in empty conduit and duct.
- (c) Comply with the additional requirements of Division 16 Section "Raceways and Boxes".

XX. IDENTIFICATION.

- (a) Provide vinyl tagging with panel source and circuit number on wiring at handhole in each pole and at each exterior box.
- (b) Identify each exterior box with one-inch black letters and numbers on white vinyl weatherproof pressure sensitive adhesive labels on the covers. Labels shall be Brady #1530.
- (c) Identify each pole with three-inch black letters and numbers on white vinyl weatherproof pressure sensitive adhesive labels 6'-6" above grade facing the parking areas, or facing the road if the pole is at the road. Labels shall be Brady #1550.
- (d) Comply with the additional requirements of Division 16 Section "Electrical Identification".

XX. CONTRACTOR STARUP AND REPORTING.

- (a) Inspect each installed fixture for damage. Replace damaged fixtures and components.
- (b) Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
- (c) Replace fixtures that show evidence of corrosion during project warranty period.
- (d) Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.
- (e) Tests: Upon completion of installation of lighting fixtures, and after building circuits have been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.
- (f) Contractor shall train Owner's maintenance personnel on the proper operation and maintenance of all products in this specification.
- (g) Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner.

XX. FIELD QUALITY CONTROL.

- (a) Inspect each installed fixture for damage. Replace damaged fixtures and components.
- (b) Illumination Observations:
 - (1) Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
 - (2) Verify operation of photoelectric controls.

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

XX. COMMISSIONING AND DEMOSTRATION.

(a) After system checkout and adjustment, the contractor shall operate the system for the review of the owner and Architect. Necessary adjustments or modifications shall be made as required by the owner or Architect.

XX. ADJUSTING AND CLEAN.

(a) Clean: Clean lighting fixtures of dirt and debris upon completion of installation. Do not damage finishes or lens or refractor surfaces.

(b) Clean fixtures internally and externally after completion of installation. Use methods and materials recommended by manufacturer.

(c) Protection: Protect installed fixtures from damage during remainder of construction period.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Light Pole with Post Top Luminaire), Special Provision (Post Top Luminaire), Special Provision (In-Grade Uplight), Special Provision (Bracket Mounted Luminaire) to be measured for payment will be the number of each unit installed in the complete and accepted work.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Light Pole with Post Top Luminaire), Special Provision (Post Top Luminaire), Special Provision (In-Grade Uplight), Special Provision (Bracket Mounted Luminaire) will be paid for at the Contract unit price for each. Payment will be full compensation for furnishing, transporting, handling, assembling, and placing the materials specified, including poles, fixtures, lamps, anchors, grounding, receptacles, wiring, photocells, and accessories; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

The cost of furnishing and installing conduit and pull boxes will be paid separately under the appropriate Contract items.

Payment will be made under:

<u>Pay Items</u>	<u>Pay Unit</u>
900.620 Special Provision (Light Pole with Post Top Luminaire, Type P1)	Each
900.620 Special Provision (Post Top Luminaire, Type P1A)	Each
900.620 Special Provision (In-Grade Uplight, Type P3)	Each
900.620 Special Provision (In-Grade Uplight, Type P4)	Each
900.620 Special Provision (Bracket Mounted Luminaire, Type P5)	Each

ADD ALTERNATES

<u>Pay Items</u>	<u>Pay Unit</u>
900.620 Special Provision (Bracket Mounted Luminaire, Type P2 and P2A)	Each
900.620 Special Provision (In-Grade Uplight, Type P3A)	Each

LIGHTING CONTROL SYSTEM

XX. DESCRIPTION.

- (a) Types of control systems in this Section shall include the following:
- (1) Architectural
 - (2) Auxiliary Equipment
- (b) The extent of lighting control work includes, but is not limited to, the furnishing and installation of all lighting control components into complete and working lighting control systems as specified in this section, on the drawings, and as required by job conditions. System components include, but are not limited to:
- (1) Factory pre-assembled and pre-wired networkable lighting control panelboards for dimmed control of 0-10VDC dimmed and switching control of non-dimmed loads.
 - (2) Control stations, including wall mounted low voltage remote controls.
 - (3) Control system network low voltage wiring and/or fiber cabling for interconnection of lighting control panelboards, remote switches and master control stations.
 - (4) Permanently installed terminal(s) and master control stations for system programming and feedback.
 - (5) CONFORMANCE: System shall be manufactured in strict accordance with the Contract Drawings and Specifications
 - (6) IMPORTANT: Information regarding circuit designation, sizes and quantities is indicated elsewhere. Circuiting indicated in this section is included only to specify dimmer sizes and control capacities. DO NOT use this information for sizing branch circuit breaker panelboards, wiring or any other work not included in this section.

XX. SUBMITTALS.

- (a) Product Data: Provide catalog cut sheets for each type of product indicated. Catalog submittals lacking sufficient detail to indicate compliance with contract documents shall not be acceptable.
- (b) Shop Drawings: Submit dimensioned drawings of control system components. Submit shop drawings with proposed component and accessories clearly indicated on each sheet. Shop drawings must be submitted for review before fabrication. Fabrication details may vary slightly from those shown on drawings provided those changes do not adversely affect ease of installation, durability, performance or suitability.
- (c) Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project.
- (1) Outline Drawings: Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
 - (2) Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components.
 - (3) Wiring Diagrams: Power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram.

- (d) Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.
 - (1) Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
 - (2) For networked controls, list network protocols and provide statements from manufacturers that input and output devices meet interoperability requirements of the network protocol.
- (e) Provide a load schedule which indicates the actual connected load and load type per circuit, circuits and their respective control zones, circuits that are on emergency, and the capacity, phase, and corresponding circuit numbers (per the electrical drawings).
- (f) Manuals: Prior to final inspection, provide six (6) complete sets of operating and maintenance manuals. Include technical data sheets and parts ordering information. Include testing and maintenance requirements and instructions for emergency transfer components.
- (g) Shop drawings shall be submitted in reproducible form. Fixture fabrication details shall be drawn at either full size or half size scale. Fabrication details shall illustrate a minimum of three (3) critical views indicating all fabrication and assembly methods, materials, material gauges and finishes to be employed.
- (h) Catalogue submittals lacking sufficient detail to indicate compliance with contract documents shall not be acceptable.
- (i) "Approved Equal" specification status does not and shall not exempt the identified manufacturers from full and complete compliance with all criteria identified either in the specifications or as attributed to "prime specification" equipment with regards to performance, control capability, size finishes, etc. Consideration, acceptance or rejection of any proposed submittal at any time shall rest solely upon the evaluation of the Architect/ Engineer for those areas within the project scope.
- (j) Complete facility site plans indicating location of all components raceways and wiring of the lighting control system.

xx. QUALITY ASSURANCE:

- (a) All lighting control systems and components and sub-components shall be manufactured, furnished and installed in compliance with all government agencies having jurisdiction. All fixtures shall bear the appropriate UL (or ETL) and IBEW identifications. Panelboards and integral Lighting Control Chassis are to be UL listed under UL 916 Energy Management Equipment, UL 67 Panelboard Interiors and UL 5 panelboard box.
 - (1) Source Limitations: Obtain lighting control module and power distribution components through one source from a single manufacturer.
 - (2) Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- (3) Comply with 47 CFR, Subparts A and B, for Class A digital devices.
- (b) Manufacturers: Provide products of firms regularly engaged in the manufacture of lighting control equipment of the types and ratings whose products have been in satisfactory use in similar service for not less than 10 years.
- (c) Materials and equipment, as well as workmanship, shall conform to the highest commercial standards and shall be as specified and/or as indicated on the drawings. Parts not specifically identified shall be made of materials most appropriate for their intended use.
- (d) Regulatory Requirements: Cabinets and all related components and subsystems shall comply with regulatory requirements including NFPA 70 National Electric Code (NEC), NFPA 110 - Emergency and Standby Power systems, National Electrical Manufacturer's Association (N.E.M.A), NEMA ICS 10 - AC Transfer Switch Equipment, Underwriter's Laboratories, Inc. (UL) or (ETL), UL924- EM Bypass Relays, as well as any local jurisdictional codes.
- (e) Manufacturers: Manufacturers listed as "prime spec" or approved equal in the lighting control specification shall be assumed capable of supplying the listed systems unless clearly written exceptions are set forth in their quotations. Any such exceptions shall immediately be brought to the attention of the Architect/Engineer. Manufacturers not listed (as prime or approved equal) must comply with the following.
- (1) Experience: Manufacturers shall have not less than ten (10) years experience in design and manufacturing of lighting control equipment of the type and quality shown. Submission must include a list of completed projects and dated catalogue pages or drawings indicating length of experience.
- (2) Samples: Manufacturers shall submit a prototype sample of each control station for review by the Architect/Engineer. Prototype samples shall be sufficiently detailed and operational to allow evaluation of compliance with the salient features of the specification. Preliminary design or shop drawings shall not be accepted in place of prototype samples.
- (f) All major system components shall be manufactured and supplied by one company.
- (g) Manufacturer shall have their quality system registered to the ISO 9001 Quality Standard, including in-house engineering for all product design activities.
- (h) Lighting control system shall meet IEC801-2, tested to withstand a 15kV electrostatic discharge without damage or loss of memory.
- xx. COORDINATION.
- (a) Coordinate lighting controls. Design display graphics showing building areas controlled by this system; include the status of lighting controls in each area.
- (b) Site General Contractor and Site Electrical Contractor shall coordinate with Building General Contractor and Building Electrical Contractor in terms of installation sequencing and installation of

site lighting control equipment to be located in buildings (see Electrical Drawings).

xx. WARRANTY & MAINTENANCE.

- (a) The entire lighting control system [unless noted otherwise] shall carry a warranty for two (2) years from date of final written acceptance of the Lighting Control System by the Owner.
- (b) For the duration of the warranty the control system manufacturer shall provide 24 hour, 7-day emergency service contact with trained factory personnel. Maximum acceptable response time to a call for service shall be 12 hours. At the end of the warranty period, the manufacturer shall submit to the Owner a proposal for a continued maintenance contract for the entire control system.
- (c) Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship within specified warranty period.
 - (1) Failures include, but are not limited to, the following:
 - i. Software: Failure of input/output to execute switching commands.
 - ii. Failure of modular relays to operate under manual or software commands.
 - iii. Damage of electronic components due to transient voltage surges.
 - (2) Warranty Period: Cost to repair or replace malfunctioning parts for five (5) years from date of written acceptance by owner.
 - (3) Extended Warranty Period: Cost of replacement parts that failed in service due to transient voltage surges (materials only, f.o.b. the nearest shipping point to Project site) for eight years.
 - (4) Extended Warranty Period: Cost to repair or replace electrically / mechanically held relays for 10 years from date of Substantial Completion.
- (d) Warranty Period [Parts]: Cost to repair or replace malfunctioning parts for five (5) years from date of written acceptance by Owner.
- (e) Extended Warranty Period: Cost of replacement parts that failed in service due to transient voltage surges (in-panel transient surge suppression device rated for 5A at 277VAC) (materials only, f.o.b. the nearest shipping point to Project site) for eight years.
- (f) Extended Warranty Period: Cost to repair or replace electrically / mechanically held relays for 10 years from date of final written acceptance by the Owner.
- (g) The manufacturer shall make available to the owner a method of ordering new equipment for expansions, replacement, or replacement parts for a minimum period of ten years from the final date of commissioning to be used as spares.
- (h) At the time of Bid Submission each manufacturer shall submit for review and approval the name of the person/persons or agency who will be charged with the responsibility of fulfilling the manufacturer's field service obligations for the life of the warranty. Field service

capability located beyond an 80-mile radius of the project's location shall be considered unacceptable.

- (i) Warranty shall ensure that the Lighting Control System manufactured and supplied will be the kind and quality described in the specification and will be free of defects in workmanship and material.

XX. TECHNICAL AND ADMINISTRATIVE REQUIREMENTS.

- (a) The submission of a bid by the Contractor will be construed as evidence that a careful, complete and thorough examination of the premises, existing job conditions and Contract Documents has been made and later claims for labor, materials or equipment required or for difficulties encountered, which could have been foreseen had such an examination been made, will not be recognized. It shall also constitute a representation that the Contractor has checked and verified all quantities, work and materials involved and shall take complete responsibility for any deficiencies encountered thereafter
- (b) The Contractor shall provide deduct alternate for the provision of wiring and power supply in a single conduit utilizing class 1 wiring. Refer to Electrical Engineer's drawings for appropriate wire sizes.
- (c) The Contractor shall insure that the lighting control system manufacturer shall keep on file and make available for review by the Architect/Engineer and the Owner complete Quality Control and Quality Assurance records for all phases of production for all lighting equipment to be supplied under this project.
- (d) Upon request the Contractor shall submit for review by the Architect/Engineer and the Owner verification that he has solicited pricing from all manufacturers which have been listed as "prime spec" and "approved equal." Upon request the Contractor shall submit for review itemized (line item) unit equipment costs for all equipment to be provided under the Scope of this Contract.
- (e) The Contractor shall be solely responsible for coordinating and expediting the timely procurement and delivery for the lighting control system, equipment and related components for the project.
- (f) Specifications and drawings are intended to convey the salient features, function and character of the control system only, and do not undertake to illustrate or set forth every item or detail necessary for the work. Minor details not usually indicated on the drawings nor specified, but that are necessary or normally required for the proper execution, completion, installation and operation of the control systems shall be included, the same as if they were herein specified or indicated on the drawings.
- (g) Omissions: The Owner shall not be held responsible for the omission or absence of any detail, construction feature, etc. which may be normally required in the production of the lighting control equipment. The full and complete responsibility for accurately fabricating the control systems described herein to the fulfillment of those specifications shall rest solely with the Contractor.

XX. SPARE.

- (a) As part of this contract, the installing Contractor shall furnish and provide the following spare material components:
 - (1) 10 percent of each type relay, timer, switch and contactor, but not less than 2 each.
 - (2) 10 percent of each type 0-10V dimming control card.

XX. SAMPLES.

- (a) Upon request, submit for review one representative sample of each lighting control station required under this Contract. After sample acceptance, the control station shall be sent to the project for final installation. In the event the submission is rejected, the control station will be returned to the manufacturer who shall immediately make a new submission which meets the contract requirements.
- (b) Shipping: The samples must be actual working devices to be supplied and shall be submitted complete, ready for energizing and examining and shall be shipped (prepaid) by Contractor to the Lighting Designer or as otherwise specified or directed.

XX. SUBSTITUTIONS. Equipment included under this section is specified by approved manufacturer, type, function to establish minimum standards of quality for bidding. Furnish equipment as specified unless substitutions are agreed upon as follows:

- (a) Submit a written Request for Substitution of Specified Equipment to the Owner within forty-five (45) days of Contract Award. Make the request an Alternate, separate proposal accompanied by complete descriptive and technical data in comparison to the "Accepted" manufacturers. Show cost comparison of "Accepted" manufacturer's equipment to the proposed substitution. Substitutions proposed more than forty-five (45) days after Award, or not including proper documentation will not be considered.
- (b) Where proposed substitutions will alter the functional or visual design or change the space requirements from those shown in the drawings, detail such changes in the proposal and include costs for revised design and construction for all trades involved.
- (c) No requested for substitutions will be considered more than forty-five (45) days after the contract is awarded.
- (d) If equipment to be supplied, including that supplied by approved manufacturers, meets the broad scope requirements of the drawings and specifications, but differed in some details, bring such differences to the Owner's attention and obtain a written interpretation before submitting the bid, or proceeding with the work. Otherwise no variations or differences are permitted.
- (e) The Lighting Designer will approve/disapprove any requests for substitution.

XX. PROJECT/SITE CONDITIONS.

- (a) The lighting controls must operate in an ambient temperature range of 0°C (32°F) to 40°C (104°F) and 90% non-condensing relative

humidity without the requirement of a regularly scheduled maintenance program for air filtration components. Where lighting control equipment is to be located outdoors, such equipment must be housed in an approved NEMA 4X rated temperature and humidity regulated enclosure to be provided by the Contractor. Contractor shall provide to the Engineer cutsheets of enclosure and air conditioning/heating unit for review and consideration.

XX. PRODUCTS MANUFACTURERES.

- (a) Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- (1) Eaton: Cleveland, OH 800-386-1911
 - (2) Douglas Lighting Controls: Burnaby, Canada 604-873-2797
 - (3) Acuity Lighting: Conyers, GA 770-922-9000

XX. FUNCTIONAL SYSTEM DESCRIPTION.

- (a) Summary:
- (1) The lighting control system specified in this section shall provide time-based, sensor-based, and manual lighting control.
 - (2) The system shall be capable of turning lighting loads on/off as well as dimming lights (if lighting load is capable of being dimmed).
 - (3) The system architecture shall facilitate remote operation via a computer connection.
 - (4) The system shall not require any centrally hardwired switching equipment.
- (b) General:
- (1) Provide system hardware that is designed, tested, manufactured, and warranted by a single manufacturer.
 - (2) Architectural Lighting Controls: Ten-year operational life while operating continually at any temperature in an ambient temperature range of 0 degrees C (32 degrees F) to 40 degrees C (104 degrees F) and 90 percent non-condensing relative humidity.
 - (3) Designed and tested to withstand electrostatic discharges up to 15,000 V without impairment per IEC 801-2.
 - (4) Devices shall have addresses automatically assigned to them.

XX. NETWORKABLE LIGHTING CONTROL SYSTEM DESCRIPTION.

- (a) The networkable lighting control system shall consist of pre-assembled lighting control panelboards complete with integral networkable low-voltage lighting control module, low-voltage switches and their associated wiring to allow control of the lighting

XX. SYSTEM COMPLIANCE.

- (a) System Architecture:
- (1) System shall have an architecture that is based upon three main concepts: (1) networkable intelligent lighting control devices, (2) standalone lighting control zones using

- distributed intelligence, (3) optional system backbone for remote, time based and global operation between control zones
- (2) Intelligent lighting control devices shall have individually addressable network communication capability and consist of one or more basic lighting control components: occupancy sensor, photocell sensor, relay, dimming output, contact closure input, analog 10V input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or more of these components into a single device enclosure shall be permissible so as to minimize overall device count of system.
 - (3) System must be capable of interfacing directly with networked luminaires such that either low voltage network cabling or wireless RF communication is used to interconnect networked luminaires with control components such as sensors, switches and system backbone.
 - (4) Lighting control zones consisting of one or more networked luminaires and intelligent lighting control devices and shall be capable of providing automatic control from sensors (occupancy and/or photocell) and manual control from local wallstations without requiring connection to a higher-level system backbone; this capability is referred to as "distributed intelligence". Lighting control zones (wired and wireless) of at least 128 devices per zone shall be supported.
 - (5) The system shall be capable of providing individually addressable switching and dimming control of the following: networked luminaires, control zones, and relay and dimming outputs from centralized panels to provide design flexibility appropriate with sequence of operations required in each project area or typical space type.
 - (6) Networked luminaires and intelligent lighting control devices shall support individual (unique) configuration of device settings and properties.
 - (7) Networked luminaires and intelligent lighting control devices shall have distributed intelligence programming stored in non-volatile memory such that following any loss of power the lighting control zones shall operate according to their defined default settings and sequence of operations.
 - (8) Lighting control zones shall be capable of being networked with a higher-level system backbone to provide time based control, remote control from inputs and/or systems external to the control zone, and remote configuration and monitoring through a software interface.
 - (9) The system may include "communication bridge" devices that route communication from lighting control zones (wired or wireless) to and from the system controller, for purposes of decreasing system wiring requirements.
 - (10) All system devices shall support remote firmware update, such that physical access to each device is not necessary, for purposes of upgrading functionality at a later date.
- (b) Wired Networked Control Zone Characteristics:
- (1) Connections to devices within a wired networked lighting control zone and to backbone components shall be with a single type of low voltage network cable, which shall be compliant with CAT5e specifications or higher. To prevent wiring errors

- and provide cost savings, the use of mixed types of low voltage network cables shall not be permitted.
- (2) Devices in an area shall be connected via a "daisy-chain" topology; requiring all individual networked devices to be connected back to a central component in a "hub-and-spoke" topology shall not be permitted, so as to reduce the total amount of network cable required for each control zone.
 - (3) Following proper installation and provision of power, all networked devices connected together with low voltage network cable shall automatically form a functional lighting control zone without requiring any type of programming, regardless of the programming mechanism (e.g., software application, handheld remote, pushbutton). The "out of box" default sequence of operation is intended to provide typical sequence of operation so as to minimize the system startup and programming requirements and to also have functional lighting control operation prior to system startup and programming.
 - (4) Once software is installed, system shall be able to automatically discover all connected devices without requiring any provisioning of system or zone addresses.
 - (5) All networked devices shall have the ability to detect improper communication wiring and blink its LED in a specific cadence as to alert installation/startup personnel.
- (c) Supported Sequence of Operations:
- (1) The following characteristics and performance requirements shall apply to wired and wireless control zones provided by the system.
 - (2) Control Zones
 - i. Networked luminaires and intelligent lighting control devices installed in an area (also referred to as a group of devices) shall be capable of transmitting and tracking occupancy sensor, photocell sensor, and manual switch information within at least 48 unique control zones to support different and reconfigurable sequences of operation within the area. These shall also be referred to as local control zones.
 - ii. Networked luminaires and intelligent lighting control devices located in different areas shall be able to transmit and track occupancy, photocell, and switch information within at least 128 system-wide control zones to support required sequences of operation that may span across multiple areas. These shall also be referred to as global control zones.
 - (3) Wallstation Capabilities
 - i. Wallstations shall be provided to support the following capabilities:
 - a. On/Off of a local control zone and global control zone simultaneously, as required.
 - b. Continuous dimming control of light level of a local control zone and global control zone simultaneously, as required.
 - c. Preset Scenes that can activate a specific combination of light levels across multiple local and global channels, as required.

- d. Profile Scenes that can modify the sequence of operation for the devices in the area (group) in response to a button press. This capability is defined as supporting "Local Profiles" and is used to dynamically optimize the occupant experience and lighting energy usage. Parameters that shall be configurable and assigned to a Local Profile include light level, response to occupancy sensors (including enabling/disabling response), response to daylight sensors (including enabling/disabling response) and enabling/disabling of wallstations.
 - ii. 3-way / multi-way control: multiple wallstations shall be capable of controlling the same local and global control zones, so as to support "multi-way" switching, dimming, preset scene, and profile scene control.
- (4) Photocell Sensing Capabilities (Automatic Daylight Sensing)
- i. Photocell sensing devices shall be configurable to control a local and global zone simultaneously, as required.
 - ii. The system shall support the following types of photocell-based control:
 - a. On/Off: The control zone is automatically turned off if the photocell reading exceeds the defined setpoint and automatically turned on if the photocell reading is below the defined setpoint. A time delay or adaptive setpoint adjustable behavior may be used to prevent the system from exhibiting nuisance on/off switching.
 - b. Continuous Dimming: The control zone automatically adjusts its dimming output in response to photocell readings, such that a minimum light level consisting of both electric light and daylight sources is maintained at the task. The photocell response shall be configurable to adjust the photocell setpoint and dimming rates.
- (5) Schedule and Global Profile Capabilities
- i. The system shall be capable of automatically modifying the sequence of operation for selected devices in response to any of the following: a time-of-day schedule, contact closure input state, RS-232/RS-485 command, BACnet input command, and demand response signal. This capability is defined as supporting "Global Profiles" and is used to dynamically optimize the occupant experience and lighting energy usage.
 - ii. Scheduling. Global profiles may be scheduled with the following capabilities:
 - a. Global Profiles shall be stored within and executed from the system controller (via internal timeclock) such that a dedicated software host or server is not required to be online to support automatic scheduling and/or operation of Global Profiles.
 - b. Global Profile time of day schedules shall be capable of being given the following recurrence

- settings: daily, specific days of week, every "n" number of days, weekly, monthly, and yearly. Lighting control profile schedules shall support definition of start date, end date, end after "n" recurrences, or never ending. Daylight savings time adjustments shall be capable of being performed automatically, if desired.
- c. Global Profiles shall be capable of being scheduled to run according to timed offsets relative to sunrise or sunset. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.
 - d. . Blink warning and timed extension capabilities. At the end of a scheduled period, the system shall be capable of providing a visible "blink warning" 5 minutes prior to the end of the schedule. Wallstations may be programmed to provide timed overrides that turn the lights on for an additional period of time. Timed override duration shall be programmable for each individual device, zone of devices, or customized group of devices, ranging from 5 minutes to 12 hours.
 - e. Software management interface shall be capable of displaying a graphic calendar view of profile schedules for each control zone.
- iii. System Global Profiles shall have the following additional capabilities:
 - a. Global Profiles shall be capable of being manually activated directly from the system controller, specially programmed input devices, and software management interface.
 - b. Global Profiles shall be selectable to apply to a single device, zone of devices, or customized group of devices.
 - c. Parameters that shall be configurable and assigned to a Global Profile include light level, response to occupancy sensors (including enabling/disabling response), response to daylight sensors (including enabling/disabling response), and enabling/disabling of wallstations.
 - iv. A backup of Local and Global Profiles shall be stored on the software's host server such that the Profile backup can be applied to a replacement system controller or wallstation.
- (6) Automated demand response capabilities. Profiles created for automated demand response events shall support automatic reduction of light level to programmable values. At least four levels of demand response profiles shall be supported by the system.

XX. SYSTEM SOFTWARE INTERFACES.

- (a) Management Interface

- (1) System shall provide a web-based management interface that provides remote system control, live status monitoring, and configuration capabilities of lighting control settings and schedules.
 - (2) Management interface must be compatible with industry-standard web browser clients, including, but not limited to, Microsoft Internet Explorer®, Apple Safari®, Google Chrome®, Mozilla Firefox®.
 - (3) Management interface shall require all users to login with a User Name and Password, and shall support creation of at least 100 unique user accounts.
 - (4) Management interface shall support at least three permission levels for users: read-only, read & change settings, and full administrative system access.
 - (5) Management interface shall be capable of restricting read-only and read & change access for user accounts to specific devices within the system.
 - (6) All system devices shall be capable of being given user-defined names.
 - (7) The following device identification information shall be displayed in the Management interface: model number, model description, serial number, manufacturing date code custom label(s), and parent network device.
 - (8) Management interface shall be able to read the live status of a networked luminaire or intelligent control device and shall be capable of displaying luminaire on/off status, dim level, power measurement, device temperature, PIR occupancy sensor status, microphonic occupancy sensor status, remaining occupancy time delay, photocell reading, and active Scenes or Profiles.
 - (9) Management interface shall be able to read the current active settings of a networked luminaire or intelligent control device and shall be capable of displaying dimming trim levels, occupancy sensor and photocell enable/disable, occupancy sensor time delay and light level settings, occupancy sensor response (normal or vacancy), and photocell setpoints and transition time delays.
 - (10) Management interface shall be able to change the current active settings and also default settings for an individual networked luminaire or intelligent control device.
 - (11) Management interface shall be capable of applying settings changes for a zone of devices or a group of selected devices using a single "save" action that does not require the user to save settings changes for each individual device.
 - (12) A printable network inventory report shall be available via the management interface.
 - (13) A printable report detailing all system profiles shall be available via the management interface.
 - (14) All sensitive information stored by the software shall be encrypted.
 - (15) All system software updates must be available for automatic download and installation via the Internet.
- (b) Historical Database and Analytics Interface:

- (1) System shall provide a historical database that stores device operational history and calculates energy usage for all networked luminaires and intelligent control devices.
 - (2) System shall be capable of reporting lighting system events and performance data back to the historical database for display and analysis.
 - (3) Historical database shall be capable of recording historical data for up to 20,000 networked devices for a period of at least 1 calendar year.
 - (4) An "Energy Scorecard" shall be displayed that shows calculated energy savings in dollars, kWh, or CO2.
 - (5) Software shall calculate the allocation of energy savings to different control measures (occupancy sensors, photocells, manual switching, etc.)
 - (6) Energy savings data shall be calculated for the system as a whole or for individual zones.
 - (7) A time scaled graph showing all relay transitions shall be presented.
 - (8) A time scaled graph showing a zones occupancy time delay shall be presented.
 - (9) A time scaled graph showing the total light level shall be presented.
 - (10) User shall be able to customize the baseline run-time hours for a space.
 - (11) User shall be able to customize up to four time-of-day billing rates and schedules.
 - (12) Historical data shall be exportable from the Historical Database via a "CSV" type of file format.
- (c) Smartphone Programming Interface for Wired Devices
- (1) Application interface shall be provided for both Apple iOS® and Android operating systems that allows configuration of lighting control settings.
 - (2) The application shall support the configuration of wired networked control devices via a Bluetooth® Low Energy (BLE) Programming Device.
 - i. Application shall support a security pin-code to access the zone of lighting control devices.
 - ii. The application shall provide indication of signal strength where multiple Bluetooth Low Energy Programming Devices are available for configuration.
 - iii. The application shall indicate the number of wired networked control devices The application shall indicate the number of wired networked control devices.
 - (3) Programming capabilities through the application shall include, but not be limited to, the following
 - i. Switch/occupancy/photosensor group configuration
 - ii. Manual/automatic on modes
 - iii. Turn-on dim level

XX. SYSTEM BACKBONE AND SYSTEM INTEGRATION EQUIPMENT.

- (a) iLumin Plus Panels
 - (1) Mechanical:
 - i. Meets UL, cUL, and/or CSA Standards specifically for the required loads. Provide evidence of compliance upon request

- ii. Delivered and installed as a factory assembled panel listed to UL508
 - iii. Field wiring accessible from front of panel without need to remove dimmer or relay assemblies or other components
 - iv. Panels passively cooled via free-convection, unaided by fans or other means
- (2) Electrical:
- i. Electrolytic capacitors to operate under the component manufacturer's maximum temperature rating when device is under fully-loaded conditions in 40° C (104° F) ambient temperature.
 - ii. Design and test dimmers/relays to withstand line-side surges without impairment to performance.
 - a. Panels: Withstand surges without impairment of performance when subjected to surges of 6,000 volts, 3,000 amps per ANSI/IEEE C62.41 and per IEC 61000-4-5 surge requirements.
 - b. Other power handling devices: Withstand surges without impairment of performance when subjected to surges of 6,000 volts, 200 amps per ANSI/IEEE C62.41.
 - iii. Utilize air gap off, activated when user selects "off" at any control to disconnect the load from line supply.
 - iv. Power failure memory and dimmer/relay recovery.
 - v. When power is interrupted and subsequently returned, lights will automatically return to same levels (dimmed setting, full on, or off) prior to power interruption.
 - vi. In 3 phase panels loss of power to any phase should not effect operation or control dimmers on any other phase.
- (3) Performance:
- i. Shall be UL listed to relevant standards (UL508A, UL916, cULus)
 - ii. Shall be capable of mixed voltages 120/277VAC 50/60Hz
 - iii. Shall be capable of mixed sources including normal and emergency power
 - iv. Shall include a panel SCCR rating of 25kA
 - v. Shall be capable of providing a mixed module solution panel including relays, dimmers and DALI controls
 - vi. Shall be capable of meeting the latest IECC, ASHRAE and Title 24 energy codes
 - vii. Shall support three enclosure sizes
 - a. Small Enclosure
 - 1. Shall support up to two modules
 - b. Medium Enclosure
 - 1. Shall support up to four modules and PC connection module
 - 2. Shall include configurations with Ethernet connection to building LAN or VLAN
 - c. Large Enclosure
 - 1. Shall support up to eight modules and PC connection module
 - 2. Shall include configurations with Ethernet connection to building LAN or VLAN
 - d. Relay Module: (SCMR1220)
 - 1. Up to 48 relays in large enclosure
 - 2. Each relay module shall support up to twelve 20A fully rated relays

- i. Shall include heavy duty 20A @40C relays
 3. Rated life of relay: Minimum 1,000,000 cycles
 4. Load switched in manner so that there is no arcing at mechanical contacts when power is applied to and removed from load circuits
 5. Fully rated output continuous duty for inductive, capacitive, and resistive loads
 6. Relay controller shall include the capability for DMX input control with base address
 7. Relay controller shall include the capability for DALI input control
 8. Relay controller shall include alert dry contact input for hardware override of all r
- e. Dimmer Module: (SCMH1200)
 1. Up to 48 Low Voltage Dimming (0-10V) channels in large enclosure
 2. Each dimmer module shall support up to twelve 0-10V channels; Meet following requirements
 3. Capable of controlling any 0-10V source
 4. 0-10V dimmers shall include a fail to full output safety feature by default
 5. Provide isolated 0-10V output signal conforming to IEC 60929
 - i. 50mA sink current per channel via IEC 60929
 - ii. 50mA source current per channel
 6. 0-10V controller shall include the capability for DALI input control
- f. DALI: (SCMD4)
 1. Up to 16 DALI buses in medium enclosure
 2. Each DALI module shall support up to four DALI buses
 3. Shall include dedicated test/override buttons for each DALI bus
 4. Shall include a separate power supply for each DALI bus
 - i. Shall provide 16V nominal, 250mA max current per bus
 - ii. Shall support 64 standard DALI devices per bus
 5. DALI controller shall include the capability for DMX input control with base address
 6. DALI controller shall include the capability for DALI input control
 7. DALI controller shall include alert dry contact input for hardware override of all relays
- g. Ethernet: (EG2)
 1. Shall provide a single ethernet port for connection to the building LAN or VLAN
 2. Shall be capable of facilitating a LAN or Wi-Fi connection to the iLumin Plus system
 3. Shall include an integral web server
 4. Shall provide the capability for mobile devices to override the lighting system via scene or channel slider commands

5. Shall provide the capability for 3rd party integration via ASCII control strings
6. Shall provide the capability for bridging the iLumin Plus network across LAN or VLAN connections

(b) iLumin SC-UN Series Panels

(1) Mechanical:

- i. Meets UL, cUL, and/or CSA Standards specifically for the required loads. Provide evidence of compliance upon request.
- ii. Delivered and installed as a factory assembled panel listed to UL508.
- iii. Field wiring accessible from front of panel without need to remove dimmer or relay assemblies or other components.
- iv. Panels passively cooled via free-convection, unaided by fans or other means.

(2) Electrical:

- i. Panels contain branch circuit protection for each input circuit unless the panel is a dedicated feed-through type panel or otherwise indicated on the drawings.
- ii. Branch circuit breakers; meet following performance requirements:
 - a. Listed to UL 489 as molded case circuit breaker for use on lighting circuits.
 - b. Contain visual trip indicator
 - c. SC-UN: 10,000 AIC, 120 V Dimming and 14,000 AIC, 277 V Dimming
 - d. SC-RPB: 25,000 AIC, 120 V and 277 V relays
 - e. Thermal-magnetic construction for overload, short-circuit, and over-temperature protection. Use of breakers without thermal protection requires dimmers/relays to have integral thermal protection to prevent failures when overloaded or ambient temperature is above rating of panel.
 - f. Replaceable without moving or replacing dimmer/relay assemblies or other components in panel. Breakers shall be designed for use in frequent switching applications (switching duty rated) so that loads can be switched on and off by breakers
- iii. Power failure memory and dimmer/relay recovery:
 - a. When power is interrupted and subsequently returned, lights will automatically return to same levels (dimmed setting, full on, or off) prior to power interruption.
 - b. In 3 phase panels loss of power to any phase should not effect operation or control dimmers on any other phase.
- iv. Panel to contain 4 line LCD display controller in each panel
 - a. All set up and adjustments of the panel can be made from this device
 - b. USB, RS485, Ethernet, and DMX connections must be included
 - c. Include Timeclock standard with control of:
 1. Scene selections

2. Fade zone to a level

v. Dimmers

- a. Each individual circuit dimmer is designed and tested to specifically control incandescent/tungsten, magnetic low voltage, electronic low voltage, neon/cold cathode, fluorescent dimming ballasts, 0-10V low voltage loads, and non-dim loads without additional internal or external modules.
- b. Utilize universal 16A continuous-use dimmer listed to UL508.
- c. Limit current rise time to minimum 350 μ sec as measured from 10-90 percent of load current waveform at full dimmer capacity at a 90 degree conduction angle.
- d. Load faults only affect the given circuit.
- e. Ship panels with each dimmer in mechanical bypass position by means of jumper bar inserted between input and load terminals. Jumpers to carry full rated load current and be reusable at any time without requiring a tool to reinstall them. Mechanical bypass device to allow for switching operation of connected load with dimmer removed by means of circuit breaker.
- f. Provide real-time cycle-by-cycle compensation for incoming line voltage variations including changes in RMS voltage, frequency shifts, dynamic harmonics, and line noise.
- g. Control compatible light sources in smooth and continuous manner. Dimmers with visible steps are not acceptable.
- h. Each dimmer to be configurable in the field to provide a proper dimming curve for the specific light source.
- i. Minimum and maximum light levels user adjustable on circuit-by-circuit basis.
- j. Each individual circuit must include the ability to control the following load types standard, without additional modules or equipment.
 1. Magnetic Low Voltage (MLV) transformer:
 - i. Contain circuitry designed to control and provide a symmetrical AC waveform to input of magnetic low voltage transformers per UL 1472, Section 5.11.
 - ii. Dimmers using unipolar load current devices (such as FETs or SCRs) to include DC current protection in the event of a single device failure.
 2. Forward Phase Electronic Low Voltage (ELV) transformer.
 3. Dimmer to be approved for use on the specific ELV transformer being used, Dimming equipment manufacturer to offer free testing services to ensure compatibility. Neon and cold cathode transformers:

- e. VGA 320x240 pixel resolution, 65,000 colors available
- f. 3.5" diagonal backlit LCD touchscreen
- g. Shall allow up to 250 pages to be stored in memory
- h. Groups: The set of fixtures controlled by a given touchscreen shall be completely configurable through software and can span entire iLumin Plus network
- i. Shall support individual zone level adjustment and save scene controls

(2) ADDRESSABLE MULTI-SENSOR

- i. Product: [MST-6], [MTS-12]
 - a. Communication: DALI protocol
 - b. Power: From the DALI bus
 - c. Maximum Current Draw: 3.75 mA
 - d. Connections: Two (2) wires (16/18AWG, FT6, non-twisted, non-shielded, non-polarized and plenum rated) connected to the DALI communication bus
 - e. Sensing Technologies: Occupancy, daylight and temperature
 - f. Daylight Sensing Range: 0-400 lux
 - g. Daylight Sensing Coverage: Light input within 60° cone
 - h. Occupancy Detection Technology: Passive infrared
 - i. Occupancy Detection Coverage Area: 600 sq. ft. or 1,200 sq. ft
 - j. Occupancy Detection Angle: 360°
 - k. Mounting: Junction box or ceiling tile
 - l. Groups: The set of fixtures controlled by a given multi-sensor shall be completely configurable through software and can span iLumin Plus network
 - m. Timers: All times shall be configurable through the web software and shall not require any manual configuration of settings prior to installation. Timer values can range from 1 second to 24 hours
 - n. Shall be capable of occupancy forwarding to send occupancy status to other areas within the system

ii. Product: [NC3-C]

- a. Communication: iCANnet protocol
- b. Power: From the iCANnet bus
- c. Connections: Five (5) wires Belden 1502 or 1502P
- d. Sensing Technologies: Occupancy, daylight
- e. Daylight Sensing Range: 0-400 lux
- f. Daylight Sensing Coverage: Light input within 60° cone
- g. Occupancy Detection Technology: Passive infrared
- h. Occupancy Detection Coverage Area: 250 sq. ft.
- i. Occupancy Detection Angle: 360°.
- j. Mounting: ceiling tile
- k. Groups: The set of fixtures controlled by a given multi-sensor shall be completely configurable through software and can span entire iLumin Plus network.
- l. Timers: All times shall be configurable through the web software and shall not require any manual

- configuration of settings prior to installation.
- Timer values can range from 1 second to 24 hours
- m. Shall be capable of occupancy forwarding to send occupancy status to other areas within the system
- n. Capable of sending a command to turn HVAC on and off

(3) Addressable Sensor Powerpack

- i. Product: [FLT-SP-MV-DC2], [FLT-SP-MV-DC1], [FLT-SP-347-DC2], [FLT-SP-347-DC1], [FLT-SP-240-DC2], [FLT-SP-24-DC1]
 - a. Communication: DALI protocol.
 - b. Power: 120/277VAC, 240VAC OR 347VAC.
 - c. Maximum Current Draw: 2 mA.
 - d. Maximum number of sensors: Up to five (5) PIR or DT sensors are connected and report to the system as a single address.
 - e. Connections: Two (2) wires (16/18AWG, FT6, non-twisted, non-shielded, non-polarized and plenum rated) connected to the DALI communication bus.
 - f. Sensor connections: Five (5) wires (16/18AWG, FT6, non-twisted, non-shielded, non-polarized and plenum rated) connected to sensor for controls and addressing.

(4) Ceiling Mounted Sensors

- i. Product: [OAC-DT-2000-R], [OAC-DT-1000-R], [OAC-P-1500-R], [OAC-U-2000-R]
 - a. Provide all necessary mounting hardware and instructions
 - b. Sensors shall be Class 2 devices
 - c. Connect up to five (5) sensor to the DALI Powerpack for power and signal back to the iLumin Plus system
 - d. Device calibration and features:
 - 1. Sensitivity - 0-100% in 10% increments
 - 2. Time delay - 1-30, self-adjusts to 10 min based on room occupancy
 - 3. Test mode - Fifteen second time delay
 - 4. Detection technology - PIR, Ultrasonic or Dual Technology activation and/or re-activation
 - 5. Walk-through mode
 - 6. Ultrasonic and Dual Technology Sensors utilize two independent sensor detection circuits simultaneously to ensure optimum performance, regardless of location or proximity to walls and structures
 - 7. Ultrasonic and Dual Technology Sensors utilize Variable Drive Circuitry (VDC) in cases of over saturation from misapplication, which automatically adjusts the volumetric output without reducing detection capability. Systems that reduce detection coverage area shall not be acceptable
 - 8. Automatically and continually self-adjust ultrasonic frequency to ignore specific frequency, continuous noise from airflow to prevent detuning which can lead to inadvertent lights out. Sensors that require detuning shall not be acceptable

- e. Device Status LEDs including:
 - 1. PIR Detection
 - 2. Ultrasonic detection
 - f. Manual override of controlled loads
 - g. Where specified, sensor packaging shall be 100% recycled [made entirely from post-consumer waste (100% post-consumer fiber content) as well as, 100% recyclable]
 - h. Sensors shall be RoHS compliant
- (5) Wall/Corner Mounted Sensors
- i. Product: [OAWC-P-120W-R], [OAWC-P-009L-H-R], [OAWC-DT-120W-R]
 - a. Provide all necessary mounting hardware and instructions
 - b. Sensors shall be Class 2 devices
 - c. Connect up to five (5) sensor to the DALI Powerpack for power and signal back to the iLumin Plus system
 - d. Device calibration and features:
 - 1. Sensitivity - 0-100% in 10% increments
 - 2. Time delay - 1-30, self-adjusts to 10 min. based on room occupancy
 - 3. Test Mode - Fifteen second time delay
 - 4. Detection technology - PIR, Ultrasonic or Dual Technology activation and/or re-activation
 - 5. Walk-Through Mode
 - 6. Automatically and continually self-adjust ultrasonic frequency to ignore specific frequency continuous noise from airflow to prevent detuning which can lead to inadvertent lights out. Sensors that require detuning shall not be acceptable
 - e. Device Status LEDs including:
 - 1. PIR Detection
 - 2. Ultrasonic detection
 - f. Manual override of controlled loads
 - g. Where specified, sensor packaging shall be 100% recycled [made entirely from post-consumer waste (100% post-consumer fiber content) as well as, 100% recyclable]
 - h. Sensors shall be RoHS compliant
- (d) End Device
- (1) Addressable Relays And Drivers
 - i. Product: [FLT-DAC-DALI-DC1], [FLT-DAC-DALI-DC2]
 - a. 0-10V Addressable Dimming Modules
 - b. Communication: DALI protocol
 - c. Power: From the DALI bus
 - d. Maximum Current Draw: 3.75 mA
 - e. Communication Connections: Two wires (16/18AWG, FT6, non-twisted, non-shielded, non-polarized and plenum rated) connected to the DALI communication bus
 - f. Power Ratings: Up to 4A Ballast 120/277/347 VAC
 - g. Dimming Control: 0-10V, 50 mA max current sink
 - h. Mounting: Fixture or conduit (90° elbow and mounting clips included)
 - i. UL 924 Listed component

- ii. Product: [FLT-HPDM-DALI]
 - a. Addressable Dimming Modules
 - b. Communication: DALI protocol
 - c. Power: From the DALI bus
 - d. Maximum Current Draw: 3.75 mA
 - e. Communication Connections: Two wires (16/18AWG, FT6, non-twisted, non-shielded, non-polarized and plenum rated) connected to the DALI communication bus
 - f. Power Ratings: Up to 20A, 120 VAC
 - g. Dimming Control: Forward phase dimming control for incandescent and magnetic low voltage loads
 - h. Mounting: Junction box
 - i. Control and communication operations of the ballast shall be immune to noise and power disturbances
 - iii. Product: [FLT-HPRS-DALI]
 - a. Communication: DALI protocol
 - b. Power: From the DALI bus
 - c. Maximum Current Draw: 3.75 mA
 - d. Enclosure: Standard outlet box or NEMA 250, Type 1, unless otherwise indicated.
 - e. Communication Connections: Two (2) wires (16/18AWG, FT6, non-twisted
 - f. non-shielded, non-polarized and plenum rated) connected to the DALI communication bus
 - g. Power Ratings: Up to 20 A at 347 VAC
 - h. Field relays shall be capable of controlling plug loads
 - i. Mounting: Junction box
- (2) Power Converters
- i. Product: [LDCM-PL-120-277-010V-GR]
 - a. Product: [LDCM-PL-120-277-010V-GRV
 - b. Power: 120/277VAC
 - c. Maximum Current: 450W @ 120V or 1000W @ 277V
 - d. Shall control ELV loads (forward or reverse) based on 0-10V input signal
 - e. Shall provide ON/OFF capability of load through external relay providing power to unit
 - f. Mounting: Junction box
- (e) Integration And Accessories
- (1) BMS Integration
 - i. Product: [FPA-W34-1130] BMSPro 2 - BACnet Interface
 - a. The iLumin Plus network shall permit data protocol translation through a building automation interface Gateway. The BACnet Gateway shall permit BACnet communication protocol to operate individual areas, scenes or channels and read the status. The iLumin Plus network shall respond efficiently to the requested information from the BACnet network.
 - b. The BMSPro2 provides up to 10,000 points of control and can communicate to multiple panel types.
 - c. The BMSPro 2 requires a dedicated EG2 interface for connectivity either installed in an iLumin Plus panel or as a separate accessory.
 - d. Provide PIC list definition and object model to other system manufacturers.

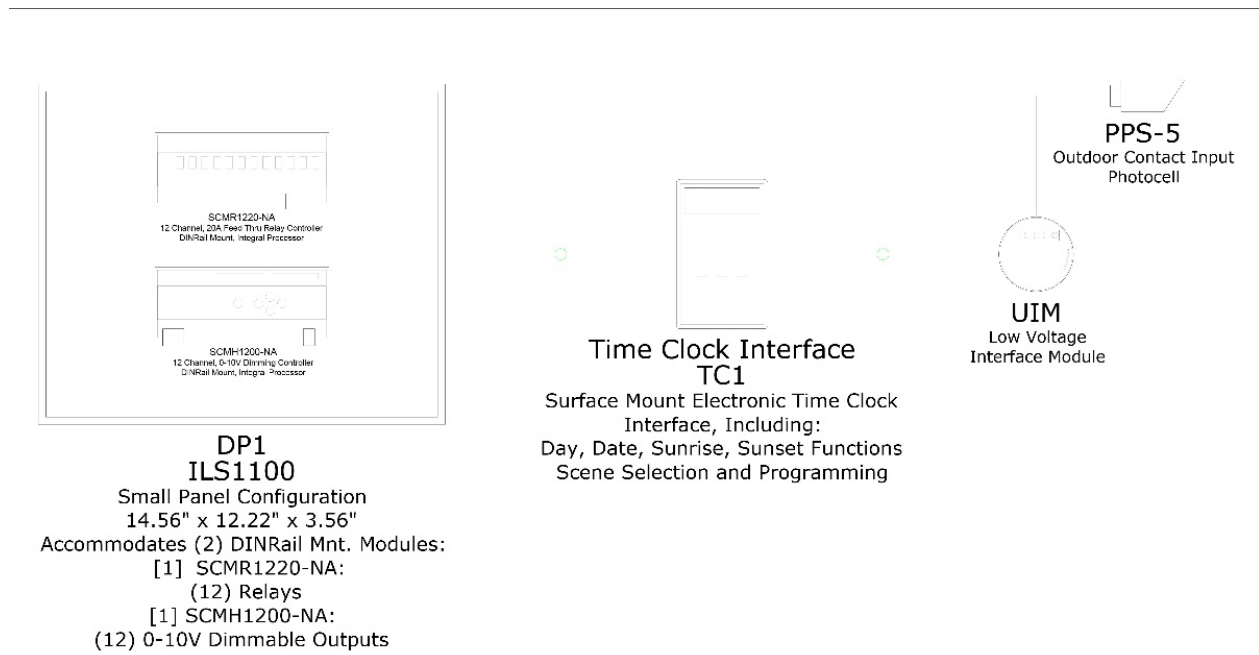
- (2) LAN/VLAN Integration
 - i. Product: [EG2-NA] Ethernet Gateway
 - a. Shall provide a single ethernet port for connection to the building LAN or VLAN
 - b. Shall be capable of facilitating a LAN or Wi-Fi connection to the iLumin Plus system
 - c. Shall include an integral web server
 - d. Shall provide the capability for mobile devices to override the lighting system via scene or channel slider commands
 - e. Shall provide the capability for 3rd party integration via ASCII control strings
 - f. Shall provide the capability for bridging the iLumin Plus network across LAN or VLAN connections
 - g. Provide ability for bi-direction communication by means of Ethernet communication to system by means of user-supplied PC, digital audiovisual, or BMS equipment. Control to be located on the same Local Area Network
 - h. Allow for custom communication command strings to be entered in to software to allow lighting control system to control other devices
- (3) Serial Integration
 - i. Product: [SI-2-NA] RS232 Interface
 - a. Communication: iCANnet protocol
 - b. Power: From the iCANnet bus
 - c. Connections: Five (5) wires Belden 1502 or 1502P
 - d. Mounting: Junction box
 - e. Provide ability for bi-direction communication by means of RS232 serial communication to system by means of user-supplied PC, digital audiovisual, or BMS equipment. Control to be located within 50 feet (15 meters) of RS232 source
 - f. Allow for custom RS-232 command strings to be entered in to software to allow lighting control system to control any other device
- (4) Partition Control:
 - i. Product: [UIG-NA], [UIM-NA]
 - a. Communication: iCANnet protocol.
 - b. Power: From the iCANnet bus
 - c. Connections: Five (5) wires Belden 1502 or 1502P
 - d. Inputs: Four (4) digitally optically isolated inputs
 - e. Mounting: Junction box
 - f. Partitioning: Shall provide partitioning and room join capabilities using either a button press, input, or IR wall partition sensors
 - g. Low Voltage Input: Shall provide the capability for contact closures to integrate between lighting controls and other systems
 - 1. The contact closure input device will accept both momentary and maintained contact closures.
 - ii. Product: [IRTR]
 - a. Infrared Transmitter & Receiver

- b. Provide the ability to sense the presence or absence of partitions
 - c. Requires the connection to a UIG-2-NA or UIM-NA
 - (5) DMX Integration
 - i. Product: [SCD96-NA]
 - a. Communication: iCANnet protocol
 - b. Power: 120VAC
 - c. iCANnet Connection: Five (5) wires Belden 1502 or 1502P
 - d. DMX Connection: Three (3) wire DMX cable (by others)
 - e. Inputs: Eight (8) digitally optically isolated inputs
 - f. Relay Outputs: Eight dry contact N.O./N.C
 - g. DMX Output: 96 channels of DMX
 - h. Mounting: Surface
 - i. Provide the ability to control standard DMX devices such as RGB fixtures, moving lights, dimmers and effects.
 - j. Provides the ability to map any iLumin Plus(?) wall station button to a DMX channel.
 - (6) Curtain/Shade Integration
 - i. Product: [RI-2-NA]
 - a. Communication: iCANnet protocol
 - b. Power: 120VAC
 - c. iCANnet Connection: Five (5) wires Belden 1502 or 1502P
 - d. Inputs: Eight (8) digitally optically isolated inputs
 - e. Relay Outputs: Eight dry contact N.O./N.C.
 - f. Mounting: Surface
 - g. Provide eight dry contact programmable low power relays to control curtain, shades, AV screens and other equipment.
 - (7) Network Accessories
 - i. Product: [LCNJ]
 - a. Communication: iCANnet protocol
 - b. Power: From the iCANnet bus
 - c. Connections: Five (5) wires Belden 1502 or 1502P
 - d. Mounting: Junction box
 - e. Shall allow the network to extend more than 1000m/3200 feet.
 - f. Shall permit the connection of multiple networks allowing up to 65,000 devices on one system.
 - (f) Software
 - (1) ICANsoft Suite
 - i. Product: [SW-2]
 - a. Software shall support multiple functions to setup entire enterprise iLumin Plus system
 - 1. DALI addressing tool
 - 2. Device editor for system programming and scheduling
 - 3. iCANsoft editor for system programming and scheduling
 - 4. Smartphone configuration tool for mobile applications
 - 5. Touchscreen configuration tool

6. Panel editor for floor plan control
- b. Software shall support multiple diagnostic tools for troubleshooting the iLumin Plus system
 1. Network monitor
 2. Flash tool for updating system device firmware
 3. Device simulator
- c. Shall include with user-friendly software suitable for operation on computer workstations which serve as central control stations for the selection and operation of lighting scenes
- d. Clients shall interface with the software via Eaton Lighting Systems iCANsoft application

XX. SINGLE LINE DIAGRAM.

- (a) Network Single Line Diagram: Site Lighting



**DP1
ILS1100**
Small Panel Configuration
14.56" x 12.22" x 3.56"
Accommodates (2) DINRail Mnt. Modules:
[1] SCMR1220-NA:
(12) Relays
[1] SCMH1200-NA:
(12) 0-10V Dimmable Outputs

**Time Clock Interface
TC1**
Surface Mount Electronic Time Clock
Interface, Including:
Day, Date, Sunrise, Sunset Functions
Scene Selection and Programming

PPS-5
Outdoor Contact Input
Photocell
UIM
Low Voltage
Interface Module

- (1) See Electrical drawings for complete panelboard schedule and load information.
- (2) See Electrical drawings for complete panelboard schedule and load information.
- (3) Refer to Electrical drawings for device locations and information.

XX. INSTALLATION.

- (a) Delivery Storage Handling: Deliver products to the job site in manufacturer's original containers marked with job name, Contractor's name and labeling that clearly indicates the contents. Deliver, store and handle products in accordance with manufacturer's written admonishments.
- (b) Job Conditions: Maintain job site conditions in accordance with manufacturer's recommendations.

- (c) Reject and do not install any damaged or unsatisfactory equipment. Replace unsatisfactory equipment with new equipment that is satisfactory if so, directed by the Owner or their representative.
- (d) The system shall be installed utilizing complete manufacturer's shop drawings and in accordance with these specifications.
- (e) Install Control Stations only after "wet" work such as plastering, and painting is complete and the area is cleaned.
- (f) The breaker cabinets and controls shall be stored in their original cartons or crates in a dry location free from dirt and dust until ready to install. Provide protection and protective coverings as appropriate to prevent damage to the equipment during installation and until Owner's acceptance. Repair or replace damaged equipment as directed.
- (g) Mount equipment at locations and heights indicated on approved shop drawings, or as directed by Owner. Locations indicated on the electrical drawings are general and approximate - carefully verify locations with Architect's plans prior to installation. Check for adequacy of headroom and clearance with other equipment such as ducts, pipes and openings. The installing contractor shall bring all conflicts to the Owner's attention prior to proceeding with the work.
- (h) Upon completion of the installation Contractor shall test all line voltage and control wiring for continuity and accuracy of all connections.
- (i) Upon completion of the installation, the lighting control equipment shall operate per specifications and be free from defects in condition and finish. Moveable parts must operate freely and with uniform friction throughout their range. Any components damaged prior to the final inspection must be replaced by the Contractor prior to inspection.
- (j) Contractor shall ensure that the factory start up engineer makes any calibrations and adjustments necessary for proper operation of the system.

XX. SYSTEM START-U.

- (a) Upon completion of the installation, the system shall be checked out and started up by a factory trained technician. Contractor to have completed and tested all wiring, installed all controls and lamped all fixtures before start up.
- (b) Upon completion of system start up, the factory trained technician shall demonstrate the operation of the system to the Contractor and the Owner's representative. Contractor to advise Owner's representative prior to scheduling start up so all persons designated by the Owner and Architect are present for training. The following system start-up services shall be supplied by a factory trained Technician during a single site visit.
 - (1) Check installation of all Lighting Control Panelboards.
 - (2) Test operation of all Breakers and Lighting Breakers.

- (3) Test operation of all Low Voltage Inputs.
 - (4) Test operation of all Telephone Override Lines.
 - (5) Test operation of all Network Communication.
 - (6) Test operation of Lighting or Building Management Station and Associated Printer
 - (7) Load Application Specific Software Control Modules and test operation
 - (8) Repair or replace any defective component
 - (9) Test operation of complete Lighting or Building Management System
- (c) Equipment manufacturer to provide six (6) bound copies of a "Maintenance and Operation Manual" to the Owner's representative. Manuals shall contain "As Built" shop drawings, wiring diagrams, description of all control functions, all instruction sheets for all components, calibration and adjustment procedures for all applicable components, maintenance procedures and instructions, component specifications, copy of warranty and service contract (if applicable), address and phone contacts for troubleshooting and service help. Manufacturer's start up engineer to review contents of manual with Owner's representative.
- (d) The Owner or his representative will schedule a final inspection with the Contractor. The Contractor will make any necessary adjustments and calibrations, whether the inspection is scheduled within or outside normal working hours, at no additional cost to the Owner.
- (e) If deficiencies that can be corrected immediately are apparent, correct them as soon as possible and schedule another final inspection with the Owner. The Contractor will reimburse the Architect or his representative for his costs, including travel costs, to return for re-inspection. The Contractor will also bear costs of any additional inspections until the system is approved of system. System must be approved prior to Owner's acceptance.

XX. TRAINING.

- (a) Factory technician will schedule, in coordination with the Owner, a training period for the Owner's staff [min. 5 personnel] or designated appointees. This training period to be a minimum of 3 hours. Training to encompass entire scope of the system including operation, adjustment, maintenance and troubleshooting until completely understood. Manufacturer shall submit names and period of attendance of those instructed.
- (b) The following system training services shall be supplied by a factory Field Engineer during a single site visit:
- (1) System review of all Hardware Components and their functions.
 - (2) System review of all software Components and their function.
 - (3) Hands-On "Operator" training to develop experience with Supplied Control Function.
 - (4) Hands-On "Building Engineer" training to develop experience with system Software Programming.
 - (5) Walk through of User's Guide and Programmer's Guide.

XX. SYSTEM PROGRAMMING. The following system programming services shall be supplied by a factory Field Engineer during a single site visit:

- (a) Advise the Building Engineer on developing a control scenario for each application.
- (b) Program the Building Engineer supplied control scenario into the lighting management system
- (c) Review the programmed information with the Building Engineer and walk through the operation of the program

XX. DOCUMENTATION. The following documentation shall be supplied:

- (a) System Single-Line Diagram: show system components and quantities including panelboards, breakers, low-voltage switches and sensors, dataline, telephone override lines and Lighting or Building Management Station.
- (b) Panelboard Configuration Diagram: Show PC board configuration, breaker configuration and power supply location.
- (c) Panelboard Wiring Schedule: Show breaker/load relationship with direct switch override if applicable.
- (d) Wiring Diagram: Show typical wiring application diagram for each system component supplied.
- (e) Installation Guide: Provide instructions as to how to install system components.
- (f) Manual: Provide User's Guide and Programmer's Guide in a loose leaf three ring binder with step by step illustrated instructions.
- (g) Riser Diagram: Provided by specifier along with reflected ceiling plans showing control schematic.

XX. CONTRACTOR'S QUALITY CONTROL REQUIREMENTS.

- (a) General: Comply with applicable provisions of Division 1 Section "Quality Requirements" for requirements for Contractor's Quality Control Program.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Lighting Control System) to be measured for payment will be the number of each unit installed in the complete and accepted work.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Lighting Control System) will be paid for at the Contract unit price for each. Payment will be full compensation for furnishing, transporting, handling, assembling, and placing the materials specified, including foundation, anchors, grounding, and accessories; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Lighting Control System)	Each

BENCH

- XX. DESCRIPTION. This work shall consist of furnishing and installing a bench and foundation in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Bench(es) shall be as specified by the manufacturer and shall meet the specifications outlined in the Plans.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The bench shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The bench shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The bench shall include a surface mounting system for permanently anchoring to a concrete surface.

The Contractor shall protect all parts of the bench and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. MANUFACTURER. The bench shall be manufactured by Landscape Forms:

Manufacturer: Landscape Forms
7800 E. Michigan Ave.
Kalamazoo, MI 49048
Tel.; (800)430-6209
www.landscapeforms.com
Model:NL999-06117-SM-118: Neoliviano 118" backed bench with center arm, surface mount, thermally modified ash.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Bench) to be measured for payment will be the number of each bench system installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Bench) will be paid for at the Contract unit price for each. Payment will be full compensation for installing a complete bench system and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for anchoring and any concrete required for anchor footings.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Bench)	Each

BIKE RACK

- XX. DESCRIPTION. This work shall consist of furnishing and installing a bicycle rack, foundation and anchoring in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Bike rack(s) materials shall be as specified by the manufacturer and shall meet the specifications outlined in the Plans.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The bike rack shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The bike rack shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the bike rack and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. MANUFACTURER. The bike rack shall be manufactured by Huntco Site Furnishing:

Manufacturer: Huntco Site Furnishings
Tel.; (503)224-8700
www.huntco.com
Model: The Arc Series 2-Capacity Stainless Steel Bike Racks, In-Ground Mount & Surface Mount (see plans & details), 304 Stainless Steel Satin #4 Finish

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Bike Rack) to be measured for payment will be the number of each bicycle rack system installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Bike Rack) will be paid for at the Contract unit price for each. Payment will be full compensation for installing a complete bicycle rack system in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for anchoring and any concrete required for anchor footings.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Bike Rack)In-Ground	Each
900.620 Special Provision (Bike Rack)Surface Mount	Each

DOG WASTE BAG DISPENSER POSTS

- XX. DESCRIPTION. This work shall consist of furnishing and installing posts for dog waste dispensers and foundation in accordance with the Plans and as directed by the Engineer. The municipality will provide and install the actual dispensers at a later date.
- XX. MATERIALS. Posts shall meet the specifications outlined in the Plans and details.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The posts shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The posts shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the posts and maintain them in an undamaged condition until they are installed and accepted for payment.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Dog Waste Bag Dispenser Posts) to be measured for payment will be the number of each Dog Waste Bag Dispenser Posts installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Dog Waste Bag Dispenser Posts) will be paid for at the Contract unit price for each. Payment will be full compensation for installing a Dog Waste Bag Dispenser Posts and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for anchoring and any concrete required for anchor footings.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Dog Waste Bag Dispenser Posts)	Each

DRINKING FOUNTAIN

- XX. DESCRIPTION. This work shall consist of furnishing and installing a drinking fountain and foundation in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Drinking Fountain shall be as specified by the manufacturer and shall meet the specifications outlined in the Plans.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The drinking fountain shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The drinking fountain shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the drinking fountain and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. MANUFACTURER. The drinking fountain shall be manufactured by Halsey Taylor:

Manufacturer: Halsey Taylor
2222 Camden Court
Oak Brook, IL 60523
800-260-6640
www.halseytaylor.com

Model:4420 DB Halsey Taylor Endura II Tubular Outdoor Fountain Bi-Level Pedestal with Pet Station Non-Filtered Non-Refrigerated
Color: As selected by landscape architect and City Staff.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Drinking Fountain) to be measured for payment will be the number of each drinking fountain system installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Drinking Fountain) will be paid for at the Contract unit price for each. Payment will be full compensation for installing a complete drinking fountain system and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for anchoring and any concrete required for anchor footings.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Drinking Fountain)	Each

ELECTRICAL DISTRIBUTION PANELS

- XX. DESCRIPTION. This work shall consist of furnishing, installing, and testing distribution panel(s) including foundations, supports, internal electrical components, and wiring, as shown in the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 679 of the Standard Specifications.

- XX. MATERIALS. Provide free standing, stainless steel, NEMA 3R Enclosures. Materials shall meet the requirements of Section 679, requirements in the Plans, and the following:

- (a) Current Transformer Cabinet
- (b) Current Transformer Rated Meter
- (c) Main Distribution Panel rated 800A, with a 3-pole 800A main circuit breaker, 120/208V, three phase, four wire, UL listed for service entrance.
- (d) Event Distribution Panel rated 150A, with a 3-pole 150A main circuit breaker, 120/208V, three phase, four wire, UL listed for service entrance.
- (e) Panel Schedule: Number as indicated on schedule. Provide 2 each 20A ground fault duplex receptacle external to the cabinet. Enclosure shall be heavy duty lockable.

- XX. SUBMITTALS. Prior to ordering any components, the Contractor shall submit Working Drawings in accordance with Section 105. The submittal shall contain, as a minimum, the following information:

- (a) Breaker / Distribution Panel. Size, manufacturer, model, accessories, material, locking mechanism, and finish.
- (b) Concrete Foundation. Dimensions, reinforcing, and material. Concrete shall meet the requirements of Section 541, Concrete Class B.
- (c) Electrical Components and Controls. Make, model, and applicable electrical capacities and settings.

- XX. CONSTRUCTION REQUIREMENTS. Prior to ordering materials, the Contractor shall coordinate with the electrical design to accommodate the electrical supply.

Contractor shall be responsible for obtaining all permits, certificates and inspections required. All work shall be in accordance with the National Electric Code, local codes and requirements, and the requirements of Green Mountain Power.

Subbase shall be as specified in the Plans.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Current Transformer Cabinet; Special Provision (Current Rated Meter; Special Provision (Event Distribution Panel; Special Provision (Main Distribution Panel) to be measured for payment will be the number of each unit installed in the complete and accepted work.

- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Current Transformer Cabinet; Special Provision (Current Rated Meter; Special Provision (Event Distribution Panel; Special Provision (Main Distribution Panel) will be paid for at the Contract unit price per each. Payment will be full compensation for furnishing, transporting, handling, assembling, testing, and placing the materials specified, including foundations, anchors, grounding, receptacles, panel and enclosure, mounting and

supports, wood posts, internal electrical components, conduit and wiring, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Excavation and subbase shall be paid under appropriate contract pay items.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Current Transformer Cabinet)	Each
900.620 Special Provision (Current Rated Meter)	Each
900.620 Special Provision (Event Distribution Panel)	Each
900.620 Special Provision (Main Distribution Panel)	Each

GRANITE CURB EDGING

XX. DESCRIPTION. This work shall consist of furnishing and installing granite curb edging including all excavation and concrete mud in accordance with the Plans and as directed by the Engineer.

XX. MATERIALS. Granite curb edging shall consist of 6" x 18" x segment length and shall meet the specifications outlined in the Plans. All granite curb shall be Woodbury granite.

Type A: Thermal face and top, natural back.

Type B: Thermal face both sides and top.

XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The granite curb edging shall be installed true to line and grade as shown on the Plans and in equal segments as detailed on the elevations or as directed by the Engineer.

The granite curb edging shall be installed at the locations indicated in the Plans, to the configuration shown in the Plans and details, and in accordance with the supplier's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all granite curb edging and maintain them in an undamaged condition until they are installed and accepted for payment.

xx. SUPPLIER:

Vermont Stone Art
14 N Main St, Barre, VT 0564
www.vermontstoneart.com

. METHOD OF MEASUREMENT. The quantity of Special Provision (granite curb edging) to be measured for payment will be on a linear foot basis in the complete and accepted work, at the location(s) indicated in the Plans.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (granite curb edging) will be paid for at the Contract lump sum price. Payment will be full compensation for installing granite curb edging and necessary concrete mud, excavation and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.XXX Special Provision (Granite Curb Edging Type A)	Linear Foot
900.XXX Special Provision (Granite Curb Edging Type B)	Linear Foot

900.XXX Special Provision
(Granite Curb Edging Type C)

Linear Foot

LANDSCAPE PLANTS

- XX. DESCRIPTION. This work shall consist of bed preparation, furnishing, transporting, delivering and installing all plant material shown on Planting Plan L300, planted per details on L503. All work shall comply with Section 656, unless noted otherwise.
- XX. MATERIALS. Trees will be provided by the municipality and delivered to site. All other Materials will be provided by contractor and shall meet the requirements of subsection 656.02.
- XX. QUALITY ASSURANCE
Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants. Experience: Five years' experience in landscape installation of similar size projects. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
- a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Interior.
 - c. Landscape Industry Certified Horticultural Technician.
 - d. Pesticide Applicator: State licensed, commercial.
- Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
- XX. SHRUBS: Measure with branches and trunks or canes in their normal` position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
Other Plants: Measure with stems, petioles, and foliage in their normal position.
- XX. TREES: Trees will be tagged at nurseries by Landscape Architect and Arborist. Municipality will pay for trees and for tree delivery to the site. City arborist will be responsible for organizing the appropriate digging and preparation for shipping of trees. Contact arborist 4 weeks prior to desired date of planting to schedule delivery. Contractor shall be responsible for planting and staking the trees at the locations called for in the plans and per the landscape details.
- XX. INSPECTION AND DELIVERY. Inspection and delivery shall be in accordance with subsection 656.04.
- XX. PROTECTION AND TEMPORARY STORAGE. Protection and temporary storage shall be in accordance with subsection 656.05.
- XX. DELIVERY TO PROPERTY OWNER. Prior to delivering the plants to the site they shall be approved by the Landscape Architect and the arborist provided by the City to ensure the plant material is in good health and

has been properly protected and temporarily stored. Once the plant material is approved by the Landscape Architect and Arborist for delivery, the plant materials shall be delivered to the approved location on site. The delivery period for Trees, shrubs, perennials and grasses shall occur after March 1 and until November 15. Bulb delivery shall occur after Sept 1 and until November 15.

XX. COORDINATION

Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

xx. INSTALLATION. The plants shall be installed at the distances and depths specified in the Plans. Approved mulch at a settled 2" depth shall be installed on top of the plantings after the plant has been backfilled with the appropriate soil. Seed germination and planted vegetation survival depends on regular watering. It is the Contractor's responsibility to follow VTrans specifications for landscape watering to ensure that all plants have proper moisture during the entire project construction and plant establishment period.

XX. RESTORATION AND MAINTENANCE. The Contractor shall restore all seeded and grassed areas disturbed by the delivery of the plant materials at no cost to the City.

xx. METHOD OF MEASUREMENT. The quantity of Special Provisions (Trees, shrubs, Perennials, Ornamental Grasses) to be measured for payment will be the number of each quart, gallon or balled and burlapped, caliper inch as specified in the plans, complete in place in the accepted work, measured within the limits specified on the Plans or as directed by the Engineer. The quantity of Special Provision (Deciduous Trees) to be measured for payment will be the number of each Caliper inch, gallon or balled and burlapped as specified in the plans, complete in place in the accepted work, measured within the limits specified on the Plans or as directed by the Engineer. The quantity of Special Provision (Landscape Plants) will be the number of each bulb installed in the complete and accepted work.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Special Provision (Bulbs), Special Provision (Grasses), Evergreen Shrubs, Deciduous Trees, Deciduous Shrubs, Ground Cover & Vines, Perennials) will be paid for at the Contract unit price per each. Payment will be full compensation for performing the work specified and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
656.30 Deciduous Trees (Planting & Staking Only)	Each
656.35 Deciduous Shrubs	Each
656.41 Perennials	Each
900.620 Special Provision (Grasses)	Each
900.620 Special Provision (Bulbs)	Each
900.620 Special Provision (Rain Gardens A, B & C Planting)	Each

LIGHT POLE BASE

- XX. DESCRIPTION. This work shall consist of furnishing and installing light poles bases, and all incidentals, as shown in the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 679 of the Standard specifications.

- XX. MATERIALS. Materials shall meet the requirements of Section 679 and the following:

- (a) Base. Concrete shall meet the requirements of Section 541 for Concrete, Class B. Reinforcing steel shall meet the requirements of Section 713.01.

The Contractor shall provide and install the grounding electrode and associated ground wiring for each light pole base.

- XX. CONSTRUCTION REQUIREMENTS. The Contractor shall submit, as Working Drawings in accordance with Subsection 105.03, manufacturer's descriptive literature for materials specified. Concrete light pole base anchor bolts shall meet light pole specifications.

Transport, storage, handling and installation of products shall be in accordance with the manufacturer's instructions.

All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The pole base shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The light pole base shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the bases and maintain them in an undamaged condition until they are installed and accepted for payment.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Light Pole Base) to be measured for payment will be the number of each unit installed in the complete and accepted work.

- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Light Pole Base) will be paid for at the Contract unit price for each. Payment will be full compensation for furnishing, transporting, handling, assembling, and placing the materials specified, including pole bases, anchors, grounding, and accessories; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

The cost of furnishing and installing conduit and pull boxes will be paid separately under the appropriate Contract items.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Light Pole Base)	Each

MESSAGE BOARD

- xx. DESCRIPTION. This work shall consist of the furnishing and installation of message board(s) at the location(s) indicated in the Contract Documents and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 620 of the Standard Specifications.

- xx. GENERAL REQUIREMENTS. Prior to ordering materials, the Contractor shall submit details and shop drawings for proposed message board to the Engineer for approval.

- xx. MATERIALS.

Base Bid: The message board shall be aluminum tube frame (alloy 6061) with a natural finish and plywood board. The board shall be placed in Type B concrete foundation. Materials shall conform to the requirements as specified in the plans and as specified in the following subsections: Aluminum frame shall meet the requirements of Section 715. Concrete type B shall meet the requirements of Section 541.

Add Alternate: The message board shall be stainless steel frame (Grade MT 304) with a 180 Grit polish and 1" x 4" cedar board (Clear V.G. Heart, Kiln Dried, Smooth face both sides). The board shall be placed in Type B concrete foundation. Materials shall conform to the requirements as specified in the Plans and as specified in the following subsections: Anchor bolts shall be Type 304 stainless-steel fasteners. Base plate stainless steel shall be ASTM A 240/A 240M or ASTM A 666, Type 304. Concrete Type B shall meet the requirements of Section 541.

- xx. SUBMITTALS. Working Drawings and pertinent data shall be submitted for acceptance to the Engineer in accordance with Section 105.

- xx. CONSTRUCTION REQUIREMENTS. Posts for the message board be set plumb in the concrete at the spacing and depth shown on the plans. Message board be installed to the configuration shown in the Plans, as recommended by the manufacturer, and as directed by the Engineer.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Message Board) to be measured for payment will be the number of each installed in the complete and accepted work.

- xx. BASIS OF PAYMENT. The accepted quantities of Special Provision (Message Board) will be paid for at the Contract unit price per each. Payment will be full compensation for detailing, furnishing, transporting, handling, assembling, and placing the materials specified, including posts and concrete for bases; performing drilling necessary for post placement; excavation and disposal of excess material; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Message Board Base Bid)	Each
900.620 Special Provision (Message Board Add Alt.)	Each

METAL SCREEN FENCE SYSTEM

- XX. **GENERAL.** All trees, brush, and other obstructions which interfere with proper grade, alignment, and construction of fences shall be removed and disposed of as specified in Section 201, unless otherwise directed by the Engineer. Modification of the alignment may be made as directed by the Engineer to preserve valuable trees or other features. Posts shall be set plumb at the spacing and depth shown on the Plans and, when used for property line fence, shall be erected parallel to and 6 inches inside the Right-of-Way line. In no case shall the fence be connected to a structure.
- XX. **MATERIALS.** The Screen Fence shall be as provided by the manufacturer and shall meet the specifications outlined in the Plans.
Extruded aluminum: ASTM B221, Alloy 6063, Temper T-6.
Posts: Steel, Powder Coat Finish
- xx. **MANUFACTURER:** The Screen Fence shall be by AMETCO.

Manufacturer: AMETCO Manufacturing Corporation
4326 Hamann Parkway, PO Box 1210
Willoughby, OH 44096
Tel.; (800)321-7042
www.ametco.com

Contractor to price 4 options for selection by City:

Option A: Model: Blade Design aluminum Fence system (Vertical blades)
Color: Silver, Champagne or Cal. Gray (provide actual color samples of all 3 for final selection by Landscape Architect & City).

Aluminum Fence System

Ametco Aluminum Fencing products are manufactured from extruded aluminum sections and have a powder coat finish.

- Blade Design - Manufactured from 1/2" x 4" (12.7 x 102 mm) extruded aluminum tubes that are spaced 4" (102 mm) apart; fencing shall be configured vertically to limit climbing. Interim fence posts shall be standard 3" x 3" x 1/4" aluminum posts with flat caps.

Gates: Gates shall be 3" x 2" x 1/4" gate frame, supported by 4" x 4" x 3/8" posts. Provide padlockable cane or slide bolts at gates.

Removeable Top Grate: Grates to be 2" x 3/16" bar on 13/16" Centers Extruded Aluminum Bar Grille (Sunshade)with powder coat finish to match gate, posts and fencing material. Mounting brackets at wall and fence posts will also be required as recommended by the manufacturer. Provide padlockable cane or slide bolts at grate and fence panel interface.

Option B: Model: Perforated Polaris Panels

Color: Silver, Champagne or Cal. Gray (provide actual color samples of all 3 for final selection by Landscape Architect & City).

Aluminum Fence System

Ametco Aluminum Fencing products are manufactured from extruded aluminum sections and have a powder coat finish.

- Polaris Design - Manufactured with holes to allow 50% openings for semi-transparency.

Gates: Manufacturer's recommended gate frame, supported by 4" x 4" x 3/8" posts. Provide padlockable cane or slide bolts at gates.

Removeable Top Grate: Grates shall be manufactured by extruded aluminum and constructed to match fence panels with powder coat finish. Mounting brackets will also be required as recommended by the manufacturer. Provide padlockable cane or slide bolts at grate and fence panel interface.

Option C: Model: Perforated Panels

Color: Silver, Champagne or Cal. Gray (provide actual color samples of all 3 for final selection by Landscape Architect & City).

Aluminum Fence System

Ametco Aluminum Fencing products are manufactured from extruded aluminum sections and have a powder coat finish.

- Perforated Design - Manufactured from perforated panels with 2" diameter offset holes, supported by manufacturer's recommended posts.

Gates: Manufacturer's recommended gate frame, supported by 4" x 4" x 3/8" posts. Provide padlockable cane or slide bolts at gates.

Removeable Top Grate: Grates shall be manufactured by extruded aluminum and constructed to match fence panels with powder coat finish. Mounting brackets will also be required as recommended by the manufacturer. Provide padlockable cane or slide bolts at grate and fence panel interface.

Option D: Model: Shield Grate Panels

Color: Silver, Champagne or Cal. Gray (provide actual color samples of all 3 for final selection by Landscape Architect & City).

Aluminum Fence System

Ametco Aluminum Fencing products are manufactured from extruded aluminum sections and have a powder coat finish.

- Shield Grate Design - Manufactured from grated panels of 1-3/4" vertical by 1-21/32" horizontal grid, with 1-3/16" top rail, supported by manufacturer's 3-1/2" x 5/16" flat stock posts.

Gates: Manufacturer's recommended gate frame, supported by 4" x 4" x 3/8" posts. Provide padlockable cane or slide bolts at gates.

Removeable Top Grate: Grates shall be manufactured by extruded aluminum and constructed to match fence panels with powder coat finish. Mounting brackets will also be required as recommended by the manufacturer. Provide padlockable cane or slide bolts at grate and fence panel interface.

- xx. SUBMITTALS. Prior to ordering the fence system, the Contractor shall submit manufacturer's literature and Shop Drawings to the Engineer in accordance with Section 105.03. The submittal shall indicate materials, dimensions, tolerances, welding, fasteners, hardware, mounting, finish, accessories, and the manufacturer's warranty. Shop drawings showing

layout, dimensions, profiles, spacing of components and anchorage and installation details.

- xx. SAMPLE PANEL. Provide a 4' high by 3' wide minimum sample panel of product with vertical blades for verification by City prior to ordering.
- xx. INSTALLATION. The fence system shall be mounted per the manufacturer's specifications.

All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The Contractor shall protect all parts of the fence and maintain them in an undamaged condition until they are installed and accepted for payment.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Screen fence system) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Screen fence system) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a complete Screen fence system and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Screen Fence System)Option A	Lump Sum
900.645 Special Provision (Screen Fence System)Option B	Lump Sum
900.645 Special Provision (Screen Fence System)Option C	Lump Sum
900.645 Special Provision (Screen Fence System)Option D	Lump Sum

METAL SCREEN FENCE SYSTEM

- XX. **GENERAL.** All trees, brush, and other obstructions which interfere with proper grade, alignment, and construction of fences shall be removed and disposed of as specified in Section 201, unless otherwise directed by the Engineer. Modification of the alignment may be made as directed by the Engineer to preserve valuable trees or other features. Posts shall be set plumb at the spacing and depth shown on the Plans and, when used for property line fence, shall be erected parallel to and 6 inches inside the Right-of-Way line. In no case shall the fence be connected to a structure.
- XX. **MATERIALS.** The Screen Fence shall be as provided by the manufacturer and shall meet the specifications outlined in the Plans.
Extruded aluminum: ASTM B221, Alloy 6063, Temper T-6.
Posts: Steel, Powder Coat Finish
- xx. **MANUFACTURER:** The Screen Fence shall be by AMETCO.

Manufacturer: AMETCO Manufacturing Corporation
4326 Hamann Parkway, PO Box 1210
Willoughby, OH 44096
Tel.; (800)321-7042
www.ametco.com

Option A: Model: Blade Design aluminum Fence system (Vertical blades)
Color: Silver, Champagne or Cal. Gray (provide actual color samples of all 3 for final selection by Landscape Architect & City).

Aluminum Fence System

Ametco Aluminum Fencing products are manufactured from extruded aluminum sections and have a powder coat finish.

- Blade Design - Manufactured from 1/2" x 4" (12.7 x 102 mm) extruded aluminum tubes that are spaced 4" (102 mm) apart; fencing shall be configured vertically to limit climbing. Interim fence posts shall be standard 3" x 3" x 1/4" aluminum posts with flat caps.

Gates: Gates shall be 3" x 2" x 1/4" gate frame, supported by 4" x 4" x 3/8" posts. Provide padlockable cane or slide bolts at gates.

Removeable Top Grate: Grates to be 2" x 3/16" bar on 13/16" Centers Extruded Aluminum Bar Grille (Sunshade)with powder coat finish to match gate, posts and fencing material. Mounting brackets at wall and fence posts will also be required as recommended by the manufacturer. Provide padlockable cane or slide bolts at grate and fence panel interface.

Option B: Model: Perforated Polaris Panels

Color: Silver, Champagne or Cal. Gray (provide actual color samples of all 3 for final selection by Landscape Architect & City).

Aluminum Fence System

Ametco Aluminum Fencing products are manufactured from extruded aluminum sections and have a powder coat finish.

- Polaris Design - Manufactured with holes to allow 50% openings for semi-transparency.

Gates: Manufacturer's recommended gate frame, supported by 4" x 4" x 3/8" posts. Provide padlockable cane or slide bolts at gates.

Removeable Top Grate: Grates shall be manufactured by extruded aluminum and constructed to match fence panels with powder coat finish. Mounting brackets will also be required as recommended by the manufacturer. Provide padlockable cane or slide bolts at grate and fence panel interface.

Option C: Model: Perforated Panels

Color: Silver, Champagne or Cal. Gray (provide actual color samples of all 3 for final selection by Landscape Architect & City).

Aluminum Fence System

Ametco Aluminum Fencing products are manufactured from extruded aluminum sections and have a powder coat finish.

- Perforated Design - Manufactured from perforated panels with 2" diameter offset holes, supported by manufacturer's recommended posts.

Gates: Manufacturer's recommended gate frame, supported by 4" x 4" x 3/8" posts. Provide padlockable cane or slide bolts at gates.

Removeable Top Grate: Grates shall be manufactured by extruded aluminum and constructed to match fence panels with powder coat finish. Mounting brackets will also be required as recommended by the manufacturer. Provide padlockable cane or slide bolts at grate and fence panel interface.

- xx. SUBMITTALS. Prior to ordering the fence system, the Contractor shall submit manufacturer's literature and Shop Drawings to the Engineer in accordance with Section 105.03. The submittal shall indicate materials, dimensions, tolerances, welding, fasteners, hardware, mounting, finish, accessories, and the manufacturer's warranty. Shop drawings showing layout, dimensions, profiles, spacing of components and anchorage and installation details.
- xx. SAMPLE PANEL. Provide a 4' high by 3' wide minimum sample panel of product with vertical blades for verification by City prior to ordering.
- xx. INSTALLATION. The fence system shall be mounted per the manufacturer's specifications.

All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The Contractor shall protect all parts of the fence and maintain them in an undamaged condition until they are installed and accepted for payment.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Screen fence system) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Screen fence system) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a complete Screen fence system and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials,

equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Screen Fence System)Option A	Lump Sum
900.645 Special Provision (Screen Fence System)Option B	Lump Sum
900.645 Special Provision (Screen Fence System)Option C	Lump Sum

SOIL CELLS

- xx. DESCRIPTION. This work shall consist of furnishing and installing soil cell(s) at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. MATERIALS. The soil cells shall be as provided by the manufacturer and shall meet the specifications outlined in the Plans. Any additional materials including geotextile fabrics and/or geogrids required by the manufacturer shall meet the soil cell manufacturers' specifications.
- xx. INSTALLATION. The soil cells shall be installed at the location indicated in the Plans, to the general configuration shown in the Plans, and in accordance with the manufacturer's specifications. All locations shall be field approved by the Engineer prior to installation.
- xx. MANUFACTURERS. The following manufacturers are capable of supplying soil cells that meet the requirements for this project:
 - DeepRoot Green Infrastructure, LLC
101 Montgomery Street, Suite 2850
San Francisco, CA 94104
Product: Silva Cell 2
Tel.; (415)781-9700
Website: www.deeproot.com
 - GreenBlue Urban Ltd.
4405 Anderson Road
Knoxville, TN 37918
Product: StrataVault 60 Series or StrataCell 60 Series
Tel.; (866)282-2743
Website: www.greenblue.com
- xx. SUBMITTALS. Working Drawings, cell layout plan, and pertinent data shall be submitted to the Engineer for approval in accordance with Section 105.
- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Soil Cells) to be measured for payment will be the number of soil cells (24"W x 48"L x 30.9" equivalent) encapsulated horticultural soils in the complete and accepted work.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Soil Cells) will be paid for at the Contract unit price per each. Payment will be full compensation for furnishing and installing the soil cells, geotextile and/or geogrid wraps including any other materials and labor required by the manufacturer and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Soil Cells)	EA

TENT TIE DOWN HARDWARE

- XX. DESCRIPTION. This work shall consist of furnishing and installing a tent tie down hardware in pavement as well as lawn in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Tent tie down hardware shall be as specified by the manufacturer and shall meet the specifications outlined in the Plans.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The tent tie down hardware shall be installed true to line and grade as shown on the Plans or as directed by the Engineer. Anchor to be installed with ring angled toward direction of force.

The tent tie down hardware shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the tent tie down hardware and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. MANUFACTURER. The Tent Tie Down Hardware shall be manufactured by Anchor Manufacturing:

Manufacturer: Anchor Manufacturing
1510 Lone Oak Road
Eagan, Minnesota 55121
651-270-322
www.anchormfg.com

Model: 3" Square ANC - 204 Assembly & Optional Cover
Material: 304 SS

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Tent Tie Down Hardware) to be measured for payment will be the number of each Tent Tie Down Hardware installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Tent Tie Down Hardware) will be paid for at the Contract unit price for each. Payment will be full compensation for installing a complete Tent Tie Down Hardware and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for anchoring.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Tent Tie Down Hardware)	Each

TRASH, RECYCLING & COMPOSTING RECEPTACLES

- xx. DESCRIPTION. This work shall consist of installing Bigbelly® receptacle(s) provided by the municipality at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. MATERIALS. The receptacles shall be as provided by the manufacturer and shall meet the specifications outlined in the Plans.
- xx. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The receptacle shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The receptacles shall include a surface mounting system for permanently anchoring to a concrete surface.

The trash, recycling & composting receptacles shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer’s recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the receptacles and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. MANUFACTURERS. The product shall be supplied by Bigbelly Solar, Inc:

Manufacturer: Bigbelly Solar, Inc.
 Tel.: (888)820-0300
 www.bigbelly.com
 150 A Street, Suite 103
 Needham, MA 02494
 Model: Bigbelly litter, recycling & composting

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Big Belly Receptacles) to be measured for payment will be the number of each trash receptacle installed in the complete and accepted work.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Big Belly Receptacles) will be paid for at the Contract unit price per each. Payment will be full compensation for installing the trash receptacle provided by the municipality, including hardware necessary for securing the receptacle to the concrete sidewalk, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Big Belly Receptacles)	Each

SURFACE DRAINS

- XX. DESCRIPTION. This work shall consist of furnishing and installing surface drain systems and foundation in accordance with the Plans and as directed by the Engineer. This includes but is not limited to trench drain grates, concrete channel, reinforcing, excavation and all required fasteners.

The work under this Section shall be performed in accordance with these provisions, the Plans and Sections 203, 404 and 541 of the Standard Specifications.

- XX. QUALIFICATIONS. The installer shall provide their installation history, including installation of trench drains to the Engineer.

The installer's foreman shall have a minimum of 5 years of experience in the installation of trench drain systems of similar size and complexity.

- XX. MATERIALS. Materials shall meet the following requirements:

- xx. MANUFACTURER. Trench Drains (TBD)

Trench Drain Type 1: TBD

Grate: 12" x 42" Jamieson Grate Type PA frame

Material: Aluminum, brushed finish

Manufacturer: Urban Accessories Inc.

Tel.; (877)487-0488

www.urbanaccessories.com

- xx. MANUFACTURER. Area Drain Grates and frames shall be by Urban Accessories.

Manufacturer: Urban Accessories Inc.

Tel.; (877)487-0488

www.urbanaccessories.com

Drain Grate Type 2a: 18" x 18" Jamieson Grate and Type PA frame with a 4-3/4" riser.

Material: Ductile Iron, with Rust Conditioner

Drain Grate Type 2b: 18" x 18" Jamieson Grate Type PA frame with a 4-3/4" riser.

Material: Aluminum, brushed finish.

- XX. CONSTRUCTION REQUIREMENTS.

(a) Excavation. Excavation shall be made to the required depth and to the width that will permit placing of base and setting beds as shown in the Plans.

(b) Base. Crushed Gravel shall be placed and compacted to an elevation which will result in the top surface of the pavers being flush with the surrounding pavers.

- (c) Protection of the Grates. The grates shall be stacked at the job site on pallets or suitable platforms that do not unnecessarily obstruct pedestrians or motorists and are protected from damage.
- (d) Installation. Installation shall be performed in accordance with the Plans and the following requirements:
 - (1) The depth control base must be set carefully to bring the grates, when laid, to proper grade.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Trench Drains) to be measured for payment will be the number of square feet placed in the complete and accepted work.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Trench Drains) will be paid for at the contract unit price per square foot. Payment will be full compensation for transporting, handling, and placing the material specified, including grates, concrete channel and aggregate; performing any other required excavation; cleaning the completed surface as required; and for all labor, tools, equipment and incidentals necessary to complete the work.

The Contractor will be responsible for replacing, at no additional cost to the City, any grates that are broken or otherwise damaged by the Contractor's operations.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Area Drain)	Each
900.620 Special Provision (Cobble Runnel Drain)	Each
900.640 Special Provision (Trench Drain)(12")	LF
TBD 900.640 Special Provision (Trench Drain)(8")	LF

TREE GRATES

XX. DESCRIPTION. This work shall consist of furnishing and installing tree grates, root barriers and all required frames, concrete supports, mounting hardware, city standard irrigation/vent and the necessary soils besides horticultural soils in accordance with the Plans, the manufacturers specifications and as directed by the Engineer.

XX. MATERIALS. The tree grates shall be as provided by the manufacturer and shall meet the specifications outlined in the Plans.

xx. MANUFACTURER: The tree grates and frame shall be by Urban Accessories Inc.

Manufacturer: Urban Accessories Inc.

Tel.; (877)487-0488

www.urbanaccessories.com

Model: Tree Gate: Jamison, 6' square

Material: Ductile Iron, with optional Rust Conditioner

xx. SUBMITTALS. Prior to ordering the tree grate, the Contractor shall submit manufacturer's literature and Working Drawings to the Engineer in accordance with Section 105.03. The submittal shall indicate materials, dimensions, tolerances, welding, fasteners, hardware, mount, finish, accessories, and the manufacturer's warranty.

xx. INSTALLATION. The tree grates shall be mounted per the manufacturer's specifications. The frame shall be set in the fresh concrete during fabrication of the reinforced precast concrete footing as indicated in the Plans. Frames shall be flush and level and protected from distortion during concrete placement. Clean concrete and debris from the frame prior to grate installation.

Footing, grate and frame shall be installed flush and leveled with the surrounding finished surfaces. If required, grind pads on underside of tree grates to level and prevent rocking in the frame.

All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The Contractor shall protect all parts of the bench and maintain them in an undamaged condition until they are installed and accepted for payment.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Tree Grates) to be measured for payment will be the number of each tree grate system installed in the complete and accepted work.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Tree Grates) will be paid for at the Contract unit price for each. Payment will be full compensation for installing a complete tree grate and guard system in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for anchoring and any concrete required for anchor footings.

Payment will be made under:

Burlington City Hall Park
Special Provisions

December 2018

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Tree Grates)	Each

GRANITE CURB EDGING

XX. DESCRIPTION. This work shall consist of furnishing and installing granite curb edging including all excavation and concrete mud in accordance with the Plans and as directed by the Engineer.

XX. MATERIALS. Granite curb edging shall consist of 6" x 18" x segment length and shall meet the specifications outlined in the Plans. All granite curb shall be Woodbury granite.

Type A: Thermal face and top, natural back.

Type B: Thermal face both sides and top.

XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The granite curb edging shall be installed true to line and grade as shown on the Plans and in equal segments as detailed on the elevations or as directed by the Engineer.

The granite curb edging shall be installed at the locations indicated in the Plans, to the configuration shown in the Plans and details, and in accordance with the supplier's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all granite curb edging and maintain them in an undamaged condition until they are installed and accepted for payment.

xx. SUPPLIER:

Vermont Stone Art
14 N Main St, Barre, VT 0564
www.vermontstoneart.com

. METHOD OF MEASUREMENT. The quantity of Special Provision (granite curb edging) to be measured for payment will be on a linear foot basis in the complete and accepted work, at the location(s) indicated in the Plans.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (granite curb edging) will be paid for at the Contract lump sum price. Payment will be full compensation for installing granite curb edging and necessary concrete mud, excavation and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Granite Curb Edging Type A, B, C)	Linear Foot

LANDSCAPE EDGING

- XX. DESCRIPTION. This work shall consist of furnishing and installing landscape edging in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Landscape edging shall be as specified by the manufacturer and shall meet the specifications outlined in the Plans.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The landscape edging shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The landscape edging shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the landscape edging and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. MANUFACTURER. The drinking fountain shall be manufactured by Border Concepts:

Border Concepts
7621 Little Ave.
Suite 426
Charlotte, NC 28226
www.borderconcepts.com
800-845-3343

Product: Borcon Guard 3/16" x 4"

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Landscape Edging) to be measured for payment will be the number of each drinking fountain system installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Landscape Edging) will be paid for at the Contract linear foot price. Payment will be full compensation for installing a complete landscape edging system and necessary anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for anchoring and any concrete required for anchor footings.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Landscape Edging)	Linear Foot

PEDESTRIAN HAND RAILING

XX. DESCRIPTION. This work shall consist of furnishing and erecting pedestrian hand railing at the locations indicated in the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 525 of the Standard Specifications.

XX. MATERIALS.

(a) General. Materials for pedestrian hand railing shall meet the requirements specified in the Contract Documents.

(b) Railing and Posts. Pedestrian hand railing and posts shall be made of 1-1/2 inch diameter stainless steel pipe meeting the requirements of Subsection Tubing: ASTM A 554 / Pipe: ASTM A 312/A 312M. Railing and posts shall be ASTM A 554, Grade MT 304. The final railing configuration shall stand approximately 34 inches high above stair tread. Finish: 180 Grit polish.

(b) Rail Anchorage. Anchor bolts shall be Type 304 stainless-steel fasteners. Base plate stainless steel shall be ASTM A 240/A 240M or ASTM A 666, Type 304. Mortar shall meet the requirements of Subsection 707.03.

XX. SHOP DRAWINGS. Fabricator shall produce shop drawings to confirm accurate dimensions, joints and configurations. Shop Drawing shall be approved by Landscape Architect prior to fabrication.

XX. CONSTRUCTION REQUIREMENTS. Pedestrian hand railing shall be installed to the configuration shown in the Plans.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Pedestrian Hand Railing) to be measured for payment will be the number of linear feet of railing placed in the complete and accepted work, measured within the pay limits designated in the Plans.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Pedestrian Hand Railing) will be paid for at the Contract unit price per linear foot. Payment will be full compensation for detailing, furnishing, handling, and placing the materials specified, including posts and post bases; for performing drilling and grouting necessary for post placement; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Pedestrian Hand Railing)	Linear Foot

TEMPORARY CHAIN-LINK, 6 FEET

- xx. DESCRIPTION. This work shall consist of furnishing, erecting and removing 6 feet chain-link privacy fence, gates and posts around the project site, as shown in the Plans and directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 620 of the Standard Specification.

- xx. MATERIALS. The chain link fence shall conform to the requirements of Section 602.20 of the Standard Specifications. Geotextile fabric shall be used for all of the fence area and shall be woven shade cloth made from polypropylene strands. The fabric shall block out a minimum 70% of light.

- xx. INSTALLATION. Fencing shall be provided and erected to the configuration shown in the Contract Documents. Fence posts and gates shall be mounted according to manufactures instruction for temporary fence and removed including repair of disturbed areas.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Temporary Chain-Link Fence, 6 Feet) to be measured for payment will be the number of linear feet of fence and gates installed in the complete and accepted work. Measurement will be along the top of the fence from inside to outside of the corner posts.

- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Temporary Chain-Link Fence, 6 Feet) will be paid for at the Contract unit price per linear foot. Payment will be full compensation for furnishing, transporting, handling, assembling and placing materials specified, including all posts, gate latches, hardware, geotextile fabric, relocations required by construction phasing, and for removing all materials after use and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Temporary Chain-Link Fence, 6 Feet)	Linear Foot

BOLLARD & RAIL FENCING SYSTEM

- XX. DESCRIPTION. This work shall consist of furnishing and installing a complete bollard & rail fencing system and foundation in accordance with the Plans and as directed by the Engineer. This includes but is not limited to screw piles, granite bollards and steel rails.
- XX. MATERIALS. Granite bollards shall be 7" x 7" x 3' Woodbury Granite with a Thermal finish all exposed faces; 2-3/8" Goliath Tech Screw Pile with a 9" helix, 4' - 6" long (to minimize disruption to adjacent tree roots), custom base plate, 2-1/2" OD Corten Steel Pipe Rails and shall meet the specifications outlined in the Plans, details and specifications.
- XX. SHOP DRAWINGS. Fabricator shall produce shop drawings to confirm accurate dimensions, components and configurations. Shop Drawing shall be approved by Landscape Architect prior to fabrication.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The bollard & rail fencing shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The bollard & rail fencing shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the bollard & rail fencing and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. SUPPLIERS of components:

Bollard:
Vermont Stone Art
14 N Main St, Barre, VT 0564
(802) 505-2503
www.vermontstoneart.com

Tech Screw & Base Plate:
Charitie E. Barnes
Inside Sales / Administrator
5 Main St, Bristol VT 05443
802-922-8959
www.goliathtechpiles.com

Corten Rail:
Border Concepts
7621 Little Ave.
Suite 426
Charlotte, NC 28226
www.borderconcepts.com

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Bollard & Rail Fence System) to be measured for payment will be on a lump sum

basis in the complete and accepted work, at the location(s) indicated in the Plans.

- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Bollard & Rail Fence System) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a complete Bollard & Rail Fence System and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Bollard & Rail Fence System)	LS

CONTAMINATED SOILS
MANAGEMENT

- xx. DESCRIPTION. This work shall consist of management of contaminated soils excavated from roadways, sidewalks, utility trenches, and stormwater treatment facilities in reasonably close conformity with the lines, grades, and typical cross sections shown on the Plans or established by the Engineer. For the purposes of this section, management shall include proper handling, storage, treatment and disposal. The work shall include identification, classification, handling, treatment, transportation, disposal and final placement of the contaminated soils. The contractor shall engage the services of qualified environmental consultant to develop and implement a soil management plan and to coordinate plan review and approval with the Vermont Agency of Natural Resources (ANR), Department of Environmental Conservation (DEC), Sites Management Section (SMS). This provision solely addresses the management and disposal requirements unique to contaminated soil, which may be excavated during work described elsewhere in the specification.

This work is in addition to other items requiring excavation in contaminated soils.

- xx. SUBMITTALS. Contractor shall supply cost proposals for contaminated soils management, following the procedures of Subsection 105.30(b)(2) Conceptual Value Engineering Proposal, section a, b, and e. The submittal shall include detailed cost in accordance with Subsection 109.06; and sufficient technical information for evaluation by the Engineer to confirm the proposal meets regulatory requirements.

- xx. CLASSIFICATION. The soils shall be classified as follows:

The near-surface soil at City Hall Park is contaminated by polycyclic aromatic hydrocarbons (PAHs) from atmospheric deposition and by pesticides from historical silviculture practices. In the depth zone of 0-1 ft over much of the Park, these contaminants are present at concentrations above the Vermont Department of Environmental Conservation (VT DEC) Soil Screening Values (SSVs; see Appendix A - 35-APX-A1 of the Investigation and Remediation of Contaminated Properties Rule). Specifically, PAHs are above the urban background concentration of 580 micrograms per kilogram (ug/Kg), and the pesticide 4,4'-DDD is above the residential regional screening level of 2000 ug/Kg. Because of these contaminants, the upper 18" of soil shall be managed as Development Soils as per Section 35-512 of the IRULE. This soil can be temporarily stockpiled onsite as part of the soil management process, and can be temporarily stored offsite at another City Owned property with permission by the VT DEC.

The soil from 2-6' depth has been tested also, and the soil in this zone has concentrations below SSVs with the exception of the northeast corner of the park. Contaminants in this zone extend down to 6 ft and all disturbed soil must be managed as Development Soils, and excavation in this general area should be minimized. For the remaining soil that have concentrations below SSVs, the soil does not need to be managed as Development Soils, and can be used as fill material at other appropriate sites in the VT DEC Urban Background Area after approval by the Environmental Professional.

Preliminary testing of the soil indicates that it is not hazardous or toxic, and meets standard landfill requirements to be disposed of at an approved landfill.

The ANR Guidelines can be found at the following website address:

<http://dec.vermont.gov/waste-management/contaminated-sites/guidance>

The information provided to the Contractor is presented in good faith and is not intended to be a substitute for any investigation that the Contractor may conduct on their own. The Contractor is encouraged to conduct an investigation to define the degree and extent of soil and groundwater contamination in an effort to establish the parameters of the required remediation and/or disposal plan.

- xx. GENERAL CONSTRUCTION REQUIREMENTS. The Contractor's consultant shall develop a contaminated soil management and disposal plan for review and approval from SMS or submit an alternate plan which must be approved by SMS and the Engineer prior to implementation.

Unless otherwise directed in writing by the Engineer, the Contractor shall comply with all provisions of the contaminated soil management and disposal plan. Contaminated soil management and disposal plan shall include frequency of sampling, methods of soil testing, maximum stockpile volumes, locations of stockpiling, soil stockpiling containment, destination of final disposal, and requirements for disposal.

All changes to the remediation/disposal plan ordered in writing by the Engineer will be paid for as Extra Work.

The Contractor shall hire a qualified consultant who shall prepare a site specific Health & Safety Plan, train site workers, monitor contamination levels of excavated soils, and ensure that the remediation/disposal plan is followed. Complete copies of the details of the plan and program shall be provided to the Engineer.

The Agency's Hazardous Materials and Waste Coordinator, or his/her representative, may also monitor the contamination levels of the excavated soils for the Engineer and ensure that the contaminated soil management and disposal plan is fully followed.

If during the excavation, characterization, management or disposal of contaminated soil, the Contractor encounters any condition or situation which is different from that expected, the Contractor shall immediately notify the Engineer. All excavation operations in the contaminated area shall cease until the condition or situation can be evaluated. The evaluation shall include, but is not limited to, the determination of health or other hazards to the Contractor's personnel and the immediate neighborhood, the possibility of explosion, requirements for protective clothing, and special excavation or transportation requirements.

In the event that unidentified hazardous waste or contaminated soils are encountered during construction beyond those areas identified in the plans, the Contractor shall excavate and properly dispose of the contaminated soils as necessary and be compensated under the same Contract items applied to those areas of identified contamination.

The Engineer will decide whether to leave the excavation open and exposed, whether barrier fence shall be erected around the excavation to act as a visible barrier, or whether to backfill it while the Agency and the Contractor are evaluating the situation and negotiating the Supplemental Agreement(s). The cost of installing barrier fence or backfilling the

excavated area, if either is required, will be included in the Supplemental Agreement(s).

No additional compensation or allowance for additional Contract time will be made for any delays incurred waiting for an agreement(s) to be executed, for failure to make an agreement(s), nor for any delays incurred in executing the remediation and/or disposal plan(s).

xx. SOILS MANAGEMENT/HANDLING REQUIREMENTS. The identified top layer(s) of soil identified in the environmental classification report shall require special management to minimize the necessity of offsite disposal. The following is a general sequence of work which will be required:

- a) The top layer of identified Development Soil shall be excavated and segregated from other soils and materials.
- b) These soils shall be temporarily stockpiled. Temporary stockpiling shall occur on the project site and/or at an off-site temporary stockpile location identified by the City
- c) Over-excavation below proposed sidewalks and other hardscape surfaces shall occur to provide the volume necessary for disposal of the contaminated soils removed above.
- d) Contaminated soils shall be placed and compacted in the locations of over excavation to provide suitable subgrade meeting requirements of the associated sidewalk or hardscape section above.
- e) Soils from the over-excavation has been preliminarily identified as having concentrations below the SSV's. This soil shall be disposed of offsite at other appropriate sites in the VT DEC urban background area.

Based on cut-and-fill calculations, the volume of soil to be disturbed that shall be managed as development soils is approximately 2,500 CY.

All soil management must be in accordance with the VT DEC-approved Corrective Action Plan for the project, which is being prepared at this time. Additional inspections and testing of the soil by the Environmental Professional will need to occur during the construction process.

The above soil management sequence will be amended upon receipt of a VT DEC approved Corrective Action Plan for the project.

xx. METHOD OF MEASUREMENT. Special Provision (Contaminated Soils Management) **N.A.B.I.** to be measured for payment will be on a lump sum basis or in accordance with supplemental agreement provisions in the complete and accepted work.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Contaminated Soils Management) **N.A.B.I.** will be paid for as specified for force account work in subsection 109.06.

Payment will be made under:

Pay Item	Pay Unit
900.645 Special Provision (Contaminated Soils Management) N.A.B.I	Lump Sum

The conceptual cost proposal and any subsequent revisions to obtain an approved supplemental agreement shall be incidental to the Contract.

GRANITE BLOCK SEATWALL AT ELLIPSE

- XX. DESCRIPTION. This work shall consist of furnishing and installing a solid granite block seatwall including all excavation, concrete, reinforcing and fasteners and engraved text in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Granite block seatwall shall consist of solid granite and shall meet the specifications outlined in the Plans. All veneer shall be Woodbury granite, with thermal finish for all exposed faces. All outside exposed corner edges shall be eased to avoid chipping during delivery & installation. Do not ease interior edges that abut other blocks. Concrete shall meet the requirements of Section 541 for Concrete, Class B. Reinforcing steel shall meet the requirements of Section 713.01.
- XX. GRANITE. Granite shall meet ASTM C-615 standards for Granite Dimension Stone. Granite shall be sound and uniform in quality, texture and strength, and shall be free of any flaws, reeds, rifts, laminations, seams, or defects which would impair its strength, durability or appearance.
- XX. TOLERANCES. Comply with recommendations of National Building granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."
- xx. SUPPLIER:
- Vermont Stone Art
14 N Main St, Barre, VT 0564
(802) 505-2503
www.vermontstoneart.com
- XX. SAMPLES. Provide a 12" x 12" sample demonstrating thermal finish and eased edge for approval prior to fabrication.
- XX. STEEL ANCHORS, FASTENERS AND DOWELS. Anchor plates and dowels shall be manufactured using AISI Type 304 Steel, of sizes and configurations required to anchor stone elements to resist applicable design loads, per engineered anchoring design. Anchor fasteners shall be Elco Crete-Flex 410 stainless steel Tap-con type screws, passing ASTM B117 testing of 2,00 hours in a salt spray cabinet with no signs of red rust, installed with a commercial grade hammer drill or rotary hammer and specially sized Crete-Flex carbide-tipped drill bit.
- XX. JOINTS. Provide submittals for joint materials, backer rod & sealant.
- Product: Dymonic FC High-Performance, Fast-Curing, Single-Component, Hybrid Sealant. Color as selected from manufacturers standard color chart.
- Manufacturer: Tremco Commercial Sealants & Waterproofing
3735 Green Rd Beachwood OH 44122 216.292.5000 / 800.321.7906
www.tremcosealants.com
or approved equal.

- XX. STONE CLEANER. To clean the stone, Contractor shall use hot water (160 - 180 degrees) under medium pressure (700 - 800 psi) through 45 degree fan spray tip, with water flow rate of 8 gallons per minute; delivered through 45 degree fan spray tip. No acid containing masonry cleaning products permitted. Stone shall be shop cleaned at time of final fabrication. After installation, pointing and caulking. Contractor shall carefully clean stone, removing all dirt, excess mortar, sealant, weld splatter, stains and other site defacements. Stainless steel wire brushes and stainless steel wool may be used, but use of other wire brushes or acid or other solutions which may cause discoloration is prohibited. Demonstrate all alternate cleaning methods on mock up wall for approval.
- XX. SEALER. All exposed granite faces to be sealed and have anti-graffiti coating installed. Vermont Stone Art to recommend product sealer and graffiti coating. Provide 1' x 1' samples of both untreated and sealed and coated granite for approval. Granite samples shall match the specified granite.
- XX. FABRICATION. To ensure accuracy, mill all granite units with a 5 - axis CNC equipment, driven by Pegasus software. Cut stone to produce pieces of thickness, size and shape indicated on the Contract drawings and as developed by the Landscape architect and refined and documented by fabricator in Pegasus digitally modeled format.

Holes shall be factory drilled in edges of granite units requiring embedded anchors, for anchor dowels and other tieback and support devise, per the approved shop drawings. However, additional dowel holes may be drilled at job site by Contractor to facilitate alignment, as required.

Any miscellaneous cutting and drilling of stone necessary to accommodate other trades will be done by the Fabricator only when necessary information is furnished in time to be shown on the shop drawings and details, and when work can be executed before fabrication. Cutting and fitting, due to job site variable conditions, will be the responsibility of the Contractor.

- XX. EXAMINATION. Examine surfaces indicated to receive stone for compliance with requirements for installation tolerances and other field conditions affecting performance. Advise installers of other work about specific requirements for placement of anchors, flashing and similar items to be built into the granite veneer assembly. Proceed with installation only after unsatisfactory conditions have been corrected.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The granite blocks shall be installed true to line and grade as shown on the Plans and in segments as detailed on the elevations or as directed by the Engineer.

All stone work requiring mechanical anchors will be performed as shown on the Contract Drawings. Unit shall be set on concrete base with grout and dowel connections, as shown on Contract Drawings. Fill all dowel holes with same sealant used to point stone joints. Care shall be taken to ensure that any kerfs and dowel holes capable of retaining water are filled after use to prevent water collection and freezing. When installing backer rod and sealant into joints, apply blue masking tape to both sides of joint to prevent sealant from touching face of unit. If

any sealant gets on unit, remove it immediately. After joints have been struck flush, immediately remove protective tape. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before sealing.

The Contractor shall protect all granite blocks and maintain them in an undamaged condition until they are installed and accepted for payment.

- XX. CLEANING. Contractor shall perform in-progress cleaning with water and non-acidic detergent as work progresses, using bucket and brush, or standard garden hose rinsing for all dry set elements. Contractor shall perform a final cleaning of mortar set units using hot water (160 - 180 degrees) under medium pressure (700 - 800 psi) through 45 degree fan spray tip, with water flow rate of 8 gallons per minute, delivered through 45 degree fan spray tip.
- XX. SUBMITTALS. Contractor shall submit, for approval by Landscape Architect, at least 2 sets of samples of the specified stone. Sample size shall be 1'-0" x 1'-0" and represent finish, texture and anticipated full range of color to be supplied. Obtain each variety of stone, regardless of finish, from a single quarry with resources to provide slabs of consistent quality in appearance and physical properties.
- XX. MOCKUP. Upon approval of material, Contractor shall provide full size mock-up of one unit at Fabricators facility. Unit shall be made available for review by Landscape Architect and Owner.
- XX. TEST REPORT. Contractor shall submit reports from tests conforming to ASTM C-615 Standard Specification for Granite Dimension Stone:
- 1.) Compressive strength, psi (ASTM C170)
 - 2.) Density, lbs / CF (ASTM C97)
 - 3.) Absorption by weight, % (ASTM C 97)
 - 4.) Abrasion resistance (ASTM C 241)
 - 5.) Flexural stretch, psi (ASTM C 880)
- XX. DIGITAL SUBMITTALS. Contractor shall submit digital finish submittals of full extent models for units. The fabricator shall produce 3D models as submittals (completed in Pegasus-compatible format for Landscape Architects review) to represent each CNC tool path finish conditions across the entirety of the units. This model will be the file used to produce the final product on a 5 -axis CNC mill to ensure accuracy. 3D Model will be reviewed for overall form and finish only. Approved 3D model does not relieve Contractor of the responsibility to produce accurately dimensioned final product coordinated with approved 2D shop drawings.
- XX. 2D SHOP DRAWINGS. Fabricator shall produce 2D shop drawings to confirm accurate dimensions, joints and configurations. Shop Drawing shall be approved by Landscape Architect prior to stone milling.
- XX. SUPPLIER AND MANUFACTURERS QUALIFICATIONS. Manufacturer shall have a minimum of ten years experience in producing units similar to those required for this project. All granite materials shall be obtained from a supplier having adequate capacity and facilities to meet the specified requirements, and by a Manufacturer equipped to process the

material promptly on order and in strict accordance with design requirements. The Engineer reserves the right to approve the Stone Supplier prior to the award of this contract. All granite material and workmanship quality shall be in accordance with industry Standards and Practices as set forth by the MIA Dimension Stone design Manual and ACI-530 Building Requirements for Masonry Structures.

- XX. INSTALLER QUALIFICATIONS. Installer shall have a record of at least five years of successful installation of units similar to those required for the project.
- XX. DELIVERY STORAGE AND HANDLING. Upon delivery of stone to site, Contractor shall inspect, inventory and prepare stone for installation. Contractor shall store stone on elevated platforms, under cover, in a dry location. Contractor shall report breakage, chipping or problems with stone dimensions to stone Supplier. Resting stone on wood timber supports at job site, without protective plastic, is an example of imposing stains onto stone. Stone accessories, including metal items, shall be stored in clean, dry location.
- XX. PROJECT CONDITIONS. During construction, Contractor shall protect unfinished units by covering with waterproof sheeting at the end of each day's work. Contractor shall immediately remove dirt and impurities to prevent staining of stone faces. Contractor shall protect base of unit from rain splashed mud by coverings spread on the ground and over the unit surface.
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Granite Block Seatwall at Ellipse) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Granite Block Seatwall at Ellipse) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a complete granite veneer wall and necessary foundation, excavation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Granite Block Seatwall at Ellipse)	Lump Sum

GRANITE STAIRS

XX. DESCRIPTION. This work shall consist of furnishing and installing solid granite stair treads including all concrete footings, reinforcing and fasteners in accordance with the Plans and as directed by the Engineer.

XX. MATERIALS. Granite stair treads shall consist of solid granite and shall meet the specifications outlined in the Plans. All granite shall be Woodbury granite, with thermal finish for all exposed faces. Stair nose shall be eased to avoid chipping during delivery & installation. Concrete shall meet the requirements of Section 541 for Concrete, Class B. Reinforcing steel shall meet the requirements of Section 713.01.

XX. GRANITE. Granite shall meet ASTM C-615 standards for Granite Dimension Stone. Granite shall be sound and uniform in quality, texture and strength, and shall be free of any flaws, reeds, rifts, laminations, seams, or defects which would impair its strength, durability or appearance.

Stair Tread Dimensions:

Top Stair Tread: 12"W x 5-3/4"H X Length as shown on plans.

Middle Stair Treads: 14"W x 5-3/4"H x Length as shown on plans.

Bottom Stair Tread: 14"W x 7"H x Length as shown on plans.

xx. SUPPLIER:

Vermont Stone Art
14 N Main St, Barre, VT 0564
(802) 505-2503

www.vermontstoneart.com

XX. STEEL ANCHORS, FASTENERS AND DOWELS. Dowels shall be manufactured using AISI Type 304 Steel, of sizes and configurations required to anchor stone elements to resist applicable design loads, per engineered anchoring design.

XX. STONE CLEANER. To clean the stone, Contractor shall use hot water (160 - 180 degrees) under medium pressure (700 - 800 psi) through 45 degree fan spray tip, with water flow rate of 8 gallons per minute; delivered through 45 degree fan spray tip. No acid containing masonry cleaning products permitted. Stone shall be shop cleaned at time of final fabrication. After installation, pointing and caulking. Contractor shall carefully clean stone, removing all dirt, excess mortar, sealant, weld splatter, stains and other site defacements. Stainless steel wire brushes and stainless steel wool may be used, but use of other wire brushes or acid or other solutions which may cause discoloration is prohibited. Demonstrate all alternate cleaning methods on mock up wall for approval.

XX. FABRICATION. Cut stone to produce pieces of thickness, size and shape indicated on the Contract drawings and as developed by the Landscape architect.

Holes shall be factory drilled in granite units requiring embedded anchors, for anchor dowels and other tieback and support devise, per the approved shop drawings. However, additional dowel holes may be drilled at job site by Contractor to facilitate alignment, as required.

Any miscellaneous cutting and drilling of stone necessary to accommodate other trades will be done by the Fabricator only when necessary information is furnished in time to be shown on the shop drawings and details, and when work can be executed before fabrication. Cutting and fitting, due to job site variable conditions, will be the responsibility of the Contractor.

- XX. EXAMINATION. Examine surfaces indicated to receive stone for compliance with requirements for installation tolerances and other field conditions affecting performance. Advise installers of other work about specific requirements for placement of anchors, flashing and similar items to be built into the granite veneer assembly. Proceed with installation only after unsatisfactory conditions have been corrected.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The granite stair treads shall be installed true to line and grade as shown on the Plans and in segments as detailed on the elevations or as directed by the Engineer.

All stone work requiring mechanical anchors will be performed as shown on the Contract Drawings. Granite shall be set on concrete base with grout and dowel connections, as shown on Contract Drawings. Fill all dowel holes with same sealant used to point stone joints. Care shall be taken to ensure that any kerfs and dowel holes capable of retaining water are filled after use to prevent water collection and freezing. When installing backer rod and sealant into joints, apply blue masking tape to both sides of joint to prevent sealant from touching face of unit. If any sealant gets on unit, remove it immediately. After joints have been struck flush, immediately remove protective tape. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before sealing.

The Contractor shall protect all granite blocks and maintain them in an undamaged condition until they are installed and accepted for payment.

- XX. CLEANING. Contractor shall perform in-progress cleaning with water and non-acidic detergent as work progresses, using bucket and brush, or standard garden hose rinsing for all dry set elements. Contractor shall perform a final cleaning of mortar set units using hot water (160 - 180 degrees) under medium pressure (700 - 800 psi) through 45 degree fan spray tip, with water flow rate of 8 gallons per minute, delivered through 45 degree fan spray tip.
- XX. SUBMITTALS. Contractor shall submit, for approval by Landscape Architect, at least 2 sets of samples of the specified stone. Sample size shall be 1'-0" x 1'-0" and represent finish, texture and anticipated full range of color to be supplied. Obtain each variety of stone, regardless of finish, from a single quarry with resources to provide slabs of consistent quality in appearance and physical properties.
- XX. MOCKUP. Upon approval of material, Contractor shall provide full size mock-up of one unit at Fabricators facility. Unit shall be made available for review by Landscape Architect and Owner.

- XX. TEST REPORT. Contractor shall submit reports from tests conforming to ASTM C-615 Standard Specification for Granite Dimension Stone:
- 1.) Compressive strength, psi (ASTM C170)
 - 2.) Density, lbs / CF (ASTM C97)
 - 3.) Absorption by weight, % (ASTM C 97)
 - 4.) Abrasion resistance (ASTM C 241)
 - 5.) Flexural stretch, psi (ASTM C 880)
- XX. 2D SHOP DRAWINGS. Fabricator shall produce 2D shop drawings to confirm accurate dimensions, joints and configurations. Shop Drawing shall be approved by Landscape Architect prior to stone milling.
- XX. SUPPLIER AND MANUFACTURERS QUALIFICATIONS. Manufacturer shall have a minimum of ten years experience in producing units similar to those required for this project. All granite materials shall be obtained from a supplier having adequate capacity and facilities to meet the specified requirements, and by a Manufacturer equipped to process the material promptly on order and in strict accordance with design requirements. The Engineer reserves the right to approve the Stone Supplier prior to the award of this contract. All granite material and workmanship quality shall be in accordance with industry Standards and Practices as set forth by the MIA Dimension Stone design Manual and ACI-530 Building Requirements for Masonry Structures.
- XX. INSTALLER QUALIFICATIONS. Installer shall have a record of at least five years of successful installation of units similar to those required for the project.
- XX. DELIVERY STORAGE AND HANDLING. Upon delivery of stone to site, Contractor shall inspect, inventory and prepare stone for installation. Contractor shall store stone on elevated platforms, under cover, in a dry location. Contractor shall report breakage, chipping or problems with stone dimensions to stone Supplier. Resting stone on wood timber supports at job site, without protective plastic, is an example of imposing stains onto stone. Stone accessories, including metal items, shall be stored in clean, dry location.
- XX. PROJECT CONDITIONS. During construction, Contractor shall protect unfinished units by covering with waterproof sheeting at the end of each day's work. Contractor shall immediately remove dirt and impurities to prevent staining of stone faces. Contractor shall protect base of unit from rain splashed mud by coverings spread on the ground and over the unit surface.
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Granite stair treads) to be measured for payment will be on a linear foot basis in the complete and accepted work, at the location(s) indicated in the Plans.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Granite stair treads) will be paid for at the Contract linear foot price. Payment will be full compensation for installing a complete Granite stair treads and necessary foundation, excavation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Granite Stairs)	LS

GRANITE VENEER WALL CENTRAL RAINGARDEN

- XX. DESCRIPTION. This work shall consist of furnishing and installing granite veneer including all excavation, concrete, reinforcing, fasteners and sealers in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Granite veneer shall consist of 2" thick face veneer & 3" thick cap veneer and shall meet the specifications outlined in the Plans. All veneer shall be Woodbury granite, with thermal finish for all exposed faces. All outside exposed corner edges shall be eased to avoid chipping during delivery & installation. Do not ease interior panel edges. Concrete shall meet the requirements of Section 541 for Concrete, Class B. Reinforcing steel shall meet the requirements of Section 713.01.
- XX. GRANITE. Granite shall meet ASTM C-615 standards for Granite Dimension Stone. Granite shall be sound and uniform in quality, texture and strength, and shall be free of any flaws, reeds, rifts, laminations, seams, or defects which would impair its strength, durability or appearance.
- XX. TOLERANCES. Comply with recommendations of National Building granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The veneer shall be installed true to line and grade as shown on the Plans and in equal segments as detailed on the elevations or as directed by the Engineer.
- The veneer shall be installed at the locations indicated in the Plans, to the configuration shown in the Plans and details, and in accordance with the supplier's recommendations. All locations shall be field approved by the Engineer prior to installation.
- The Contractor shall protect all veneer panels and maintain them in an undamaged condition until they are installed and accepted for payment.
- xx. SUPPLIER:
- Vermont Stone Art
14 N Main St, Barre, VT 0564
(802)505-2503
www.vermontstoneart.com
- XX. SAMPLES. Provide a 12" x 12" sample demonstrating thermal finish and eased edge for approval prior to fabrication.
- XX. STEEL ANCHORS, FASTENERS AND DOWELS. Anchor plates and dowels shall be manufactured using AISI Type 304 Steel, of sizes and configurations required to anchor stone elements to resist applicable design loads, per engineered anchoring design. Anchor fasteners shall be Elco Crete-Flex 410 stainless steel Tap-con type screws, passing ASTM B117 testing of 2,00 hours in a salt spray cabinet with no signs of red rust, installed with a commercial grade hammer drill or rotary hammer and specially sized Crete-Flex carbide-tipped drill bit.
- XX. JOINTS. Provide submittals for joint materials, backer rod & sealant.

Product: Dymonic FC High-Performance, Fast-Curing, Single-Component, Hybrid Sealant. Color as selected from manufacturers standard color chart.

Manufacturer: Tremco Commercial Sealants & Waterproofing
3735 Green Rd Beachwood OH 44122 216.292.5000 / 800.321.7906
www.tremcosealants.com
or approved equal.

- XX. STONE CLEANER. To clean the stone, Contractor shall use hot water (160 - 180 degrees) under medium pressure (700 - 800 psi) through 45 degree fan spray tip, with water flow rate of 8 gallons per minute; delivered through 45 degree fan spray tip. No acid containing masonry cleaning products permitted. Stone shall be shop cleaned at time of final fabrication. After installation, pointing and caulking. Contractor shall carefully clean stone, removing all dirt, excess mortar, sealant, weld splatter, stains and other site defacements. Stainless steel wire brushes and stainless steel wool may be used, but use of other wire brushes or acid or other solutions which may cause discoloration is prohibited. Demonstrate all alternate cleaning methods on mock up wall for approval.
- XX. SEALER. All exposed granite faces to be sealed and have anti-graffiti coating installed. Vermont Stone Art to recommend product sealer and graffiti coating. Provide 1' x 1' samples of both untreated and sealed and coated granite for approval. Granite samples shall match the specified granite.
- XX. TEST REPORT. Contractor shall submit reports from tests conforming to ASTM C-615 Standard Specification for Granite Dimension Stone:
- 1.) Compressive strength, psi (ASTM C170)
 - 2.) Density, lbs / CF (ASTM C97)
 - 3.) Absorption by weight, % (ASTM C 97)
 - 4.) Abrasion resistance (ASTM C 241)
 - 5.) Flexural stretch, psi (ASTM C 880)
- XX. 2D SHOP DRAWINGS. Fabricator shall produce 2D shop drawings to confirm accurate dimensions, joints and configurations. Shop Drawing shall be approved by Landscape Architect prior to stone milling.
- XX. SUPPLIER AND MANUFACTURERS QUALIFICATIONS. Manufacturer shall have a minimum of ten years experience in producing units similar to those required for this project. All granite materials shall be obtained from a supplier having adequate capacity and facilities to meet the specified requirements, and by a Manufacturer equipped to process the material promptly on order and in strict accordance with design requirements. The Engineer reserves the right to approve the Stone Supplier prior to the award of this contract. All granite material and workmanship quality shall be in accordance with industry Standards and Practices as set forth by the MIA Dimension Stone design Manual and ACI-530 Building Requirements for Masonry Structures.
- XX. INSTALLER QUALIFICATIONS. Installer shall have a record of at least five years of successful installation of units similar to those required for the project.

- XX. DELIVERY STORAGE AND HANDLING. Upon delivery of stone to site, Contractor shall inspect, inventory and prepare stone for installation. Contractor shall store stone on elevated platforms, under cover, in a dry location. Contractor shall report breakage, chipping or problems with stone dimensions to stone Supplier. Resting stone on wood timber supports at job site, without protective plastic, is an example of imposing stains onto stone. Stone accessories, including metal items, shall be stored in clean, dry location.
- XX. PROJECT CONDITIONS. During construction, Contractor shall protect unfinished units by covering with waterproof sheeting at the end of each day's work. Contractor shall immediately remove dirt and impurities to prevent staining of stone faces. Contractor shall protect base of unit from rain splashed mud by coverings spread on the ground and over the unit surface.
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Granite Veneer Wall Central Raingarden) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Granite Veneer Wall Central Raingarden) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a complete granite veneer wall and necessary foundation, excavation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Granite Veneer Wall Central Raingarden)	Lump Sum

GRANITE VENEER WALL COLLEGE ST. TERRACE

- XX. DESCRIPTION. This work shall consist of furnishing and installing granite veneer including all excavation, concrete, reinforcing and fasteners in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Granite veneer shall consist of 2" thick face veneer & 3" thick cap veneer and shall meet the specifications outlined in the Plans. All veneer shall be Woodbury granite, with thermal finish for all exposed faces. All outside exposed corner edges shall be eased to avoid chipping during delivery & installation. Do not ease interior panel edges. Concrete shall meet the requirements of Section 541 for Concrete, Class B. Reinforcing steel shall meet the requirements of Section 713.10.
- XX. GRANITE. Granite shall meet ASTM C-615 standards for Granite Dimension Stone. Granite shall be sound and uniform in quality, texture and strength, and shall be free of any flaws, reeds, rifts, laminations, seams, or defects which would impair its strength, durability or appearance.
- XX. TOLERANCES. Comply with recommendations of National Building granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The veneer shall be installed true to line and grade as shown on the Plans and in equal segments as detailed on the elevations or as directed by the Engineer.

The veneer shall be installed at the locations indicated in the Plans, to the configuration shown in the Plans and details, and in accordance with the supplier's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all veneer panels and maintain them in an undamaged condition until they are installed and accepted for payment.

xx. SUPPLIER:

Vermont Stone Art
14 N Main St, Barre, VT 0564
(802)505-2503
www.vermontstoneart.com

- XX. SAMPLES. Provide a 12" x 12" sample demonstrating thermal finish and eased edge for approval prior to fabrication.
- XX. STEEL ANCHORS, FASTENERS AND DOWELS. Anchor plates and dowels shall be manufactured using AISI Type 304 Steel, of sizes and configurations required to anchor stone elements to resist applicable design loads, per engineered anchoring design. Anchor fasteners shall be Elco Crete-Flex 410 stainless steel Tap-con type screws, passing ASTM B117 testing of 2,00 hours in a salt spray cabinet with no signs of red rust, installed with a commercial grade hammer drill or rotary hammer and specially sized Crete-Flex carbide-tipped drill bit.

- XX. JOINTS. Provide submittals for joint materials, backer rod & sealant.

Product: Dymonic FC High-Performance, Fast-Curing, Single-Component, Hybrid Sealant. Color as selected from manufacturers standard color chart.

Manufacturer: Tremco Commercial Sealants & Waterproofing
3735 Green Rd Beachwood OH 44122 216.292.5000 / 800.321.7906
www.tremcosealants.com
or approved equal.

- XX. STONE CLEANER. To clean the stone, Contractor shall use hot water (160 - 180 degrees) under medium pressure (700 - 800 psi) through 45 degree fan spray tip, with water flow rate of 8 gallons per minute; delivered through 45 degree fan spray tip. No acid containing masonry cleaning products permitted. Stone shall be shop cleaned at time of final fabrication. After installation, pointing and caulking. Contractor shall carefully clean stone, removing all dirt, excess mortar, sealant, weld splatter, stains and other site defacements. Stainless steel wire brushes and stainless steel wool may be used, but use of other wire brushes or acid or other solutions which may cause discoloration is prohibited. Demonstrate all alternate cleaning methods on mock up wall for approval.

- XX. SEALER. All exposed granite faces to be sealed and have anti-graffiti coating installed. Vermont Stone Art to recommend product sealer and graffiti coating. Provide 1' x 1' samples of both untreated and sealed and coated granite for approval. Granite samples shall match the specified granite.

- XX. TEST REPORT. Contractor shall submit reports from tests conforming to ASTM C-615 Standard Specification for Granite Dimension Stone:

- 1.) Compressive strength, psi (ASTM C170)
- 2.) Density, lbs / CF (ASTM C97)
- 3.) Absorption by weight, % (ASTM C 97)
- 4.) Abrasion resistance (ASTM C 241)
- 5.) Flexural stretch, psi (ASTM C 880)

- XX. 2D SHOP DRAWINGS. Fabricator shall produce 2D shop drawings to confirm accurate dimensions, joints and configurations. Shop Drawing shall be approved by Landscape Architect prior to stone milling.

- XX. SUPPLIER AND MANUFACTURERS QUALIFICATIONS. Manufacturer shall have a minimum of ten years experience in producing units similar to those required for this project. All granite materials shall be obtained from a supplier having adequate capacity and facilities to meet the specified requirements, and by a Manufacturer equipped to process the material promptly on order and in strict accordance with design requirements. The Engineer reserves the right to approve the Stone Supplier prior to the award of this contract. All granite material and workmanship quality shall be in accordance with industry Standards and Practices as set forth by the MIA Dimension Stone design Manual and ACI-530 Building Requirements for Masonry Structures.

- XX. INSTALLER QUALIFICATIONS. Installer shall have a record of at least five years of successful installation of units similar to those required for the project.

XX. DELIVERY STORAGE AND HANDLING. Upon delivery of stone to site, Contractor shall inspect, inventory and prepare stone for installation. Contractor shall store stone on elevated platforms, under cover, in a dry location. Contractor shall report breakage, chipping or problems with stone dimensions to stone Supplier. Resting stone on wood timber supports at job site, without protective plastic, is an example of imposing stains onto stone. Stone accessories, including metal items, shall be stored in clean, dry location.

XX. PROJECT CONDITIONS. During construction, Contractor shall protect unfinished units by covering with waterproof sheeting at the end of each day's work. Contractor shall immediately remove dirt and impurities to prevent staining of stone faces. Contractor shall protect base of unit from rain splashed mud by coverings spread on the ground and over the unit surface.

. METHOD OF MEASUREMENT. The quantity of Special Provision (Granite Veneer Wall College St. Terrace) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Granite Veneer Wall College St. Terrace) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a complete granite veneer wall and necessary foundation, excavation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Granite Veneer Wall College St. Terrace)	Lump Sum

GRANITE VENEER WALL MAIN ST. & SW CORNER

- XX. DESCRIPTION. This work shall consist of furnishing and installing granite veneer including all excavation, concrete, reinforcing and fasteners, and granite steps in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Granite veneer shall consist of 2" thick face veneer & 3" thick cap veneer and shall meet the specifications outlined in the Plans. All veneer shall be Woodbury granite, with thermal finish for all exposed faces. All outside exposed corner edges shall be eased to avoid chipping during delivery & installation. Do not ease interior panel edges. Concrete shall meet the requirements of Section 541 for Concrete, Class B. Reinforcing steel shall meet the requirements of Section 713.01.
- XX. GRANITE. Granite shall meet ASTM C-615 standards for Granite Dimension Stone. Granite shall be sound and uniform in quality, texture and strength, and shall be free of any flaws, reeds, rifts, laminations, seams, or defects which would impair its strength, durability or appearance.
- XX. TOLERANCES. Comply with recommendations of National Building granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The veneer shall be installed true to line and grade as shown on the Plans and in equal segments as detailed on the elevations or as directed by the Engineer.

The veneer shall be installed at the locations indicated in the Plans, to the configuration shown in the Plans and details, and in accordance with the supplier's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all veneer panels and maintain them in an undamaged condition until they are installed and accepted for payment.

xx. SUPPLIER:

Vermont Stone Art
14 N Main St, Barre, VT 0564
(802) 505-2503
www.vermontstoneart.com

- XX. SAMPLES. Provide a 12" x 12" sample demonstrating thermal finish and eased edge for approval prior to fabrication.
- XX. STEEL ANCHORS, FASTENERS AND DOWELS. Anchor plates and dowels shall be manufactured using AISI Type 304 Steel, of sizes and configurations required to anchor stone elements to resist applicable design loads, per engineered anchoring design. Anchor fasteners shall be Elco Crete-Flex 410 stainless steel Tap-con type screws, passing ASTM B117 testing of 2,00 hours in a salt spray cabinet with no signs of red rust, installed with a commercial grade hammer drill or rotary hammer and specially sized Crete-Flex carbide-tipped drill bit.

- XX. JOINTS. Provide submittals for joint materials, backer rod & sealant.

Product: Dymonic FC High-Performance, Fast-Curing, Single-Component, Hybrid Sealant. Color as selected from manufacturers standard color chart.

Manufacturer: Tremco Commercial Sealants & Waterproofing
3735 Green Rd Beachwood OH 44122 216.292.5000 / 800.321.7906
www.tremcosealants.com
or approved equal.

- XX. STONE CLEANER. To clean the stone, Contractor shall use hot water (160 - 180 degrees) under medium pressure (700 - 800 psi) through 45 degree fan spray tip, with water flow rate of 8 gallons per minute; delivered through 45 degree fan spray tip. No acid containing masonry cleaning products permitted. Stone shall be shop cleaned at time of final fabrication. After installation, pointing and caulking. Contractor shall carefully clean stone, removing all dirt, excess mortar, sealant, weld splatter, stains and other site defacements. Stainless steel wire brushes and stainless steel wool may be used, but use of other wire brushes or acid or other solutions which may cause discoloration is prohibited. Demonstrate all alternate cleaning methods on mock up wall for approval.

- XX. SEALER. All exposed granite faces to be sealed and have anti-graffiti coating installed. Vermont Stone Art to recommend product sealer and graffiti coating. Provide 1' x 1' samples of both untreated and sealed and coated granite for approval. Granite samples shall match the specified granite.

- XX. TEST REPORT. Contractor shall submit reports from tests conforming to ASTM C-615 Standard Specification for Granite Dimension Stone:

- 1.) Compressive strength, psi (ASTM C170)
- 2.) Density, lbs / CF (ASTM C97)
- 3.) Absorption by weight, % (ASTM C 97)
- 4.) Abrasion resistance (ASTM C 241)
- 5.) Flexural stretch, psi (ASTM C 880)

- XX. 2D SHOP DRAWINGS. Fabricator shall produce 2D shop drawings to confirm accurate dimensions, joints and configurations. Shop Drawing shall be approved by Landscape Architect prior to stone milling.

- XX. SUPPLIER AND MANUFACTURERS QUALIFICATIONS. Manufacturer shall have a minimum of ten years experience in producing units similar to those required for this project. All granite materials shall be obtained from a supplier having adequate capacity and facilities to meet the specified requirements, and by a Manufacturer equipped to process the material promptly on order and in strict accordance with design requirements. The Engineer reserves the right to approve the Stone Supplier prior to the award of this contract. All granite material and workmanship quality shall be in accordance with industry Standards and Practices as set forth by the MIA Dimension Stone design Manual and ACI-530 Building Requirements for Masonry Structures.

- XX. INSTALLER QUALIFICATIONS. Installer shall have a record of at least five years of successful installation of units similar to those required for the project.
- XX. DELIVERY STORAGE AND HANDLING. Upon delivery of stone to site, Contractor shall inspect, inventory and prepare stone for installation. Contractor shall store stone on elevated platforms, under cover, in a dry location. Contractor shall report breakage, chipping or problems with stone dimensions to stone Supplier. Resting stone on wood timber supports at job site, without protective plastic, is an example of imposing stains onto stone. Stone accessories, including metal items, shall be stored in clean, dry location.
- XX. PROJECT CONDITIONS. During construction, Contractor shall protect unfinished units by covering with waterproof sheeting at the end of each day's work. Contractor shall immediately remove dirt and impurities to prevent staining of stone faces. Contractor shall protect base of unit from rain splashed mud by coverings spread on the ground and over the unit surface.
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Granite Veneer Wall Main St. \$ SW Corner) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Granite Veneer Wall Main St. & SW Corner) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a complete granite veneer wall and necessary foundation, excavation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Granite Veneer Retaining Wall Main ST & SW CORNER)	Lump Sum

SECTION 131213 - EXTERIOR FOUNTAINS

PART 1 - GENERAL

INTERACTIVE FOUNTAIN SYSTEM

1. DESCRIPTION. This work shall consist of furnishing and installing a complete interactive fountain system and foundation in accordance with the Plans and as directed by the Engineer. This includes but is not limited to mechanical vault, water reservoir vault, chemical vaults, fountain hardware, pumps, control panel, plumbing and wiring.

The fountain consists of (12) Pop-jet nozzles with integral RGB LED ring light with the showerhead spray pattern operating at a maximum display height of 6' and (13) Smooth Bore Pop-jet nozzles with integral RGB LED ring light, the Pop-jet nozzles will operate at a maximum display height of 6'.

2. MATERIALS. Interactive Fountain shall be as specified by the fountain designer and shall meet the specifications outlined in the Plans, details and specifications.
3. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The interactive fountain shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The interactive fountain shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the interactive fountain and maintain them in an undamaged condition until they are installed and accepted for payment.

4. MANUFACTURER. The interactive fountain equipment shall be as specified and designed by Delta Fountains:

Manufacturer: Delta Fountains
11494 Columbia Park Dr W # 4, Jacksonville, FL 32258
www.deltafountains.com
(904) 886-9030

5. METHOD OF MEASUREMENT. The quantity of Special Provision (Interactive Fountain System) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.
6. BASIS OF PAYMENT. The accepted quantity of Special Provision (Interactive Fountain System) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a complete interactive fountain system and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for

furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Interactive Fountain System)	Lump Sum

1.1 SUMMARY

A. Work of this Section includes all labor, materials, equipment, tools, incidentals, and services necessary to design, engineer, manufacture, supply, and install the Stationary Fountain with related mechanical and electrical systems complete including all components, hardware, and accessories as indicated on the Contract Drawing and specified herein:

1. Discharge and suction piping systems.
2. Electrical conduit and wiring systems.
3. Subterranean Vault
4. Mechanical and electrical equipment with components and accessories.
5. Manufacture of primary fountain equipment and components is a "Basis of Design".
6. Include fountain system testing, adjustment, and operational training for Owner.
7. Custom fabricated fixtures.

B. Related Sections include the following:

1. Division 7, Section 071000 "Damp proofing and Waterproofing"
2. Division 13 Section 130112 "Operation and Maintenance of Fountains"
3. Division 13 Section 130500 "Common Work Results for Special Construction"
4. Division 13 Section 130812 "Commissioning of Fountains"
5. Division 22 Section 220110 "Operation and Maintenance of Plumbing Equipment"
6. Division 22 Section 220150 "Operation and Maintenance of Pool and Fountain Plumbing Systems"
7. Division 22 Section 221513 "Common Motor Requirements for Plumbing Equipment"
8. Division 22 Section 220516 "Expansion Fittings and Loops for Plumbing Piping"
9. Division 22 Section 220519 "Meters and Gages for Plumbing and Piping"
10. Division 22 Section 220523 "General-Duty Valves for Plumbing Piping"
11. Division 22 Section 220529 "Hangers and Supports for Plumbing Piping and Equipment"
12. Division 22 Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment"

13. Division 22 Section 220553 "Identification for Plumbing Piping and Equipment"
14. Division 22 Section 220650 "Schedules for Pool and Fountain Plumbing Systems"
15. Division 22 Section 220700 "Plumbing Insulation"
16. Division 22 Section 220800 "Commissioning of Electrical Systems"
17. Division 22 Section 221116 "Domestic Water Piping"
18. Division 22 Section 221316 "Sanitary Waste and Vent Piping"
19. Division 22 Section 221423 "Storm Drainage Piping Specialties"
20. Division 22 Section 225200 "Fountain Plumbing Systems"
21. Division 26 Section 260500 "Common Work Results for Electrical"
22. Division 26 Section 260526 "Grounding and Bonding for Electrical Systems"
23. Division 26 Section 262816 "Enclosed Switches and Circuit Breakers"
24. Division 26 Section 265529 "Underwater Lighting"

C. Related Fountain System Work to be Provided by Other Separate Contractors:

1. Paving systems.
2. Earthwork including trench excavation and backfill.

1.2 REFERENCES AND STANDARDS

A. General: As Specified in Division 1.

B. "Rules Governing and Restricting the Use and Supply of Water", City of Burlington, VT. Department of Environmental Protection, Bureau of Water and Sewer Operations, Division of Water Connections and Permits.

C. Other Standards and References:

1. American Society for Testing and Materials (ASTM).
2. American Water Works Association (AWWAA).
3. American Public Works Association (APWA).
4. American National Standards Institute, Inc. (ANSI).
5. National Fire Protection Association (NFPA).
6. Underwriters Laboratories, Inc. (UL).
7. National Sanitation Foundation (NSF).
8. Department of Health (DOH).
9. National Electric Code (NEC).
10. American Society of Mechanical Engineers (ASME).
11. American Society of Sanitary Engineering (ASSE).
12. Commercial Standards (CS).
13. National Electrical Manufacturer's Association (NEMA).
14. Uniform Building Code (UBC).
15. Institute of Electrical and Electronic Engineers (IEEE).
16. Insulated Power Cable Engineers Association (IPCEA).
17. International Plumbing Code (IPC)

D. All work shall conform to the latest edition of the National Building Code and/or International Plumbing Code.

1.3 SYSTEM REQUIREMENTS

A. Design Requirements:

1. The fountain described in this Section shall be a fully automated, self-contained type stationary feature.
2. The work of this Section shall include design of equipment items for fabrication and installation of fountain equipment and components to suit Project requirements as approved by Owner. See Division 1 for additional provisions related to delegated design by Owner's Engineer.

B. Performance Requirements:

The fountain consists of (12) Pop-jet nozzles with integral DMX programmable RGB LED ring light with the showerhead spray pattern operating at a maximum display height of 6' and (13) Smooth Bore Pop-jet nozzles with integral DMX programmable RGB LED ring light, the Pop-jet nozzles will operate at a maximum display height of 6'. The nozzles are to be interchangeable with the ability to change the nozzle display at a later date, at the discretion of the owner. The pumps are sized to provide enough volume and head pressure assuming all of the nozzles were to be showerhead displays. The nozzles will be divided into three zones with each zone operating independently of the other two for display heights. An anemometer is incorporated into the controls system to limit the height of the nozzles based on wind speed input to the controller. The RGB lighting will be programmed in consultation with the owner for various shows for special events and holidays.

1.4 SUBMITTALS

A. General: Refer to and comply with Division 1 Section, for procedures and additional submittal criteria.

B. Installer Qualifications: Comply with Article "Quality Assurance" herein. Submit fountain system installer qualifications including resume and system identification of previous work experience on fountain systems of type indicated for Project and the following work:

1. Plumbing work.
2. Electrical work
3. Concrete and Waterproofing Work.
4. Other specific work; rock work, stainless steel, etc...

C. Product Data:

1. Submit manufacturers' data for all equipment and individual components listed in "Part 2 - Products".

2. Submit a comprehensive electrical package to include a power diagram, logic diagram, process and instrumentation diagram, panel layout, component schedule, and cut sheets on all individual components in the control panel. The contractor shall furnish evidence that the building department has been contacted to assure local compliance and that any exceptions to local requirements or the National Electric Code have been addressed.
 3. Submit for other items and materials of system not indicated in this Section including for items of conduit, wiring, electrical devices, piping and fittings, sealants and/or seals to confirm compatibility and conformance to Project wide requirements.
- D. Shop Drawings: A concise plan, details, and section(s) shall accompany the submittal data on all components to assure compliance with the intended design as specified and shown on the Contract Drawings.
1. Include equipment and material handling instructions and interfacing requirements and coordination notes with other trades and contractors.
 2. If family product data sheets are submitted for approval, cross out all items not appropriate and highlight the selections for the components to be submitted, include all options.
- E. Samples for Verification: Submit for surface exposed elements of system as requested by Architect and highlight only the information that is pertinent.
- F. Quality Control Submittals:
1. Test Reports: Fountain manufacturer's test report must be included in the control panel information package. This report shall include results of the test on both motors and all lighting circuits and uncommissioning report indicating proper operation.
 2. Field Reports: The manufacturer shall provide a field test report in the controls package. This report, which includes information on the field voltage, current, and resistance at all components, must be filled out by the installing electrical contractor and submitted to the manufacturer and the Architect for approval.
- G. Contract Closeout, Operations and Maintenance: Submit manuals pertaining to the operations and maintenance of the fountain system prior to final approval of system installation. The manuals shall include specification sheets, operations and maintenance data, exploded diagrams, replacement part lists, copies of field and test reports, and warranty information. Comply with Division 1.

1.5 QUALITY ASSURANCE

- A. General:

1. Insofar as possible, all materials and equipment used in the installation of this work shall be of the same brand or manufacturer throughout for each class of material or equipment. The specification has allowed for substitutions, however, the substitution process will be strictly adhered to. If the process is incomplete, or not within the time frame, no substitutions will be considered. Substitutions will not be partially approved. If any item is not approved, the entire submittal will be rejected, not for resubmission. There will be no consideration for alternates, after the bid. Conform to Reference Standards and other Project Manual Sections as applicable.
 2. Piping materials shall bear label, stamp, or other markings of specified testing agency.
 3. Use numbers of skilled workmen equal to work requirement or occasion. The skilled workman shall be thoroughly trained and experienced in the necessary crafts and shall be completely familiar with the specified requirements and methods needed for proper performance of the work in this Section.
- B. Fountain Manufacturer: The fountain equipment described in this section shall be supplied by Delta Fountains, Jacksonville, Florida, (800) 641-6675, Fax: (904) 886-9089. All other fountain manufacturers requesting approval must comply with the requirements listed in the SUBMITTALS section under the Product Data paragraph. All manufacturers' data on individual components listed in PART 2: Products, or pre approved equals where allowed, shall be submitted to the Landscape Architect and fountain consultant, prior to approval. Manufacturers requesting prior approval shall submit to owner, at least 10 business days prior to the bid date, all data on all individual components listed in PART 2: Products, for review by the owner and fountain consultant. All approvals will be issued in an addendum prior to the bid date.
- C. Installer's Qualifications: Plumbing and electrical work for fountain system installation shall be performed by firms with each having at least 5 years of successful commercial fountain installation experience on features similar to that required for the Project.
- D. Water feature contractor qualifications:
1. The water feature installing contractor shall have five (5) projects of similar complexity in the past 3 years. In entering into a contract covering this work, the Contractor accepts the specifications and drawings and guarantees that the work will be performed in accordance with the requirements of the specifications and drawings or such modifications to said specifications and drawings as may be made in the contract documents. The Contractor, in accepting the contract, has verified the design, and will perform such work as is required to achieve the design intent.
 2. The contractor shall currently be in the business of constructing custom water features and shall have a continuous 5 year record of no less than 5 successful projects of equal or greater scope.
 3. The Contractor further guarantees that the workmanship and material will be of the best quality procurable and that none

but experienced workmen, familiar with each particular class of work, will be employed

4. The Contractor further agrees to hold himself responsible for any defects which may develop in any part of the entire system, including equipment as provided for under this specification, due to faulty workmanship, design or material and to replace, make good, without cost to the Owner, any such faulty parts or construction which may develop at any time within one (1) year from the date of the final acceptance. Any repairs or replacements required because of defects, as outlined in this clause, are to be made promptly and approved in writing by the Landscape Architect.
- E. Field Measurements: Verify dimensions with other work on Project which adjoins the equipment item(s) of this Section or to which work of this Section will be a part.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Fountain manufacturer shall adequately package all shipments to protect the material during shipment. Consolidate freight of like items when possible to ensure minimal shipments. All shipments to be freight on board, manufacturer's plant, with fully insured freight allowed to the jobsite.
- B. Handling and Unloading: All shipments shall be driver signed and counted to verify that all components listed on the packing slips are included in shipment prior to leaving the manufacturer's premise.
- C. Special Handling: Contractor to take necessary precautions in unloading, handling, moving, and storing all shipments, until it is installed in its final position, to protect all components from damage. Contractor to refer to all notes on the shop drawings for any additional instructions on handling fountain equipment.
- D. Acceptance at Site: Contractor to schedule and arrange for delivery of all shipments. Contractor is responsible for preparations of all equipment necessary to safely facilitate the unloading of all shipments and moving it to the final location. Freight is F.O.B plant, full freight allowed to jobsite. Contractor to account for all items in each shipment for accuracy before signing for acceptance of shipment. All damages and shortages shall be clearly documented on the Bill of Lading and packing slip before the delivery driver leaves the premises. The manufacturer shall be promptly notified within 24 hours of any and all documented damages and shortages. By signing the bill of lading, it is mutually agreed that the goods listed are accepted in apparent good order, condition and correct quantity, except as noted, and are in proper condition for transportation according to the applicable regulations of the department of transportation (for truck load shipments). In cases where shipments that are damaged in-transit and are signed for in good condition, it will be the contractor's responsibility to replace those damaged items. All shipments are subject to the manufacture's standard terms and conditions.

- E. Storage and Protection: Contractor shall store all components in their original packages and protect all items from damage until final placement occurs. Contractor shall rotate all motor shafts $\frac{1}{4}$ turn each and every month during storage up to the time of first performance to ensure motor shaft integrity.

1.7 WARRANTY

- A. Contractor and installer shall furnish warranty for fountain system installation for a minimum period of one year from date of Substantial Completion of the Contract as specified in Contract Conditions. Contractor shall include provisions of warranty to Owner not otherwise covered by manufacturer. Warranty to include the following:

1. Fountain system to be free of defects of materials and workmanship.
2. Fountain system performance to the designated water volumes, heights, patterns, and display features, as outlined in the design requirements in section 1.3(E)(3).
3. Adjustments and/or corrections to warranted equipment shall be made at factory as per standard warranty terms.

- B. The manufacturer shall warrant all properly installed and maintained fountain equipment (except lamps) as provided in "Part 2 - Products" of this Section, free of defects in material and workmanship for a minimum period of 18 months from shipment or one year from 1st performance, whichever comes first. The fountain manufacturer, at their option, shall replace or repair any materials, components, or workmanship found to be defective within the warranty period when returned to the factory, freight pre-paid. No component may be returned for repair or replacement without an approved return materials authorization.

1. Extended Warranties: Fountain manufacturer shall furnish to Owner any extended warranty that is standard and usually available from item manufacture/supplier for an item of equipment.

1.8 MAINTENANCE AND EXTRA MATERIALS

- A. Contractor shall supply chemical treatment materials of sufficient quantity, in addition to materials needed for system testing and adjustment, for use by Owner in maintenance of the system for a period of at least one month after Substantial Completion.
- B. Contractor shall supply any other special tools or parts that would be needed for Owner's maintenance of the fountain system.
- C. Extra Materials - one additional replacement element is to be provided for all cartridge filters. Contractor to supply 30 day supply of chemicals

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Mechanical Components: The major mechanical components of the stationary fountain are as follows:

1. DFFP-400, 4 Hp, Self-priming, ETL listed full-rated filter pump. One piece plastic case constructed with basket strainer, easy on/on/off two piece lid for tool free access to removable basket strainer. Chemical and UV resistant with re-enforced suction and discharge connections. The motor shall be 208V, 3 phase, 3500 R.P.M. The pump shall operate at a minimum of 150 GPM at 65' TDH and shall have 4" suction and 4" discharge ports. Filter pump is pre-plumbed and pre-wired in the equipment vault including all necessary check valves, isolation/flow control valves, true union type, and vacuum switch gauge panel assembly as shown on the drawings.
2. DFCF-200, 200 SQ. FT. Cartridge filter, heavy-duty abs constructed with cam & ramp lid for easy access to removable, washable filter media. Include one spare element.
3. DFWMUA-100, 1" water make-up assembly, type 304, schedule 40 stainless steel constructed with 110V, bronze, slow closing solenoid valve, water hammer arrestor and (3) 1" heavy-duty bronze constructed ball valves. The water make-up assembly is pre-plumbed ready for installation by the contractor. PVC or copper construction is not acceptable. The contractor shall connect in-line on fresh water make-up line and provide back-flow preventer and/or reduced pressure zone, and pressure reducing valve to ensure the incoming line pressure does not exceed 50 P.S.I.
4. Hammer Arrestor, ASSE 1010 certified, type L copper tube, HHPP piston with two lubricated EPDM O-rings, FDA approved lubricant, rolled piston stop, wrought copper male thread adapter. (manufacturer and product: Sioux Chief Mfg. Co., Inc., Series 650 and 660).
5. DFWLS-T, Transducer style water level sensor, min. type 316 stainless steel housing with isolated diaphragm sensors. The transducer is certified intrinsically safe, 4 to 20 mA outputs. The transducer is shipped complete with polyurethane jacketed shielded cable with polyethylene vent tube and Kevlar tension members, 200 lbs pull strength for use in a 5' depth tank. Conductors are 22 AWG. The length of the cable shall be no less than 150' and shall be verified by contractor if more is required to make home run to PLC without a junction.
6. DFDS-14SS-PJ/SH, Custom fabricated type 304 stainless steel and fiberglass constructed discharge sump with stainless steel grate, 27W/12VAC RGB LED ring light with nozzle insert (showerhead and smooth bore), 12VAC Pop-jet nozzle with quick connect fitting and valve, junction box, potting compound and cord seals.
7. DFPJN-100F, Animated pop jet nozzle with machined stainless steel nozzle (nozzle insert in ring light fixture), stainless steel support and high density synthetic construction, capable of producing programmed effects at a high switching speed of up

- to 10 times per second via a 12 VAC switching mechanism. The nozzle is to be housed in a stainless steel sump with light and grate, pre-plumbed with Cam-Lock type quick disconnect fittings attached to rib reinforced Tigerflex tubing that will not kink.
8. DFUL-27W, (27W) selectable 12VAC RGB LED UL Listed, IP68 rated, wet/dry fountain ring light fixture with oversized face ring, certified marine grade 316SS housing with minimum 1/8" thick shell (stamped or spun fixture housing will not be accepted), silicone gasket, tempered glass lens, 10-15 degree beam angle, 3M UL listed SOW cable (3,5 or 7 wire). Static or Auto preprogrammed color change with connection to power supply, supplied with internal DMX-512 and driver on board. Replaceable LEDs, removable base disc and yoke for wet or dry installation and standard "sparkle matt" face ring with optional mirror polish SS.
 9. DFJB-4, 4-Tap underwater junction box, cast bronze constructed with silicone gasket and (1) 3/4" bottom tap and (4)
 10. DFGDF-400, 4" N.P.T. Gravity drain fitting, sch. 40 type 304 stainless steel constructed with integral water-stop flange.
 11. DFGDF-600, 6" N.P.T. Gravity drain fitting, sch. 40 type 304 stainless steel constructed with integral water-stop flange.
 12. DFCC-50, 1/2" Machined brass cord seals with neoprene grommet, for water sensor cord.
 13. DFPC-2123C, two part re-enterable potting compound for application in the junction boxes to provide watertight environment for electrical connections.
 14. DFCFV-3030, 30" X 30" Chemical feed vault with aluminum tile set hatch, fiberglass constructed with all fittings glassed to the tank wall for watertight integrity. Includes 20 gal. polypropylene tank for acid and 60 gal. tank for chlorine storage.
 15. DFST-11200, 8' x 14' x 6' subterranean equipment vault, heavy-duty fiberglass constructed with minimum (13) layers of fiberglass or a minimum of 1" thick, one-piece molded construction on bottom shell and lid. Fabricating the bottom shell from fiberglass sheets and caulking the joints will not be acceptable. The vault access hatch shall be 42" X 42" Aluminum tile set hatch bolted to the fiberglass with stainless steel lockable hardware. 6" vents with fiberglass vent caps. All pipe connection fittings to be glassed and sealed to the tank wall for watertight integrity. The use of bulkhead type fittings will not be accepted. A leveling skid fabricated from steel tubing shall be glassed to the vault bottom allowing for clearance of the sump and for ease of leveling and handling of the vault on site. The vault is to house the feature/filter pump, filtration equipment, UL listed control panel, automatic sump pump, exhaust fan, utility light and access ladder. The vault is pre-plumbed and pre-wired ready for installation and dome lid. As shown on the drawings.
 16. DFORP/pH-PM200, 120VAC 5A single phase combination ORP/pH chemical controller. Fully interactive Ethernet TCP/IP graphical interface with security access codes. 2 line, 16 character LCD display, 5 buttons, 2 LEDs: Steady Blue = "OK", Flashing Blue = flow switch is in "Recovery Delay" after a flow interruption, Flashing Red = "Alarm". Control - On/Off, P/PI/PID, Time Modulated, Event Timer, Flow Restored delay (adjustable).

- Communication - HTML server on board, standard, USB port, Standard Ethernet, Wireless EVDO Cellular, Optional WiFi for use with Smartphone / iPad, HTML Micro Web Server with user definable IP address Non-metallic NEMA 4x enclosure with lithium battery for ram stored values.
17. DFCT-3600, 6, x 6," x 6' Collector tank, heavy-duty fiberglass constructed with minimum (13) layers of fiberglass or a minimum of 3/4" thick, one-piece molded construction on bottom shell and lid. Fabricating the bottom shell from fiberglass sheets and caulking the joints will not be acceptable. The vault access hatch shall be 42" x 42" Aluminum tile set hatch and bolted to the fiberglass with stainless steel lockable hardware, All pipe connection fittings to be glassed and sealed to the tank wall for watertight integrity. The use of bulkhead type fittings will not be accepted. A leveling skid fabricated from steel tubing shall be glassed to the vault bottom allowing for clearance of the sump and for ease of leveling and handling of the tank on site. The tank will house the sump pump, overflow, junction box, water level sensor, and filter discharge manifold. The tank is pre-plumbed and ready for installation.
 18. DFUV-30. Ultraviolet light sanitizer, 208V, 1 phase, 114 GPM maximum flow to produce a UV dosage rate of 40mJ/sec/cm² at the end of the bulb life. The unit shall have an average bulb life expectancy under normal conditions equal to 8,000 - 12,000 hours. The UV chamber unit is manufactured of 316L stainless steel, with 3" flanged ANSI 150 RF fittings and produces wave lengths that operate within a 200 nanometer to 315 nanometer range or UV-C spectrum and remain unaffected by water temperature variance. The unit comes equipped with temperature probes, UV monitor probes, power control, and automatic wiper system. The medium pressure system shall produce an energy band in the bacterial region and shall emit multiple wave lengths suitable for chlorine destruction and have high power outputs (1.3kw -7.3kw). The UV units shall be validated via 3rd party testing to meet the requirements of the health department codes. An external signal supplied from a flow switch/meter shall be tied into the control cabinet for water flow detection through the chamber to not allow the lamp to operate in a no flow condition. The chambers shall include temperature sensors and UV output monitors wired to the control unit. The control system for the UV unit shall be located in a NEMA 12 (IP54) rated panel. The control unit shall incorporate simple touchpad control buttons for ease of operation and shall be capable of incorporating many user configurable features for system integration and the microprocessor shall be able to be set up and monitored from a remote computer. The unit shall have a polychromatic light for improved chloramines destruction and shall also be designed to improve performance by treating 100% of the filtration flow. The unit shall be NSF/ANSI 50 certified, manufactured in the US, have MET/UL/CSA approval, and ISO9001 quality systems compliancy. The unit shall incorporate advanced wiper technology that is DC electrically powered. The wiper shall be able to park away from the lamp reducing wiper ring degradation. The location of the wiper shall incorporate an optical readout and have no proximity switches, magnets, or timers and shall incorporate multiple seal arrangements for long

- life. The UV control unit shall include many interface options such as process interlock for local pressure switch pump interference, low power overnight operation, automatic restart on power supply interruption, and shall have profibus interface capabilities. The lamp technology shall incorporate chokes. Units supplied with ballasts are not acceptable. The control panel unit incorporates multiple levels of operation and shall include stop/start reset buttons. The unit shall also include LED two line text display indicating UV dosage, lamp current, UV intensity, flow, temperature, operational hours, lamp fault, low UV and temperature alarm, pre-temperature alarm, power supply over-temp alarm, ground fault trip, and wiper fault. The unit shall incorporate interface controls of local remote operation, process interruption, valve control with limit switch feedback, UV shutdown, and flow meter input. The unit shall have built in data-logging which include parameters logged of UV intensity required, UV intensity measured, lamp current, temperature, flow, time and date, and all alarms generated.
19. DFVG-100, Vacuum Switch and gauge panel assembly equipped with (1) weathertight nema 4 enclosed, single pole/double throw switching element, combination vacuum switch with viton o-rings that are suitable for temperatures of 32° - 400° F. Panel also includes (1) ¾" N.P.T., glycerin liquid filled, 304 stainless steel cased pressure gauge with 2.25" dia. face, and (1) ¾" N.P.T., glycerin liquid filled, 304 stainless steel cased vacuum gauge with 2.25" dia. face. Mounted on P.V.C. backboard.
 20. DFDPS-100, Differential Pressure Switch and gauge panel assembly equipped with (1) weathertight nema 4 enclosed, single pole/double throw switching element, pressure differential switch with viton o-rings that are suitable for temperatures of 32°- 400° F. Panel is also equipped with influent and effluent ¾" N.P.T. glycerin liquid filled, 304 stainless steel cased pressure gauges with 2.25" dia. face. Mounted on P.V.C. backboard.
 21. DFFP-050, ½ Hp, Self-priming, NSF approved full-rated filter pump and fitted 2" FPT connections. The pump shall operate at a minimum of 40 GPM at 40' TDH. Pump is one piece case constructed with oversized basket strainer, double ring lock design lid for tool free access to removable basket strainer and pump internals. The pump shall have a floating eye seal between the closed impeller and diffuser for maximum efficiency. The motor shall be 208V, 3 phase, 3450 R.P.M and have a rust-proof stainless steel shaft, and permanently lubricated, sealed bearings. Filter pump is pre-plumbed and pre-wired in the equipment vault including all necessary check valves, isolation/flow control valves, true union type, as shown on the drawings.
 22. DFSF-3.14, 24 1/2" Diameter Sand filter with automatic back washing valve, 3.14 square feet of filter surface area and stainless steel linkage valve system with pressure differential switch for backwash activation, pre-plumbed on tank., The sand filter tank is heavy duty one piece re-enforced fiberglass constructed with UV resistant outer coating surface finish. Sand filter includes easy access, heavy duty closure with integral pressure gauge with air-relief valve, swing away diffuser for easy access to sand and internal parts, all internal parts are

threaded for ease of service, maximum operating pressure - 50 p.s.i. The automatic backwash linkage system shall consist of one 3-port bronze body ball valve with electronic actuator, one cast bronze 3-port ball valve and sch. 80 P.V.C. Piping with flanged, clear acrylic sight glass. The valves are connected by type 304 stainless steel single lever linkage with double operator arms and stainless steel jam nuts and couplings to facilitate manual adjustment of the linkage assembly. The electronic actuator shall be powered by 120V relay outputs from either the P.L.C. (if provided) or relays in the control panel. The backwash initiation shall be configurable for either a set time for backwashing or by use of a pressure differential switch measuring pressure differential from the influent and effluent sensors located on the face piping manifold of the filter. A visual alarm light or dedicated screen on the H.M.I. will be incorporated in the main control panel to alert when the system is in the backwash cycle. Controls for the automatic backwash will switch the position of the 3-port valve when the pressure transmitters read the set pressure differential level. Once the 3-port valve state is switched, the controls will run through a timer controlled backwash cycle. Once the time set of the cycle is complete, the controls will switch the 3-port valve back returning to normal filtration cycle. Sand filter is pre-plumbed in equipment vault. Filter media is to be provided by contractor.

23. DFPAV-200, 120VAC NEMA 4X aluminum alloy powder coated electric actuator, designed for load requirements of up to 445 in/lbs and be used in either a horizontal or upright position. Outdoor or humid environments actuators must be continuously powered up and the heater is functioning. Actuator has two auxiliary switches, (shared common, rated at 3A 250V Max.), an internal low power heater and mechanical connections that are ISO5211 compliant. The Actuator shall come with the optional internal proportional control card that accepts a wide range of control signal and generates multiple feedback signals and built-in manual override capabilities. Duty cycle on all actuators shall be a minimum of 75% with an ambient temperature operating range of -30°C to +65°C (-22°F to +150°F). The actuator shall have a minimum of (2) selectable and programmable 2-10vdc, 1-5vdc, 4-20mA control signal inputs and also come with a minimum of (2) 2-10vdc or 4-20mA feedback signal outputs.
24. DFCFP-33, 110V, 1-phase Fractional Horse Power Chemical Feed pumps. NSF approved with output of 0.18gph capacity with discharge pressure of 145psi. Polypropylene constructed with EPDM seals, PVDF wetted ends eliminate compatibility concerns, integral bleed valve prevents loss of prime, and external control via dry contact pulse.

B. Electrical Components: The major components to be included in the control panel and to be incorporated into a fully functional operating fountain system are specified and listed below:

1. The fountain control system shall be designed for 208 Volts, 3 phase, 4 wire service and shall operate (3) 4 Hp feature pumps, (1) 1/2 Hp filter pump, (25) 27W/12VAC led lights, (1) Anemometer for wind speed compensation control of the display pump, and

- appurtenances of the fountain. A transducer type low water cut off system shall be provided to de-energize the control system during a low water level condition. The water level sensor shall also provide a separate water level control system to increase the water level before the low water cut off alarms in both operating and static environments.
2. NEMA 3R enclosure of galvanized steel construction, primed and phosphatized, finished with ANSI 49 gray baked on enamel, manufactured by Hoffman, equal to HCR series shall be provided. The enclosure shall have collar studs for sub-panel mounting, hasp and staple for padlocking, butterfly type stainless steel draw latches and hinged cover. All Hardware shall be stainless steel.
 3. All components shall be mounted to a removable sub-panel. The sub-panel shall be fabricated from 14-gauge steel and shall be finished with baked on white enamel.
 4. Service entrance lugs shall be provided, sized for 600 volts, 300-amp minimum. The power distribution block shall have a flammability rating of UL 94V-0, shall be based on NEC table using 75 degrees C wire and shall be equivalent to Square D class 9080.
 5. A 600V lightning arrestor shall be provided and connected to the service entrance lugs for 3 phase power and 250V lightning arrestor for single phase power.
 6. Motor starters for feature pump shall be IEC rated full voltage, non-reversing with thermal overload relay. Auxiliary contacts shall be provided as required for the specific control functions. Motor starters shall be as manufactured by Square 'D', Allen Bradley or pre-approved equal.
 7. All 120 volt equipment shall be protected individually by thermal magnetic circuit breakers with an interrupting rating of 10KAIC @ 240 volt minimum. All circuit breakers shall be calibrated and sealed at the factory and shall be equivalent to Square D, type QOU.
 8. The lighting and filter pump contactors shall be 30 amps rated and shall be equivalent to Omron type g72 or equal.
 9. The fountain feature / filter pump, and lights shall be controlled by individual 24-hour time clock settings. The time clocks shall be electronic with 24-hour capabilities or shall be integral to the memory module or PLC.
 10. The motor and lights shall be controlled by touch screen, designated "Hand - Off - Auto". In the "Hand" mode, the appropriate motor or set of lights shall be energized until the selection is placed in the "Off" mode. In the "Auto" mode, the appropriate motor shall be controlled by the appropriate time clock.
 11. All power wiring shall be color coded using MTW #12 AWG minimum. Control wiring shall be MTW #14 AWG minimum and be numbered/lettered at each end. Wire numbers/letters shall be equivalent to Pass and Seymore "LeGrande".
 12. All wiring shall be routed through a wiring duct system to provide wire protection and an organized appearance.
 13. Terminals shall be provided for interface with field-installed equipment. The terminal blocks shall be mounted on a 30-degree angle for ease of field connection. Terminals shall be equivalent to Siemens, Allen Bradley, or Square D.
 14. All components shall be labeled using a laser-screened Mylar nameplate. The nameplate shall be a laminated two-part system

- using black letters on a white background on the door and yellow background on the back panel providing protection against fading, peeling, or warping. The labeling system shall be computer controlled to provide logos, post-script type or custom design. The use of engraved plastic type tags is not acceptable.
15. The control system shall have complete drawings/schematics using AutoCAD. The drawing shall have a complete Bill of Materials, front panel view with component locations and electrical schematic. References to the Bill of Materials shall be located for each component.
 16. The control system shall be designed and manufactured to meet all state and local codes, Underwriters Laboratories and the National Electric Code (particular attention to article 430 and 680)
 17. The entire control system shall bear a UL 508 serialized label "Enclosed Industrial Control Panel". The use of the UL label "industrial control panel enclosure" without the UL 508 serialized label is not acceptable. Additionally the control panel shall bear a UL label for "Industrial Control Panel for Permanently Attached Fountains".
 18. The low water cutout system shall provide intrinsically safe voltage to the transducer style sensor. The sensor shall provide an input to the PLC to de-energize the pumps and motors. An adjustable time delay shall be provided to prevent nuisance tripping. The HMI shall indicate this alarm as well as provide time delay values for alarm and reset.
 19. The water make up system shall provide intrinsically safe voltage to the transducer style sensor. The sensor shall provide an input to the PLC to energize the water make up solenoid. An adjustable time delay shall be provided to prevent nuisance tripping. The HMI shall indicate this alarm as well as provide time delay values for alarm and reset. The water make-up shall operate on 2 set points for operating and static fill functions.
 20. The variable frequency drive shall be a special purpose drive with application-specific features that add significant "more-for-less" benefits. The VFD shall be a select model for remote access, Siemens G-120, or pre-approved equal.
 - a. ASICs: Application Specific Integrated Circuitry increases reliability.
 - b. Dual-bridge, 12-pulse rectification. By using a phase shift input transformer with dual secondary, input current harmonic distortion factor can be reduced over 90%.
 - c. Energy savings control with Automatic output voltage adjustment in response to actual motor loading. Real-time energy savings based on motor algorithms. Increases motor efficiency by several %.
 - d. Simplified operator keypad with 16 function LEDs provides the perfect execution of old-fashioned simplicity of discrete indicator lights and the modern sophistication of keypad programming and control.
 - e. Built-in PID control that eliminates cost of external device.
 - f. Built-in power consumption monitoring with built-in kW display eliminates the need for external signal conditioner.
 - g. Performance features:
 - 1) Ratings: 4 HP at 208 VAC

- 2) Overload capacity: 120% for 60 sec (180% peak)
- 3) Starting torque: 150%
- 4) DC injection braking: ramp or coast to stop, adjustable, current limited
- 5) Electronic reversing
- 6) Adjustable accel/decel: 0.1 to 3600 sec (2 each)
- 7) Controlled speed range: 40:1
- 8) Critical frequency rejection: 2 selectable, adjustable bands
- 9) Torque limiting circuit: 30 to 180%
- 10) Drive efficiency: 96 to 98%
- 11) Energy saving control: improves motor efficiency
- 12) Displacement power factor: 0.98
- 13) Output frequency: 0.1 to 400 Hz
- 14) Frequency resolution: 0.01 Hz with digital reference, 0.06 Hz with analog reference
- 15) Frequency regulation: 0.01% digital (-10° to 40°C), 0.1% analog (15° to
- 16) 35°C)
- 17) Torque boost: full range, auto
- 18) Jog forward and reverse
- 19) Power loss ride-thru: 2 sec
- 20) Inertia ride-thru
- 21) Selectable auto restart after momentary power loss
- 22) Programmable auto restart (0 to 10 attempts) after re-settable fault
- 23) DC bus reactor: 30 to 125 HP at 230 VAC, 30 to 250 HP at 460 VAC

h. Design Features

- 1) 32-bit microprocessor logic
- 2) Surface mount devices
- 3) Carrier frequency: selectable to 15 kHz
- 4) Keypad operator controls
- 5) LED display: four digit
- 6) 24 VDC control logic
- 7) Programmable contacts, one form C and one NO
- 8) Timer function: contact-initiated
- 9) RS-232 communications port
- 10) Volts/hertz ratio: 15 preset and one infinitely-adjustable pattern
- 11) 5 Multi-speed settings
- 12) Remote speed reference: 0 to 10 VDC or 4 to 20 mA
- 13) Set-point (PID) control
- 14) Signal follower: bias and gain
- 15) Analog monitor output: 0 to 10 VDC
- 16) Fully EMC compliant when optional RFI filter connected
- 17) NEMA 1 enclosed or protected chassis
- 18) UL listed; IEC: 146A
- 19) MTBF: exceeds 28 years
- 20) Embedded web page for remote access and monitoring

i. Protective Features

- 1) DC bus CHARGE indicator

- 2) Optically-Isolated controls
 - a) Phase-to-phase / phase-to-neutral short circuit protection
 - b) Ground fault protection
 - c) Electronic motor overload (UL)
 - d) Current and torque limit
 - e) Fault circuit: over-current, over-voltage, and over-temperature Service Conditions
 - 3) Ambient service temperature: -10°C to 40°C (104°F) NEMA 1, to 45°C (113°F) protected chassis
 - 4) Humidity: non-condensing to 95%
 - 5) Altitude: to 3300 ft; higher by derating
 - 6) Input voltage: +10%/-15%, 200 to 230 VAC, 380 to 460 VAC
 - 7) Input frequency: 50/60 Hz ± 5%
 - 8) 3-phase, 3-wire, phase sequence insensitive
21. A programmable logic controller shall control the fountain pumps. The PLC shall be an Allen Bradley Micrologix series, Siemens S71200 series, or pre-approved equivalent.
- a. Mechanical features
 - 1) Rugged, compact plastic housing;
 - 2) Easily accessible connection elements and controls
 - 3) Assembly on standard horizontal or vertical;
 - 4) Terminal block as permanent wiring assembly.
 - b. Design features
 - 1) Data integrity; the user program is the most important
 - 2) Parameter settings are stored in the internal EEPROM.
 - 3) Built-in DC 24V sensor/load power supply for the
 - 4) Direct connection of sensors and actuators;
 - 5) On-board digital input/outputs (CPU with 12 inputs and 12 outputs)
 - 6) Interrupt points;
 - 7) High-speed counters;
 - 8) Easy expandability;
 - 9) 2 high-frequency pulse outputs;
 - 10) EEPROM 16K memory sub-module with real time clock.
 - 11) Battery module for long-term back up.
 - 12) Embedded web page for remote access and monitoring.
 - c. Functions
 - 1) Fast instruction execution; Instruction execution times of ms or 0.8
 - 2) Extensive instruction set; A large variety of basic operations such as binary logic, result assignment, save, count, time generation, load, transfer, compare, shift, rotate, complement generation, call subroutines, integrated communications instructions and other user-friendly functions such as pulse duration modulation, pulse train function, arithmetic functions, floating-point arithmetic, PID closed-loop control, jump

- functions, loop functions and code conversions serve to simplify programming.
- 3) Counting;
 - 4) Interrupt handling;
 - 5) Edge-controlled interrupts
 - 6) Time-driven interrupts
 - 7) Counter interrupts
 - 8) Communications interrupts.
 - 9) Direct interrogation and driving of inputs and outputs;
 - 10) Password protection;
 - 11) Full access
 - 12) Read only
 - 13) Complete protection.
 - 14) Debugging and diagnostic functions.
 - 15) "Forcing" of inputs and outputs in debugging and diagnostic mode
- d. Communications: The built-in PPI (point-to-point interface) provides a range of communications features.
1. If the control panel drawings include remote communication, the avenue of connection through Ethernet through cat5 cable will be installed by contractor. The communications capabilities can range from PLC upload/download, to full HMI, VFD, and PLC monitoring and control.
22. Programming: The PLC shall be supplied with a fully functional program that shall perform basic operations including time clock settings and water level control functions.
1. HMI - Simatic HMI TP700 comfort, comfort panel, touch operation, 7" widescreen-TFT-display, 16 mil. colors, 800 x 480 pixels, profinet interface, MPI/Profibus DP interface, 12 mb user memory, Windows CE 6.0, configurable from wincc comfort v11. It shall come with a SMART SERVICE Licenses to allow for connection to a LAN that can be accessed remotely over private VPN tunnel. Siemens Model #6AV2124-0GC01-0AX0 or pre-approved equivalent.
WIFI Module
 - a. The eWON Flexy 200 Router allows OEMs and system integrators to link remote devices in an environment where communication technologies are constantly changing. The Flexy 200 is a data collection gateway without any routing functions between LAN, WAN and serial sides. The main applications with the Flexy 100 are data monitoring and data collection from remote field equipment components. Allows for connection to the device end regardless of the industrial protocol used: serial, MPI, Profibus, Ethernet, proprietary protocols
Installation Components
 - b. WiFi client for WAN access to Internet
 - c. WiFi Flexy extension card with WLAN access points that allow internet connectivity while avoiding connection on the factory/corporate LAN network. The eWON Flexy extension car provides a powerful backup internet access for industrial MM applications. WLAN technology offers free access, high band width, easy deployment (no cabling) and facilitates security network management

2. Synchronorm DMX512 programmable show Controller or pre-approved equivalent. With 2x16 segment LCD display, 6 keys, anemometer control, with all necessary switches and/or DMX to analog decoders.
 - a. Performance Features:
 - 1) Incoming Power: 15 to 24VDC
 - 2) Power Consumption: 8W
 - 3) Protocols: DMX512
 - 4) Ethernet: RJ45 connection
 - 5) Operating Temperatures: 0°C to 40°C
 - 6) Up to 4 Universes of DMX512
 - 7) Programmed: Dependence software
 - 8) Removable SD Card memory card data storage
 - b. Interface Features
 - 1) 2 DMX512-RDM channels
 - 2) 1024 music DMX-RDM channels
 - 3) 8 isolated digital inputs
 - 4) RJ45 socket for 10/100Base-TX Ethernet
 - 5) IEEE 802.3af PoE powered device
 - 6) 5-pin DIN socket for MIDI In
 - 7) 5-pin DIN socket for MIDI Out
3. Acclaim RDS 600 DMX512 signal splitter for RGB lights or pre-approved equivalent.
 - a. Performance Features:
 - 1) Operating Voltage 100-240VAC
 - 2) Operating Frequency: 50/60 Hz
 - 3) Power Consumption: .12A, 14.4W at 120VAC
 - 4) Number of DMX Inputs: 1
 - 5) Number of DMX Outputs: 6
 - 6) Number of DMX Thru Links: 1
 - 7) Protocols: RDM & DMX-512
 - 8) Operating Temperatures: -10°C to 50°C
 - 9) Fixture Connectors: 3 pin terminal blocks for RDM / DMX, Bare wire 3 conductor for AC input
 - 10) Warranty: 3 Year

2.2 INSTALLATION COMPONENTS

A. Piping Materials:

1. Unless architects specifications indicate otherwise, the suggested minimum piping and fitting standard recommended for this installation is Type 1.
2. All interconnecting piping and associated fittings, supplied by installing Contractor, shall be a minimum of Schedule 80 PVC, NSF-PW rated.

3. All welded PVC fittings above 6" diameter shall be fiberglass reinforced and used only on non-pressurized lines.
4. Use only clear PVC cleaner meeting NSF, UPC, and ASTM standards for cleaning and repairing PVC pipe and fitting surfaces for solvent cementing (IPS Corporation "Weld-On" Type C-65 or equivalent). Follow all directions and instructions appearing on product label.
5. Use only purple PVC primer meeting NSF, UPC, and ASTM #F-656 standards for softening and preparing field pipe and fitting surfaces for solvent cementing (IPS Corporation "Weld-On Type P-70 or equivalent). Follow all directions and instructions appearing on product label.
6. Use only clear or white, heavy bodied, medium setting PVC cement meeting NSF, UPC, and ASTM #D-2564 standards for solvent cementing PVC plastic pipe and fittings (IPS Corporation "Weld-On" Type 711 or equivalent). Follow all directions and instructions on product label.
7. Provide Link Seal for all penetrations in equipment room. All penetrations through outside walls to below grade shall be sealed per building specifications. Using "easy-link seals" is recommended
8. All piping penetrations through structure walls into open areas below pool structure must have the necessary allowances made for settlement.
9. Pipe hangers and supports per national plumbing code. All piping in open areas below the pools shall be installed free hanging from the ceiling in the level below with pipe hangers/per specifications and code
10. Reference requirements of other Project Manual Specifications for materials and items not specified herein.
11. Thrust Block for Piping Turns

B. Electrical Materials:

1. Rigid conduit shall be corrosion resistant and either galvanized steel or rigid PVC as specified in Part 3 Article "Basic Electrical Methods" herein. Submit Product Data and related specifications on materials to be used. All electrical conduit and conduit fittings between submersible light fixture niches, junction boxes and control panels will be U.L. listed rigid, nonmetallic, PVC NEMA, TC-2 max. 90°C, sunlight resistant for above and below ground use. All conduits shall be protected at all times from possible water ingress. Use only approved primer and PVS glue suitable for joining all PVC conduits and fittings per manufacturer's instructions.
2. All conductors shall be copper with insulation suitable for the particular wiring location as specified in Part 3.4 Article "Basic Electrical Methods" herein. Submit Product Data and related specifications on materials to be used underwater.
3. Reference requirements of other Project Manual Specifications for materials and items not specified herein.
4. All PVC conduit connections underground shall be SCH40 pressure fittings ((FE) male adaptors and couplings). Use color coded primer, pressure fitting PVC glue, and Teflon paste. The use of normal electrical PVC fittings is prohibited.

5. All connections in the pool/fountain shall be made with the assistance of a plumber, using Teflon paste or Teflon tape to eliminate all leaks. Use only tapered (NPT) stainless steel fittings and nipples. The use of galvanized, black, brass or steel piping is prohibited.
6. All conduit connections between dissimilar metals must be made with dielectric fittings, and sealed with dielectric thread compound to prevent galvanic degradation

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of existing elevations: Verify all joining elevations prior to laying pipe or setting pipe. Notify Fountain equipment manufacturer, Architect, and or Engineer of all discrepancies before proceeding with the construction of the fountain.
- B. Verification of Dimensions: Before proceeding with any work, the contractor shall check and verify all dimensions, sizes, and the like, and shall assume full responsibility for the fitting-in of all materials and equipment to the conditions on site if the Fountain equipment manufacturer, Architect, and or Engineer is not notified in writing and a resolution is not agreed upon.
- C. All conflicts relating to any penetration size, dimension, elevation, equipment location, or equipment size or dimension, shall be addressed and resolved with the manufacturer, Architect, and or Engineer of record before the contractor can proceed with the construction of any part of the fountain that may be or become affected by the confliction.
- D. Verify Utilities: Contractor shall verify with local authorities where the proper tie into sanitary or storm sewer for overflow and drain.
- E. Contractor shall verify matching voltage and phase of main power feed provided to serve the fountain equipment control panel and report all discrepancies in writing to the Fountain Manufacturer, Architect, and Engineer.

3.2 INSTALLATION

- A. All equipment furnished under this Section shall be installed in full conformity with the Contract Documents, engineering data, instructions, and recommendations of the manufacturer.
- B. Contractor shall obtain all necessary installation permits and inspections
- C. Installation of fountain equipment appurtenances shall conform with provisions of Reference Standards and suit existing conditions on site as approved by Architect.

- D. Contractor shall insure that installation complies with all applicable national and local codes and project specifications.
- E. The incoming water supply line pressure must not exceed 50 PSI and is part of the building contract, not the fountain.
- F. Install horizontal piping 1' below freeze line.
- G. Excavation, Backfill, and Compaction:
 - 1. Excavating, trenching, and backfilling shall be as specified in the Contract Documents and as noted on the drawings and compaction done in a maximum of 6" lifts.
- H. All pools/splash pads shall be waterproofed by specified approved means.
- I. Prior to any finishing materials (I.E. lights, jets, coverplates) being installed, all pools shall be tested for leaks for a minimum of 72 hours and all waterproofing and tile work shall be completed.
- J. Refer to mechanical and electrical notes on drawing for further information.
- K. Contractor shall field verify all dimensions.
- L. Consult architectural, structural, mechanical, and electrical drawings for additional details not shown on these drawings.
- M. When applicable, all weirs shall be installed with an accuracy of "+" or "-1/16" over the entire weir length. Unless otherwise noted, refer to the architectural drawings for weir details.
- N. Contractor shall provide all concrete work as required by all mechanical and electrical fountain equipment requirements including, but not limited to, housekeeping pads, lock-down slabs, and thrust blocks where indicated.
- O. Contractor shall provide all utilities such as power supplies, water supplies, and sewer connections under the building contract up to the fountain controls, equipment and/or pool fittings where indicated.
- P. Contractor shall provide and is responsible for all elevation and X-Y coordinates relating to all fountain equipment including vaults, pool floors, and pumps.

3.3 BASIC PIPING METHODS

- A. The Contractor shall verify and confirm all piping layouts, locations, and dimensions shown in these drawings, and insure that the specified locations do not interfere with other equipment, architecture, or construction before installation. All piping shall be installed as shown and as otherwise specified to make a complete, workable, and neat system.

All piping shall be cut accurately from dimensions established at the Project site and allowances shall be made for clearance of other devices.

- B. All intraconnecting piping and associated fittings, supplied by system manufacturer, shall be a minimum of Schedule 80 PVC, NSF-PW rated. Interconnecting-intraconnecting interface points shall be slip fit, threaded or flanged
- C. All interconnecting piping and associated fittings, supports, and seals shall be per section 2.2 A.
- D. The Contractor shall not deviate from the pipe sizes shown herein unless prior written approval is obtained from the manufacturer and Architect. When a size is not indicated, the Contractor shall request the pipe size from the fountain manufacturer. In the event that interference with other equipment or architecture requires relocation of pipes or a layout different from that shown herein, the Contractor shall notify the fountain manufacturer immediately for reexamination of hydraulic parameters of the affected sections.
- E. Pipe and accessories shall be handled in such a manner to not cause damage. All cutting shall be done in a good workmanlike manner. Before installation, all piping and fittings shall be visually inspected for damage or defects. The interior of the pipe shall be clean during the laying operation. Pipe shall not be laid in water or in the trench when weather conditions are unsuitable for the work. Water shall be kept out of the trench until the pipe is installed. While work is in progress, open ends of the pipe and fittings shall be securely closed so that no trench water, earth, or other foreign matter will enter the piping system or fittings.
- F. Perform adequate trenching and backfill operations when installing PVC piping below grade. Trench width should be minimum of "pipe O.D. plus 12 inches" and deep enough to allow piping to be buried a minimum of 12" below the maximum expected frost penetration line to avoid freeze damage. Lay piping in horizontal, parallel, or perpendicular manner. Avoid vertical stacking of pipes. Space minimum of 3" apart on all parallel runs.
- G. Use only clean, free-flowing, non-expansive backfill material (naturally rounded ¼" pea gravel, 57 stone, or sand) and backfill in 6" lifts with adequate and complete compaction between lifts to 90% of maximum density per ASTM 1557-70. Compaction to excessive loads shall not be permitted. A second pressure test on the piping system must be made at this time to insure that piping has not been damaged during backfill operations.
- H. Concrete "thrust" blocking is recommended at all directional changes (tee's, elbows, etc.), reducer fittings and line terminations (bushings, end caps, plugs, etc.) in fountain display discharge piping 6" and larger.
- I. The bearing surface for the concrete thrust blocks, where possible, should be placed against undisturbed soil. Where it is not possible, the fill between bearing surface and undisturbed soil must be compacted to at least 90% standard proctor density. Thrust block shall be a concrete mix

not leaner than one part cement, two and one-half sand, and five parts stone. Contractor shall coordinate the location of the thrust block with other work and existing conditions. Work shall be performed in accordance with all applicable codes. For additional information, refer to NFPA 24.

- J. The sump pump in the equipment vault shall be connected as immediately as possible after secure placement and shall have a continuous power supply for the duration of the fountain system installation process.
- K. Pressure test all piping as specified in Part 3 Article "Field Quality Control" herein.
- L. Avoid laying suction piping in a manner that could result in a suction loop before, during, or after backfilling and compaction. Always pitch pipe in a downward direction to avoid a suction loop that will cause air to be permanently trapped, causing loss in performance of the piping system due to increased friction and work load demand.
- M. Piping in areas subject to freezing shall be installed at elevation of minimum 1 foot below frost line.
- N. Do not install any water lines above the control panel.
- O. Any and all costs associated with above are responsibility of installer.

3.4 BASIC ELECTRICAL METHODS

- A. The information supplied in the drawings specifies the general requirements of a complete functioning electrical power distribution and control system. The electrical subcontractor shall coordinate all electrical installation activities with the Construction Manager, Contractor, Architect, and (with respect to work Phase) other separate contractors performing work related to fountain installation.
- B. All electrical work shall comply with the latest edition of the National Electric Code (NEC), Section 680, published by the National Fire Protection Association; Quincy, Massachusetts. In the event of conflicting requirements between Contract Documents and any local electric code or other governing organizations for this location, the most stringent shall govern and take precedence. In this event, the Architect shall be notified immediately in writing of such conflict.
- C. The installation of electrical equipment and wiring in water can produce extreme hazards. It is the responsibility of the installing electrical contractor to consult and comply with all electrical codes and safety regulations prior to installation of electrical equipment. Local codes take precedence over the general notes where discrepancies of conflicts exist.
- D. All wiring and conduit shall be sized by the electrical sub-contractor in accordance with the latest edition of the NEC and all electrical codes and regulations. Where wiring and conduit sizes are specified herein, they shall be interpreted as minimum allowable sizes. All conductors

shall be copper with insulation suitable for the particular wiring location. Minimum acceptable insulation is type THWN or better, suitable for both dry and wet locations. Conductor insulation shall be moisture resistant, flame-retardant thermoplastic as approved by the NEC. Conductor sizing shall be based on an ambient temperature of 30°C and a conductor temperature rating of 75°C maximum per Article 310 of NEC. All underwater electrical cable shall either be encased in waterproof, sealed PVC conduit or shall be rated for continuous operation in underwater, marine environments.

- E. Contractor shall obtain all necessary installation permits and inspections.
- F. It is the responsibility of the installing electrical contractor to insure that all electrical equipment is installed and wired by a qualified, licensed electrician, experienced in fountain system wiring. Delta Fountains assumes no responsibility for liability whatsoever for installations not carried out by a qualified, licensed, electrician in accordance with our shop drawings, and all provisions of the latest edition of NEC in general, Article 680 specifically, and local safety regulations. All Delta Fountains electrical control panels include GFCI's when and where required, when furnished.
- G. It is the responsibility of the installing electrical contractor to verify all field dimensions critical to fountain equipment installation and performance and report any discrepancies to Delta Fountains and the engineer upon immediate notice.
- H. All conductors shall be run in rigid conduit sized for the number of wires contained within per NEC requirements. Rigid conduit shall be corrosion resistant and either galvanized steel or rigid PVC. When conduit is submerged or in other wet locations, rigid PVC shall be required. Conductor sizing shall be corrected for the number of wires to be run in a single conduit or raceway in accordance with NEC. All conduit locations and routing shall be approved by the Architect before installation.
- I. The work includes such necessary material and devices of a minor nature that may not be indicated on the drawings or mentioned in the specifications, but which are necessary for the compliance with codes and for the successful operation of the entire control system. The contractor shall be allowed no extra compensation because of this requirement.
- J. All GFCI protected circuits must have a separate neutral. All GFCI breakers have pigtailed wired to a neutral bar. A Class 'A' ground fault circuit interrupter (GFCI) must be installed in each branch circuit supplying submersible or underwater fountain equipment. Equipment operating at 15 volts or less must be protected by suitable transformer U.L. Listed and marked for the application.
- K. Conduits are drawn for clarity and do not necessarily show exact routing. Contractor shall install conduits with as few changes in direction as jobsite conditions will allow.

- L. All electrical equipment must be properly bonded and grounded for safety, per the latest NEC and local code requirements. All bonding lugs shall be provided by installing electrical contractor. Installing contractor shall verify all necessary requirements of local inspector before installing, and notify Delta Fountains of any required deviations from specifications or plans or notes, and resolve all conflicts before installing equipment. Contractor to insure that all bonding codes are complied with for each metal pool equipment component.
- M. Submersible/underwater lighting fixtures must be installed for operation at 150 volts or less between conductors. Submersible pumps most operate at 300 volts or less between conductors.
- N. Submersible lighting fixtures must be installed with the top of the fixture lens a minimum of 2" below the normal operation water level and must have the lens adequately guarded to prevent contact by any person.
- O. All electrical equipment which depends on submersion for safe operation must be protected against overheating by an independent low water cutoff device if the water level drops below normal operating levels, or contain an internal Thermal Bimetallic Ambient compensating overload.
- P. Maximum length of exposed submersible cord in the fountain is limited to 9 feet. Cords extending beyond fountain perimeter must be enclosed in approved wiring enclosures.
- Q. All submersible lights and pumps must have sufficient cord length to allow removal from the water for re-lamping and normal maintenance. Fixtures can not be permanently embedded in the fountain structure so that the water level must be reduced or the fountain drained for re-lamping, maintenance, or inspection.
- R. Submersible equipment must be inherently stable or be securely fastened in place with non-corrosive fasteners suitable for the purpose.
- S. Underwater junction boxes must be filled with an approved re-enterable electrical potting compound (wax or paraffin is not acceptable) prior to filling pool and after all circuits have been checked to prevent the entry of moisture and must be firmly attached to supports or directly to the fountain surface and bonded as required. All conduit stubbed up through pool floor must be stainless steel. PVC, Red Brass, and Everdur are not acceptable as a conduit support stub for submersible junction boxes. All conduit entries must be completely sealed prior to potting to prevent compound from entering conduit system. After testing, junction boxes shall be sealed with scotch 3M re-enterable compound or other approved filling compound.
- T. All underwater junction boxes must be equipped with threaded conduit entries and compression type cord connectors for cord entry. Strain relief connectors serving niche-Mounted underwater lights shall be capable of sealing both the fixture cord and an AWG #8 insulated bonding wire which may be required by some local codes.

- U. Pull correct quantity and size conductors, wired with separate ground, through conduit into junction box. Make all splices and connections tight and well insulated. Connect ground wire to ground lug in junction box, or other suitable grounding location.
- V. Insert each submersible cord through the brass cord seals provided on the junction box and tighten completely.
- W. Do not operate submersible lights or pumps more than ten seconds unless completely submerged or damage will result and warranty will be voided.
- X. The installing electrical contractor will verify that all electrical equipment grounds will have the same reference potential and will give evidence of such to Delta Fountains before any equipment is initially energized.
- Y. The installing contractor shall size all feed-wires leading to fountain control panel for no more than 2% voltage drop, and shall notify Delta Fountains before fabricating electrical control panel if wire is upsized such that extra large wire lugs are required. It is the responsibility of electrical contractor to provide any disconnect required by local code requirements.
- Z. The fountain control panel shall be adequately protected from debris and stored properly during construction and prior to initial operation and shall be vacuumed clean and all screws for terminal connections tightened.
- AA. The electrical contractor shall ensure that supply voltage is within 5% of design voltage when all equipment is in operation and shall re-tap transformer, up size wire, or supply a buck and boost transformer to get supply voltage to necessary level, if necessary.
- BB. Wires for water level sensors must be run in a separate conduit to the fountain control panel.
- CC. All conduit penetrations through structure walls into trade areas below the pool structure must have the necessary allowances made for settlement.
- DD. Floor mounted motor control centers and transformers for fountain related equipment shall be installed on a 4" concrete housekeeping pad in equipment room.
- EE. Contractor installing fountain manufacturer supplied deck boxes in concrete for fountain lighting is to ensure that all open conduit ports are plugged watertight prior to slab pour around deck boxes.
- FF. All penetrations through outside walls to below grade shall be sealed per building specifications. Using "easy-link-seals" is recommended.
- GG. Any and all costs associated with the above are the responsibility of installing contractor.

3.5 FIELD QUALITY CONTROL

A. Inspection and Testing, General: Labor, materials, instruments, and power for testing shall be furnished by the Contractor. All tests shall be performed to the satisfaction of the Owner, Architect, and such other parties that may have legal jurisdiction. Item or system to be tested shall not be closed up, buried, or covered until testing is completed and owner confirms approval. Prepare reports of testing activities and submit as specified.

1. Reference Division 1 Section 01400 "Quality Requirements" for related and additional provisions.

B. Piping Test:

1. Conduct piping tests before joints are covered and after thrust blocks have been hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water. Flush out all pipes with clean water prior to performing leak tests.
2. Do not include equipment in tests which could be damaged by high pressure.
3. Automatic water make-up systems shall be thoroughly tested and operative at the time of final observation.
4. Pressure testing requires that a prescribed period of curing / drying time be allowed in order to allow the PVC cement to properly cure and take a permanent set. The following table sets forth the minimum drying period before the required pressure tests. Note that the table applies only to weather temperatures ranging from 50° F. to 90°F. For drying times during temperatures that differ from this, consult the fountain manufacturer.

Piping Size	Curing Time
1.5" - 2.5"	8 hours
3" - 4"	18 hours
6" -8"	24 hours
10" & higher	36 hours

5. A 24-hour static pressure test of 10 ft. above highest vacuum, drainage, or gravity pipe invert elevation shall be performed on all vacuum and or gravity pipe lines using water as the medium. All vacuum and gravity drain piping shall be tested with no loss of water, pressure, or noticeable leaks. All pressure testing shall include a visual check of each joint by the Contractor in the presence of Construction Manager, owner, authorized representative, and/or Architect.
6. The Contractor shall provide all pumps, pressure plugs, gauges, and other instruments and devices necessary to perform the hydrostatic pressure tests specified herein. Each complete discharge piping system shall be hydrostatically tested to a pressure of 150% of the system working pressure. For purposes of this test, system-working pressure shall be defined at 50 PSIG and the hydrostatic test shall be performed at 75 PSIG. Pressure test for at least 8 hours, at which time pressure shall

- remain constant, without additional pumping, pressure loss, or noticeable leaks. PSI is required on all pressure piping to include return inlets piping using water as the medium.
7. Pressure test all water piping prior to commencing backfill operations. Hydrostatic (water) testing shall be the only approved method. DO NOT PRESSURE TEST WITH COMPRESSED AIR as severe pipe damage and bodily injury can occur. Do not exceed the rated operational pressure of the piping and/or fittings carrying the lowest pressure rating. Locate and repair any leaks and retest prior to completion of backfill operations
 8. After the system has operated for one week, contractor and owner's representative shall inspect water make-up rates and agree that water usage is appropriate for a system of this type, are within local ordinances or codes, and that such rates are not indicative of excessive leakage from system. A water meter shall be placed on the fill line for this purpose, if necessary to document precise water usage.

C. Manufacturer's Field Services:

1. The fountain manufacturer shall be present for a minimum of 4 site coordination meetings, which includes the review of the plans and shop drawings with the mechanical, electrical, and structural disciplines. The fountain manufacturer must be available at the jobsite within a one week notice. The representative shall be a factory employee, not a local representative.

3.6 START UP AND ADJUSTMENTS

- A. Manufacturer shall be present for the initial start up of the fountain system.
- B. Contractor shall adjust fountain water system for volume and water flow characteristics to reflect design intent as approved by Architect.
- C. Contractor shall have the following conditions satisfied prior to departure of personnel from factory.
 1. All electrical connections shall be made and tested.
 2. All underwater lighting shall be lamped, installed and tested.
 3. Thoroughly test all fixtures, services, and all circuits for proper operating conditions and freedom from grounds and short circuits before acceptance is requested. All equipment, appliances, and devices shall be operated under load conditions
 4. All underwater junction boxes shall be wired and sealed with potting compound.
 5. Pump and filter motors shall be power tested to insure proper impeller rotation at specified voltage.
 6. Electronic water level control and/or low water cut-off control shall be installed and wired for operation.
 7. All hydraulic lines and fittings shall be pressure tested for leaks, repaired as necessary, and flushed clean. Basket strainers shall be checked and cleaned as required.

8. All nozzles, jets, manifolds, headers, and spray apparatus shall be installed properly and flushed of debris as required. Final nozzle adjustment for position and throttling to achieved specified performance for all display discharge points to be performed by installing contractor.
 9. Pump vaults, when supplied by manufacturer shall be thoroughly cleaned of debris, tested for electrical integrity and pressure tested for leaks.
 10. Chemical feed system, when supplied, shall be filled to proper level with required dosage of chemicals. (Manufacturer does not supply chemicals unless specifically listed in proposal).
 11. The fountain basin shall be thoroughly cleaned and filled to proper water level with clean, fresh water.
 12. Contractor shall make available to factory personnel a plumber and electrician who have first hand knowledge of the fountain installation, at contractors own expense.
 13. Contractor will perform any manual labor or provide any tools for adjustment and start-up.
- D. Contractor acknowledges the above requirements and understands that, should above requirements not be completed, factory personnel may immediately cancel visit and return to factory. In such case, Contractor shall be responsible for all costs and expenses incurred by manufacturer.

3.7 DEMONSTRATION

- A. Furnish complete on-site instructions and demonstration to owner in the operation, adjustment and maintenance of fountain system.

END OF SECTION

IRRIGATION SYSTEM

xx. DESCRIPTION. Contractor is responsible for designing and providing a system with full and complete coverage. Furnish all labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to the complete design and installation of the irrigation system, and guarantee/warranty as shown on the drawings, the installation details, and as specified herein. Items of work specifically included are:

- (a) Procurement of design layout by professional irrigation designer. Designer shall have a minimum of 5 years of experience in the design of landscape irrigation systems similar in size and complexity.
- (b) Procurement of all applicable licenses, permits, and payment of required fees.
- (c) Coordination of Utility Locates ("Dig-Safe").
- (d) Maintenance period.
- (e) Sleeving for irrigation pipe and wire.

XX. QUALIFICATIONS.

- (a) Contractor:
 - 1. Irrigation Contractor must have demonstrated experience with the installation of at least five (5) irrigation systems having large diameter HDPE pipe (6-inch) and larger), two-wire decoder technology control systems, electrically operated remote control valves, and large radius rotary sprinklers (minimum 1-inch inlet with swing joint).
- (b) Equipment Manufacturer:
 - 1. Manufacturer regularly and presently manufactures the item as one of their principal products.
- (c) System Requirements:
 - 1. Full and complete coverage is required. Contractor shall, at no additional cost to the City, make necessary adjustments to layout required to achieve full coverage of irrigated areas.
 - 2. Layout work as closely as possible to drawings. Drawings are diagrammatic to the extent that swing joints, offsets and all fittings are not shown.

xx. SUBMITTALS.

- (a) The irrigation plan is intended to be a general concept for the layout of landscape irrigation. The Contractor shall submit a site specific irrigation plan stamped by a professional irrigation designer licensed to the Engineer for acceptance prior to the start of construction. The irrigation layout, design and materials shall be coordinated with, and reviewed by, the City of Burlington prior to submittal to the Engineer.
- (b) Make submittal and provide four (4) copies of irrigation information in a 3-ring binder with table of contents and index sheet. Provide sections that are indexed and labeled for valves, sprinklers, pipe

and fittings, wire and wire connectors, ID tags, shop drawings and all other irrigation equipment shown or described on the drawings and within these specifications. Highlight items being supplied on the catalog cut sheets. Submittal package must be complete prior to being reviewed by the Contracting Officer's Technical Representative. Incomplete submittals will be returned without review.

- (c) Documentation of contractor qualifications.
- (d) Materials List: Include all materials and products that are part of the irrigation system including, but not limited to: pipe, fittings, valves, mainline components, water emission components, and control system components. Quantities of materials need not be included.
- (e) Manufacturers' Data: Submit manufacturers' catalog cuts, specifications, and operating instructions for equipment shown on the materials list.
- (f) Shop Drawings: Submit shop drawings called for in the installation details. Show products required for proper installation, their relative locations, and critical dimensions. Note modifications to the installation detail.
- (g) Testing: Submit a proof of testing report following completion of each test listed in Part 1 of these specifications. Unless otherwise noted, include name of test, date of test, name of the individual completing the test, name of the company completing the test, and a summary of the test results. If system fails test, document any and all retests until system passes test.
- (h) Maintenance and Operation Instructions: Submit information listed in Part 3 of these specifications.
- (i) Record Drawings: Submit information listed in Part 3 of these specifications.

xx. APPLICABLE PUBLICATIONS.

- (a) The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- (b) Federal Specifications (Fed. Spec.): RR-F-621E Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole
- (c) American National Standard Institute (ANSI):
 - 1. A21.4-Cement-Mortar Lining/Cast and Ductile Iron Pipe and Fittings
 - 2. B40.1-91-Gauges-Pressure Indicating Dial Type Elastic Element
- (d) American Society of Agricultural Engineers (ASAE):
 - 1. S398-Sprinkler Testing and Performance Reporting
- (e) American Society for Testing and Materials (ASTM):

B61-93	Steam or Valve Bronze Castings
B62-93	Composition Bronze or Ounce Metal Castings
C857	Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

C858	Specification for Underground Precast Concrete Utility Structures
C891	Practice for Installation of Underground Precast Concrete Utility structures
D1785-91	Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120
D2241-89	Poly(Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series)
D2287-81	Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
D2464-91	Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
D2466-90	Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
D2564-94	Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
D2855-90	Making Solvent Cement Joints with Poly(Vinyl Chloride) (PVC) Pip and Fittings
F477-90	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
F656-08	Primers for use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings F714. Standard Specification for Polyethylene (PE)4170 Plastic Pipe (SDR-PR) Based on Outside Diameter

(f) American Water Works Association (AWWA):

C104	Cement-Mortar Lining/Cast and Ductile Iron Pipe and Fittings
C110-93	Ductile-Iron and Gray-Iron Fittings, 3-Inch Through 48-Inch for Water and other Liquids
C500-93	Gate Valves for Water and Sewerage Systems
C504-87	Rubber Sealed Butterfly Valves
C600-93	Installation for Ductile-Iron Water Mains and their Appurtenances
C901-02	Polyethylene (PE) Pressure Pipe and Tubing, ½ in. through 3 in., for Water Service

(g) Manufacturers Standardization Society (MSS):

SP70-90	Cast Iron Gate Valves, Flanged and Threaded Ends
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(h) National Electrical Manufacturers Association (NEMA):

(i)

250-85	Enclosures for Electrical Equipment (1000 Volts Maximum); Revision 1, May 1986
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(j)

(k) National Electric Code: (latest edition)

(l) Uniform Plumbing Code: (latest edition)

- (m) Irrigation Association:
 - 1. Irrigation System Installation and Maintenance, 2nd Edition
 - 2. Irrigation Contractor Workbook, 2nd Edition
 - 3. Landscape Irrigation Auditor Manual, 3rd Edition

xx. RULES AND REGULATIONS.

- (a) Work and materials will be in accordance with the latest edition of the National Electric Code, the Uniform Plumbing Code, and applicable laws and regulations of the governing authorities.
- (b) When the contract documents call for materials or construction of a better quality or larger size than required by the contract documents.
- (c) If quantities are provided either in these specifications or on the drawings, these quantities are provided for information only. It is the Contractor's responsibility to determine the actual quantities of all material, equipment, and supplies required by the project and to complete an independent estimate of quantities and wastage.

xx. TESTING.

- (a) Notify the Engineer five working days in advance of testing.
- (b) Subject pipelines jointed with rubber gaskets or threaded connections to a pressure test after partial completion of backfill. Pipelines jointed with solvent-welded PVC joints will be allowed to cure at least 24 hours before testing.
- (c) Subsections of mainline pipe may be tested independently, subject to the review of the Engineer.
- (d) Furnish clean, clear water, pumps, labor, fittings, and equipment necessary to conduct tests or retests.
- (e) Hydrostatic Pressure Test - Solvent Weld Lateral Pipe and HDPE mainline Pipe:
 - 1. Subject lateral pipe to a hydrostatic pressure equal to the anticipated operating pressure of 100 PSI for 1 hour.
 - 2. Cap all sprinkler risers.
 - 3. Backfill top revent pipe from moving under pressure. Expose couplings and fittings.
 - 4. Leakage will be detected by visual inspection. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat the test until the pipe passes test.
 - 5. As an alternative to the visual inspection described in Item 4 above, the Engineer may request that a pressure drop test be performed:
 - i. Purge air from pipe before test. Attach pressure gauge to a riser in the middle of the lateral. Cap all sprinkler risers.
 - ii. Pressurize the lateral via the remote control valve then turn down flow control handle on remote control valve to seal off lateral.

- iii. Observe pressure loss on pressure gauge. If pressure loss is greater than 5 PSI, identify reason for pressure loss. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pressure loss is equal to or less than 5 PSI.
 - iv. Cement or caulking to seal leaks is prohibited.
 - v. After lateral passes test and prior to operational test, install sprinklers and backfill and compact all pipe, fittings, joints, or appurtenances.
- (f) Operational Test - Remote Control Valves, Lateral Piping and Sprinklers:
1. Activate each remote control valve in sequence from each controller. Manual operation of the valves from the bleed valve on the remote control valve is not an acceptable method of activation. Engineer will visually observe operation, water application patterns, and leakage.
 2. Replace defective remote control valve, solenoid, wiring, or appurtenance to correct operational deficiencies.
 3. Replace, adjust, add, or move water emission devices to correct operational or coverage deficiencies.
 4. Replace defective pipe, fitting, joint, valve, sprinkler, or appurtenance to correct leakage problems. Cement or caulking to seal leaks is prohibited.
 5. Repeat test(s) until each lateral passes all tests. Repeat tests, replace components, and correct deficiencies at no additional cost to the Owner.
- (g) Catch Can Test:
1. Perform a catch can test on the following to document application rate for programming of climate-based controller:
 - i. One representative zone of rotors in each burial section
 - ii. One representative zone of tree lawn rotors in each burial section
 - iii. All spray sprinkler zones
 2. Select the representative zones for testing with the Engineer.
 3. Perform a catch can test using procedures recommended by the Irrigation Association Certified Landscape Auditor procedure.
 4. Provide a written report of the test data listing controller name, station number, application rate for each zone, date of test, name of the individual completing the test, name of the company completing the test. Submit report to the Engineer.
 5. An Irrigation Association Certified Landscape Irrigation Auditor must perform the test. Provide written evidence of certification prior to conducting test.
- (h) Control System Grounding:
1. Test for proper grounding of control system per manufacturer's recommendations. Test results must meet or exceed manufacturer's guidelines for acceptance.
 2. Replace defective wire, grounding rod or appurtenances. Repeat the test until the manufacturer's guidelines are met.

3. If the test is acceptable, the individual completing the test must document the results of the grounding test via a written report. Documentation should include decoder number or location, date of test, and the ohms resistance to ground.
 4. A written report of the test data listing decoder number or location, date of test, name of the individual completing the test, name of the company completing the test and the ohms resistance to ground for each decoder must be submitted to the Engineer.
- (i) Acceptance Test Prior to Final Inspection:
1. Upon completion of construction and prior to Final Inspection, an Acceptance Test must be passes.
 2. Coordinate start of Acceptance Test with Engineer.
 3. During the Acceptance Test, the irrigation system must be fully operational from the control system. The irrigation system must operate with no faults for 14 consecutive days. If at any time during the 14-day test period, a system fault occurs, the source of the fault must be determined and corrected and the 14-day evaluation period will start again. If a system fault occurs, make repairs within 72 hours of notification from Engineer. Document any faults in the proof of test report listing date of fault, fault, cause of the fault, and the corrective action taken.
 4. When the system has operated for 14 days without fault, contact the Engineer to schedule Final Inspection.

xx. CONSTRUCTION REVIEWS.

- (a) The purpose of on-site review by the Engineer is to periodically observe the work in progress, the Contractor's interpretation of the construction documents, and to address questions with regard to the installation.
1. Schedule review for the irrigation system layout or testing with the Engineer as required by these specifications.
 2. Impromptu reviews may occur at any time during the project.
 3. A Final Inspection will occur at the completion of the irrigation Acceptance Test. The intent of the Final Inspection is to verify that all installation; testing; maintenance and operation submittals; and project record drawing submittals are completed prior to the start of the Maintenance and Guarantee/Warranty periods.
 4. All costs, including travel expenses and site visits by the City of Burlington or City of Burlington representative(s) for additional Inspection(s) that may be required after the Final Inspection due to non-compliance with the Construction Documents are the sole responsibility of the Contractor.

xx. GUARANTEE/WARANTY AND REPLACEMENT.

- (a) The purpose of this guarantee/warranty is to insure that the City receives irrigation materials of prime quality, installed and maintained in a thorough and careful manner.
- (b) Guarantee/warranty irrigation materials, equipment, and workmanship against defects for a period of one year from Final Inspection by the Engineer. Fill and repair depressions. Restore landscape, utilities, structures or site feature damaged by the settlement of irrigation trenches or excavations. Repair damage to the premises caused by construction or a defective item. Make repairs within 72 hours of notification from the Engineer.
- (c) Replace damaged items with identical materials and methods per contract documents or applicable codes. Make replacements at no additional cost to the contract price.
- (d) Guarantee/warranty applies to originally installed materials and equipment and replacements made during the guarantee/warranty period.

xx. MATERIALS.

- (a) QUALITY.
 - 1. Use new materials without flaws or defects.
- (b) SUBSTITUTIONS.
 - 1. Pipe sizes referenced in the construction documents are minimum sizes, and may be increased at Contractor's option.
- (c) SLEEVING.
 - 1. Provide sleeve beneath hardscape for irrigation pipe and wiring. Provide separate sleeve beneath hardscape for wiring.
 - 2. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting the requirements of Cell Classification 12454-A or 23565-B, ASTM Standard D1784, with an integral belled end.
 - 3. Use Class 200, SDR-21, rated at 200 PSI, conforming to dimensions and tolerances established by ASTM Standard D2241 for mainline pipe, lateral pipe and wiring sleeves.
 - 4. Mainline and lateral pipe sleeves are as shown on the drawings.
 - 5. Install control wiring sleeve inside pipe sleeves as presented in the installation details. Wiring bundle contained in the sleeve should not exceed 40% of the available area within the sleeve per NEC recommendations.
- (d) PIPE AND FITTINGS.
 - 1. HDPE Pipe and Fittings:
 - a. Use high density, extra high molecular weight polyethylene pipe (HDPE) 4710, extruded from material meeting the specifications of cell classification on PE 245434C, ASTM standard D 3350, SDR 9, rated at 200 PSI conforming to the dimensions and tolerances established by ASTM F 714 for mainline pipe.
 - b. Join pipe lengths using butt-fusion technique as recommended by pipe manufacturer.

2. Lateral Pipe and Fittings:

- a. Use rigid, unplasticized polyvinyl chloride (PVC 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting the requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with an integral belled end suitable for solvent welding.
- b. Use Class 200, SDR-21, rated at 200 PSI, conforming to dimensions and tolerances established by ASTM Standard D2241.
- c. Use solvent weld pipe for lateral pipe. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784 for PVC pipe. Primer for use with solvent cement to conform to ASTM F656 and purple in color. Solvent cement to conform to ASTM Standard D2564, of type approved by pipe manufacturer.

3. Specialized Pipe and Fittings:

- a. Ductile Iron Pipe: Use Class 50 conforming to ANSI A21.51 (AWWA C151). Use minimum of Class 53 thickness pipe for flanged piping. Use cement-mortar lining conforming to ANSI/AWWA C104-A21.4.
- b. Use mechanical joints conforming to ANSI A 21.10 (AWWA C110) and ANSI A21.11 (AWWA C111) or flanged fittings conforming to ANSI/AWWA C110 and ANSI B16.1 (125#).
- c. Joint sealant: Use only Teflon-type tape or Teflon based paste pipe joint sealant on plastic threads. Use nonhardening, nontoxic pipe joint sealant formulated for use on water-carrying pipes on metal threaded connections.

4. Joint Restraint Harness:

- a. Use a joint restraint harness as presented in the installation details and wherever joints are not positively restrained by flanged fittings, threaded fittings, and/or thrust blocks.
- b. Use a joint restraint harness with transition fittings between metal and PVC pipe, where weak trench banks do not allow the use of thrust blocks, or where extra support is required to retain a fitting or joint.
- c. Use bolts, nuts, retaining clamps, all-thread, or other joint restraint harness materials that are stainless steel. Use retainer conforming to ASTM A536. Use high strength, low alloy steel bolts and connecting hardware conforming to ANSI/AWWA C111/A21.11.
- d. acceptable manufacturer is Uni-Flange, or approved equal.

(e) MAINLINE COMPONENTS.

1. Isolation Gate Valve Assembly:

- a. As presented in the installation details.
- b. Iron body, bronze mounted, double disc with parallel or inclined seats, non-rising stem turning clockwise to close, 200 PSI minimum working pressure. AWWA C509.

Acceptable manufacturers are Clow, Kennedy, Mueller, Waterous or approved equal.

- c. Valve Box: Use plastic (ABS) 10-inch round valve box with black lid. Acceptable manufacturer is Brooks Products or approved equal.
- d. Filter Fabric: Use a spunbond polyester 3.5 oz. per square yard landscape fabric.

2. Hydrometer:

- a. As presented in the installation details.
- b. Valve Box: Use plastic (ABS) jumbo rectangular valve box with black lid. Acceptable manufacturer is Carson or approved equal.
- c. Filter Fabric: Use a spunbond polyester 3.5 oz per square yard landscape fabric.
- d. Acceptable manufacturer is Bermad IR-910-MO-KX normally open or approved equal.

3. Air-Vacuum Relief Valve Assembly:

- a. As presented in the installation details.
- b. Cast iron body with epoxy coating, polypropylene float, glass fiber reinforced nylon kinetic float, Buna-N seals and O-rings, stainless steel nuts and bolts, pressure range 2 PSI to 230 PSI. Use a continuous acting combination air and vacuum and air release valve. Acceptable manufacturer is Bermad, Crispin, Fresno, Waterman or approved equal.
- c. PVC Ball Valve: Use a true union ball rated to 235 PSI. Use valve with safe-t-blocked seal carrier (full rated pressured), safe-t-shear stem, and self-adjusting floating seat. Acceptable manufacturer is Spears or approved equal.
- d. Filter Fabric: Use spunbound polyester 3.5 oz per square yard landscape fabric.

4. Quick Coupling Valve Assembly:

- a. As presented in the installation details.
- b. Brass construction, 1-inch nominal size, operating pressure 5-125 PSI with locking rubber or vinyl cover. Acceptable manufacturer and model is Hunter QCV, Rain Bird 5LRC, Toro 100-SLVLC or approved.
- c. Swing Joint: Use pre-manufactured bolt on anchor. Acceptable manufacturer is Harco or approved equal.
- d. Valve Box: Use plastic (ABS) 10-inch round valve box with black lid. Acceptable manufacturer is Brooks Products or approved equal.
- e. Filter Fabric: Use a spunbound polyester 3.5 oz per square yard landscape fabric.

(f) SPRINKLER IRRIGATION COMPONENTS.

1. Remote Control Valve Assembly:

- a. As presented in the installation details.
- b. PVC Ball Valve: Use a true union ball rated to 235 PSI. Use valve with safe-t-blocked seal carrier (full rated

- pressured), safe-t-shear stem, and self-adjusting floating seat. Acceptable manufacturer is Spears or approved equal.
- c. PVC Union: Use a Schedule 40 threaded union with O-ring seal. Acceptable manufacturer is Spears or approved equal.
 - d. Valve Box: Use plastic (ABS) standard valve box with black lid. Acceptable manufacturer is Brooks Products or approved equal.
 - e. Filter Fabric: Use a spunbond polyester 3.5 oz per square yard landscape fabric.
 - f. Install assembly over gravel sump as presented in the installation details.
 - g. Decoder: Single station decoder with surge suppression and ground wire.
 - h. Wire connectors: Use 3M DBY or DBR.
 - i. Lightning protection: Provide grounding rods at decoders as recommended by control system manufacturer.
 - j. Use standard Christy I.D. tags with hot-stamped black letters on a yellow background.
2. Pop-Up Rotor Sprinkler Assembly:
- a. As presented in the installation details.
 - b. Rotary Sprinkler: Use a gear drive sprinkler capable of covering the radius with the discharge rate at the pressure as presented on the drawings. Furnish part circle sprinklers with an adjustable arc of 20- to 340-degrees, and full circle sprinklers with a non-adjustable arc. Furnish sprinkler with stainless steel pop-down spring. Nozzle must be tested per ASAE S398.1 and be verified to deliver Distribution Uniformity of 80% or more and a Scheduling Coefficient of 1.2 or less at the specified offset spacing. Furnish sprinkler with stainless steel risers, integral check valve in base of the case capable of holding back 10 feet of elevation. Minimum pop-up height is 3 ½-inches. Acceptable manufacturer and model is Rain Bird 8005-SS, Hunter I-35-SS or approved equal.
 - c. Swing Joint: Use pre-manufactured triple swing joint. Acceptable manufacturer is Rain Bird, Spears, Lasco or approved equal.
3. Pop-Up Spray Sprinkler Assembly:
- a. As presented in the installation details.
 - b. Sprinkler: Use a spray sprinkler capable of covering the radius with the discharge rate at the pressure as presented on the drawings. Furnish sprinkler with pressure reducing module in the riser stem and integral check valve in base of the case capable of holding back a minimum of 8 feet of elevation. Minimum pop-up height is 4 inches. Acceptable manufacturer and model is Hunter Institutional Series, Rain Bird 1800 Series, Toro 570Z-COM Series or approved equal.

- c. Low Density Polyethylene Hose (Swing Pipe): Use pipe specifically intended for use as flexible swing joint. Use spiral barb fittings supplied by the same manufacturer as hose. Acceptable manufacturer is Rain Bird or approved equal.

(g) CONTROL SYSTEM COMPONENTS.

1. Control Units:

- a. Description: Stand alone climate-based unit that uses two-wire decoder technology. Control unit must have passed Irrigation Association SWAT protocol testing. Acceptable manufacturers and models are Rain Bird MDC2, Rain Master Eagle, Toro Sentinel, Tucor RKD or approved equal.

b. Basic Capabilities:

- 1. Uses preprogrammed historic evapotranspiration (ET) rate data for the area or is capable of manually entering ET rate data for use with the ET based scheduling.
- 2. 100% solid state electrical components with heavy duty electrical surge protection for input and output circuits.
- 3. 24 VAC transformer compatible with two-wire decoder technology.
- 4. Built in lightning and surge protection.
- 5. Battery backup of at least 14 days.
- 6. Manual activation of remote control valves from hand held radio.
- 7. Minimum number of stations as shown on the drawings. Maximum number of stations is in excess of 50.
- 8. Use wall mount configuration.
- 9. Compatible with master valve and flow sensor. Capable of automatically closing master valve if a high flow condition is identified by the flow sensor.
- 10. Flow learning mode or programmable flow enable or disable mode.

- c. Rain Sensor: Use rain sensor that is compatible with control unit and can automatically shut down controller operation in a rain event.

- d. Electrical Conduit: Use PVC Schedule 40 conforming to the dimensions and tolerances established by ASTM Standard D-1785. Fittings for PVC conduit will be Schedule 40, Type 1, PVC solvent weld fittings, ASMTA Standards D2466 and D1784.

- e. Wire Markers: Pre-numbered or labeled with indelible nonfading ink, made of permanent, nonfading material.

- f. Lightning Protection: Provide one 12"x36"x0.0625" ground plate, earth contact enhancement material, one 5/8"x10-foot copper clad UL listed grounding rod, approximately 30 feet of #6 AWG bare copper grounding wire,

6-inch plastic round valve box and CADWELD connectors at each control unit per installation detail.

2. Hand Held Radio:

a. Description: Hand held radio system that allows operation of the irrigation for maintenance purposes via interfacing with the control unit. System to be as recommended by control unit manufacturer.

b. Basic Capabilities:

1. Single or multi-station capability for testing
2. Timed station operation
3. Ability to turn an irrigation program on and off
4. Water and mud resistant

c. Provide three (3) hand held radios each complete with either replaceable lithium battery or rechargeable batteries and charging station.

d. Provide permanent receivers with antennas, necessary cabling and connectors in each control unit.

3. Controller Wire:

a. Use American Wire Gauge (AWG) #14 two-wire cable between control unit and decoder as recommended by control system manufacturer.

b. Use American Wire Gauge (AWG) #14 solid copper, Type UF between decoder and remote control valve.

c. Color: Wire color must be continuous over its entire length.

d. Splices: Use 3M DBY-6 or 3M DBR-6 splices as recommended by control system manufacturer.

e. Valve Box: Use plastic (ABS) standard rectangular valve with black lid. Acceptable manufacturer is Brooks Products or approved equal.

f. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide colored red and imprinted with "CAUTION: BURIED ELECTRIC LINE BELOW" in black lettering.

(h) OTHER COMPONENTS.

1. Tools and Spare Parts: Provide operating keys, servicing tools, spare parts and other items indicated in the General Notes of the drawings.

2. Other materials: Provide other materials or equipment shown on the drawings or installation details that are part of the irrigation system, even though such items may not have been referenced in these specifications.

xx. CONSTRUCTION REQUIREMENTS.

(a) GENERAL CONSTRUCTION REQUIREMENTS.

1. Coordinate construction of irrigation system with the Engineer and the City.

2. Control of Excavations: See Section 3.3 for safety and access directions.
3. Install irrigation components in landscaped areas only.
4. Construction cannot proceed unless staking of irrigation mainline, remote control valve locations, and sprinkler locations are reviewed and accepted by the Contracting Officer's Technical Representative.

(b) INSPECTIONS AND REVIEWS.

1. Site Inspections:
2. Verify construction site conditions and note irregularities affecting work of this section. Report irregularities to the Engineer prior to beginning work.
3. Beginning work of this section implies acceptance of existing conditions.
4. Utility Locates (Call Before You Dig"):
 - a. Arrange for and coordinate with local authorities the location of all underground utilities.
 - b. Repair any underground utilities damaged during construction. Make repairs at no additional cost to the contract price.
5. Irrigation System Layout Review: Irrigation system layout review will occur after the staking has been completed. Notify the Engineer one week in advance of review. The Engineer will identify modifications during this review.

(c) LAYOUT OF WORK.

1. Excavate to permit the pipes to be laid at the intended elevations and to permit workspace for installing connections and fittings.
2. Survey Markers:
 - a. Protect markers during construction.
 - b. If a survey marker is disturbed during construction, the Contractor is responsible for replacing the marker. The Contractor must hire a licensed surveyor to resurvey the location of the marker and replace it.
3. Minimum Cover
 - a. 24-inches over irrigation mainline pipe in landscaped areas (distance from top of pipe to finish grade).
 - b. 18-inches over irrigation lateral pipe to sprinklers (distance from top of pipe to finish grade).
 - c. 18-inches over control wire when not in common trench with mainline or lateral piping (distance from top of control wire to finish grade).
 - d. 18-inches vertical separation between lateral and mainline pipe installed in a common trench.
 - e. 2-inches minimum horizontal separation between pipes and wiring in a common trench.
 - f. Install sleeves at depth to maintain specified depth of pipe or wire routed through sleeve.
4. All excavations must be backfilled by the end of each workday.

5. Enclose pipe and wiring beneath roadways, walks, curbs, etc in sleeves. Backfill sleeves in the following manner:
 - a. Backfill trench using excavated material in 6-inch layers. Minimum compaction of backfill for sleeves shall be a minimum of 95% Standard Proctor Density, ASTM D698-78. Backfill to bottom of road base under roads or to finish grade under walks and curbs.
6. Enclose pipe and wiring beneath roadways, walks, curbs, etc., in sleeves.
7. Dress backfilled areas to original grade. Remove excess backfill to on-site location as directed by the Engineer.
8. Where utilities conflict with irrigation trenching and piper work, contact the Engineer for trench depth adjustments.

(d) SLEEVING AND BORING.

1. Install sleeaking at a depth that permits the encased pipe or wiring to remain at the specified burial depth.
2. Extend sleeve ends a minimum of 12-inches beyond the edge of the paved surface. Cover pipe ends and mark edge of pavement with a chisel or saw.
3. Verify that sleeve sizing is adequate prior to installation. Note that sleeves required for pipe with restrained casing spacers are larger than twice the diameter of the pipe.

(e) ASSEMBLING PIPE AND FITTINGS.

1. General:
 - a. Keep pipe free from dirt and pipe scale. Cut pipe ends square and debur. Clean pipe ends.
 - b. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.
 - c. Trenches may be curved to change direction or avoid obstructions within the limits of the curvature of the pipe. Minimum radius of curvature and offset per 20-foot length of mainline and lateral pipe by pipe size are shown in the following table. All curvature results from the bending of the pipe lengths. No deflection will be allowed at a pipe joint.

SIZE	RADIUS	OFFSET PER 20' LENGTH
1 1/2"	25'	7'-8"
2"	25'	7'-8"
2 2/1"	100'	1'-11"
3"	100'	1'-11"
4"	100'	1'-11"

2. Mainline Pipe and Fittings:
 - a. PVC Rubber-Gasketed Pipe:
 1. Use pipe lubricant. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.

2. Ductile iron fittings will not be struck with a metallic tool. Cushion blows with a wood block or similar shock absorber.
 - b. Fittings: The use of cross type fittings is not permitted.
 3. Lateral Pipe and Fittings:
 - a. PVC Solvent Weld Pipe:
 1. Use primer and solvent cement. Join pipe in manner recommended by manufacturer and in accordance with accepted industry practices.
 2. Cure for 30 minutes before handling and 24 hours before pressurizing or installing with vibratory plow.
 3. Snake pipe from side to side within trench.
 - b. Fittings: The use of cross type fittings is not permitted.
 4. Specialized Pipe and Fittings:
 - a. Ductile Iron Pipe: Install in accordance with accepted industry practices.
 - b. Mechanical joint connections: Install fittings, fasteners and gaskets in manner recommended by manufacturer and in accordance with accepted industry practices.
 - c. PVC Threaded Connections:
 1. Use only factory-formed threads. Field-cut threads are not permitted.
 2. Apply thread sealant in manner recommended by component, pipe and sealant manufacturers and in accordance with accepted industry practices.
 3. Use plastic components with male threads and metal components with female threads where connection is plastic-to-metal.
 5. Thrust Blocks:
 - a. Use cast-in-place concrete bearing against undisturbed soil.
 - b. Size, orientation and placement will be as shown on the installation details.
 - c. Wrap fitting with plastic to protect bolts, joint, and fitting from concrete.
 - d. Install rebar with mastic coating as shown on the installation details.
 6. Joint Restraint Harness:
 - a. Install harness in the manner recommended by the manufacturer and in accordance with accepted industry practices.
 - b. Use restrained casing spacers for gasketed pipe routed through sleeving. Install harness in the manner recommended by the manufacturer and in accordance with accepted industry practices. Install self-restraining

casing spacers at all gasketed pipe bell joints and every 10-feet along the gasketed mainline pipe installed through sleeving. Provide correct number and type of restraints per manufacturer's requirements.

(f) INSTALLATION OF MAINLINE COMPONENTS.

1. Isolation Gate Valve Assembly:

- a. As presented in the installation details, per manufacturer's instructions.
- b. Install where indicated in the irrigation plans.
- c. Brand "GV" in 2-inch high by 3/16-inch deep letters on valve box lid.

2. Hydrometer:

- a. As presented in the installation details, per manufacturer's instructions. Install where indicated in the irrigation plans.
- b. Brand "MV" in 2-inch high by 3/16-inch deep letter on valve box lid.

3. Air/Vacuum Relief Valve Assembly:

- a. As presented in the installation details, per manufacturer's instructions.
- b. Install where indicated in the irrigation plans.
- c. Brand "AV" in 2-inch high by 3/16-inch deep letters on valve box lid.

4. Quick Coupling Valve Assembly:

- a. As presented in the installation details, per manufacturer's instructions.
- b. Install where indicated in the irrigation plans.
- c. Brand "QC" in 2-inch high by 3/16-inch deep letters on the valve box lid.

(g) INSTALLATION OF SPRINKLER IRRIGATION COMPONENTS.

1. Remote Control Valve Assembly:

a. Mainline Flushing:

1. Thoroughly flush mainline before installation of Remote Control Valve Assemblies.
2. Identify remote control valve service tee(s) to be used for mainline flushing. Plug service tees not being used for flushing.
3. Connect 2-inch pipe to flushing service tee(s). Use pipe to direct water away from trench.
4. Use a volume of water such that the velocity in the largest pipe flushing at this point is 3 FPS.
5. Multiple points may be flushed simultaneously.
6. Flush for a minimum of 20 minutes. Continue flushing until the water is clear of any and all debris.
7. Engineer will review the flushing operation and clarity of water before stopping the flushing operation.
8. Disconnect pipe from service tee(s) and install remote control valve(s).

- b. Install per manufacturer's recommendations where indicated on the drawings.
 - c. adjust valve to regulate the downstream operating pressure to 70 PSI for rotor sprinklers and 35 PSI for spray sprinklers.
 - d. Use wire connectors and waterproof sealant to connect two-wire cable to decoder and decoder to solenoid wires. Install connectors and sealant per the manufacturer's recommendations.
 - e. Drive full length of grounding rod into soil. Connect decoder to grounding rod as recommended by control system manufacturer. Install number of grounding rods as recommended by control system manufacturer.
 - f. Install only one remote control valve to a valve box. Locate valve box 5-feet from and align square with nearby edges of paved areas.
 - g. Attach ID tag with controller station number to control wiring at solenoid.
 - h. Brand controller and station number in 2-inch high by 3/16-inch deep letters on valve box lid.
2. Pop-Up Rotor Sprinkler Assembly:
- a. Thoroughly flush lateral pipe before installing sprinkler assembly. Water must be clear of any debris before flushing operation stops.
 - b. Install per the installation details at locations shown on the drawings.
 - c. Allow 3-inch separation between side of rotary sprinkler and adjacent edges of paved areas, walls or fences.
 - d. Install sprinklers perpendicular to the finish grade.
 - e. Install swing joint per manufacturer's recommendations with the appropriate angle between the lateral pipe and the lay length nipple as presented in the installation details.
 - f. Supply appropriate nozzle or adjust arc of coverage of each sprinkler for best performance.
 - g. Adjust the radius of throw of each sprinkler for best performance.
3. Pop-Up Spray Sprinkler Assembly:
- a. Thoroughly flush lateral pipe before installing sprinkler assembly. Water must be clear of any debris before flushing operation stops.
 - b. Install per the installation details at locations shown on the drawings.
 - c. Allow 3-inch separation between side of rotary sprinkler and adjacent edges of paved areas, walls or fences.
 - d. Install sprinklers perpendicular to the finish grade.

- e. Install swing joint per manufacturer's recommendations with the appropriate angle between the lateral pipe and the lay length nipple as presented in the installation details.
 - f. Supply appropriate nozzle or adjust arc of coverage of each sprinkler for best performance.
 - g. Adjust the radius of throw of each sprinkler for best performance.
- (h) INSTALLATION OF CONTROL SYSTEM COMPONENTS.
- 1. Control Units:
 - a. Install control unit at location shown in construction documents. Control unit to be installed in Solar Assembly enclosure per installation detail.
 - b. Install electrical connections per control system manufacturer's recommendations. Electrical connections are to be completed by control system manufacturer's trained representative.
 - c. Lightning protection: Install per installation detail. Drive grounding rod into soil its full length. Connect #6 AWG copper grounding wire to rod and plate using CADWELD connections. Connect to control unit dedicated ground terminal.
 - d. Connect two-wire cable to the corresponding control unit terminals.
 - e. Install permanent receiver for hand held radio if not factory installed.
 - f. Install rain sensor and complete electrical connections to per control unit manufacturer's recommendations.
 - g. Create and program each new control unit with a peak season irrigation program.
 - 2. Control Wire:
 - a. Route two-wire cable in mainline trench.
 - b. Provide a 24-inch excess length of wire in an 8-inch diameter loop at each 90 degree change of direction, at both ends of sleeves, and at 100-foot intervals along continuous runs of wiring. Do not tie wiring loop. Coil 24-inch length of wire within each remote control valve box.
 - c. If cable must be spliced, use waterproof wire connectors and sealant installed per the manufacturer's instructions. Locate splice in turf areas using a valve box that contains an irrigation valve assembly, or in a separate valve box. Use same procedure for connection to valves as for in-line splices. If a separate valve box is used for wire splices, brand "WS" in 2-inch high by 3/16-inch deep letters on valve box lid.
 - d. Unless noted on plans, install wire parallel with and below mainline pipe.

- e. Protect wire not installed with PVC mainline piper with a continuous run of warning tape placed in the backfill 6-inches above the wiring.
- (i) INSTALLATION OF OTHER COMPONENTS.
- 1. Tools and Spare Parts:
 - a. Prior to the Review at completion of construction, provide operating keys, servicing tools, spare parts, and any other items indicated on the drawings.
 - 2. Other Materials: Install other materials or equipment shown on the drawings or installation details that are part of the irrigation system, even though such items may not have been referenced in these specifications.
- (j) MAINTENANCE AND OPERATION INSTRUCTIONS.
- 1. Tools and Spare Parts:
 - a. Prior to Final Inspection, provide two one-day training sessions to operating personnel on proper operation and maintenance of the irrigation system. Training session should cover aspects of maintaining, operating, and repairing the new irrigation system components.
 - b. Provide the following information:
 - 1. Catalog cut sheets for control system, valves, sprinklers, pipe and fittings, wire and wire connectors, ID tags, shop drawings, and all other irrigation equipment shown or described on the drawings and within these specifications.
 - 2. Manufacturer's Operation and Maintenance manuals.
 - 3. Manufacturer's Technical Service Bulletins.
 - 4. Manufacturer's Warranty Documentation.
 - 5. Recommended routine maintenance inspections for weekly, monthly and annual inspections and recommended actions for the inspections and a recommended method for recording the findings of the inspections.
 - 6. Predictive schedule for component replacement.
 - 7. Listing of technical support contacts.
 - c. Operation and maintenance submittal package must be complete prior to being reviewed by the Contracting Officer's Technical Representative. Incomplete submittals will be returned without review.
 - 2. Control System Programming:
 - a. Verify or enter historic ET rate data for irrigation season.
 - b. Create and program each controller with a peak season irrigation schedule for the areas being irrigated by the controller.
 - c. Using the precipitation rate results of the Distribution Uniformity tests calculate the peak season run time for each station.
 - d. Verify operation of program.

- e. Prepare a memorandum documenting the details and assumptions of the programming.
 - f. Turn over memorandum to the Engineer. Completion of the memorandum is a prerequisite for final inspection and operational testing of the irrigation system.
 - g. Program must be created by manufacturer's training personnel or an individual with documented experience in programming the control system. Provide documentation of programming experience if requested by the Engineer.
- (k) COLORED CONTROLLER CHARTS.
- 1. Prepare a map diagram showing location of all valves, lateral lines, and route of the control wires. Identify all valves as to size, station, number and type of irrigation. "As-built" drawings must be approved before charts are prepared.
 - 2. Include legend listing components used for the controller. Include a separate sprinkler table listing station number, sprinkler manufacturer and model, zone capacity, and number of sprinklers on the zone.
 - 3. Provide one colored full sized controller chart for each irrigation controller showing the area covered by the controller. Provide two 11"x17" reduced colored charts of the actual "as-built" drawing. Chart must be readable at the reduced size.
 - 4. Laminate one 11"x17" sized colored chart and place laminated chart in lid of controller.
- (l) PROJECT RECORD DRAWINGS.
- 1. The Contractor is responsible for documenting installed system and all changes to the design. Maintain on-site and separate from documents used for construction, one complete set of contract documents as Project Documents. Keep documents current. Do not permanently cover work until as-built information is recorded and work has been inspected and approved by the Engineer.
 - 2. Record irrigation components, pipe and wiring network alterations. Record work that is installed differently than shown on the construction drawings. Record accurate reference dimensions, measured from at least two permanent reference points, of each irrigation system valve, each controller or control unit, each stub-out for future pipe or wiring connections, and other irrigation components enclosed within a valve box.
 - 3. Prior to project completion label each sheet of the project drawings (redlines) as "Record Drawings" and turn over to Contracting Officer's Technical Representative for delivery to Engineer. Completion of the Record Drawings is a prerequisite for Final Inspection.
- (m) MAINTENANCE.
- 1. Operate and maintain irrigation system for a duration of 30 calendar days from Final Inspection. Make periodic examinations

and adjustments to irrigation system components so as to achieve the most desirable application of water.

(n) CLEANUP.

1. Upon completion of work, remove from the site all machinery, tools, excess materials, and rubbish. Restore site to normal or original condition.

xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Irrigation System) to be measured for payment will be a lump sum in the complete and accepted work.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Irrigation System) will be paid for at the Contract unit price on a lump sum basis. Payment will be full compensation for design, furnishing, transporting, handling, assembling, excavation, bedding and placing materials specified with connection to backflow prevention vault, including all incidental parts, hardware, and for removing all materials after use and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Irrigation System)	Lump Sum

LAWN RESTORATION

- xx. DESCRIPTION. This work shall consist of lawn restoration including but not limited to removal of mulch, preparation of area, aeration, application of amendments, scarifying subgrade, sodding, furnishing and installing topsoil, furnishing and installing sod, and hydroseed in the manner and at the location(s) indicated in the Plans and as directed by the Engineer.

- xx. MATERIALS.
 - a) Topsoil shall conform to the requirements of section 755.02 of the standard specifications.
 - b) Seed shall conform to the requirements of section 755.04 of the standard specifications.
 - c) Compost shall conform to the requirements of section 755.05 of the standard specifications.
 - d) Fertilizer shall conform to the requirements of section 755.06 of the standard specifications.
 - e) Agricultural limestone shall conform to the requirements of section 755.08 of the standard specifications.
 - f) Liquid lime shall conform to the requirements of section 755.09 of the standard specifications.
 - g) Hydraulic matrix shall conform to the requirements of section 755.10 of the standard specifications.
 - h) Sod shall conform to the requirements of section 755.03

- xx. INSTALLATION. Lawn restoration shall be performed as per the Plans. All work shall meet requirements of the standard specifications section 651 and as shown on the Plans or as directed by the Engineer.

- xx. METHOD OF MEASUREMENT. Special Provision (Lawn Restoration- Topsoil & Hydroseed) to be measured for payment will be on a lump sum basis for lawn restoration in the complete and accepted work.

- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Lawn Restoration- Topsoil & Hydroseed) will be paid for at the contract lump sum price. Partial payments will be made as follows:
 - a) Contract lump sum will be paid on a prorated basis for the total lawn restoration area. Payment will be full compensation for preparing, maintaining, implementing lawn restoration, including but not limited to preparation of area, coordination with city arborist, removal of mulch, aeration, application of amendments, scarifying subgrade, furnishing and installing topsoil, hydroseeding, and watering, and for furnishing all labor, tools, materials, equipment, and incidentals to complete the work.

The accepted quantity of Special Provision (Lawn Restoration- Sodding) will be paid for at the contract lump sum price. Partial payments will be made as follows:

- a) Contract lump sum will be paid on a prorated basis for the total lawn restoration area. Payment will be full compensation for preparing, maintaining, implementing lawn restoration, including but not limited to preparation of area, coordination with city arborist, removal of mulch, aeration, application of amendments, scarifying subgrade, furnishing and installing sod, and watering, and for furnishing all labor, tools, materials, equipment, and incidentals to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Lawn Restoration - Topsoil & Hydroseed)	Lump Sum

ADD ALTERNATE

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Lawn Restoration - Sodding)	Lump Sum

MISC. DEMOLITION AND
SALVAGE

- xx. DESCRIPTION. This work shall consist of demolishing, removing, disposing and salvaging items according to the Plans; including but not limited to removal of pavement, sidewalk, concrete wall, irrigation valves, electric meter/boxes on posts, electric pull boxes, posts, benches, light poles, abandoning underground electric lines in place, and salvage of granite cobble sidewalk border and fountain central piece in the manner and at the location(s) indicated in the Plans and as directed by the Engineer.
- xx. METHOD OF MEASUREMENT. Special Provision (Misc. Demolition and Salvage) to be measured for payment will be on a lump sum basis for misc. demolition and salvage in the complete and accepted work.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Misc. Demolition and Salvage) will be paid for at the contract lump sum price.

Removing Medium Trees, Removing Large Trees, Removing Medium Stumps, Removing Large Stumps, Removal of Existing Curb, and Removal of Existing Fence, will be paid for separately under Contract items 201.15, 201.16, 201.20, 201.21, 616.41, and 620.55 respectively.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Miscellaneous Demolition)	Lump Sum
900.645 Special Provision (Demolition and Salvage Existing Fountain & Amphitheater Wall)	Lump Sum

MOVEABLE TABLES AND CHAIRS

- XX. DESCRIPTION. This work shall consist of installing moveable tables and chairs provided by the municipality at the location(s) indicated in the Plans and as directed by the Engineer.
- XX. MATERIALS. Moveable Tables & Chairs shall be as specified by the manufacturer and shall meet the specifications outlined in the Plans.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance.
- xx. MANUFACTURER. The moveable tables and chairs shall be manufactured by Fermob:

Manufacturer: Fermob
1610 Redi Rd Cumming, GA 30040
www.fermobusa.com

TABLES: (20) Bistro 30" Round Table. Color as selected by Landscape Architect and City from standard manufacturer's color chart.

CHAIRS: (60) Metal Bistro Chair. Color as selected by Landscape Architect and City from standard manufacturer's color chart.

CABLING: (2) Provide cable and lock (key or combo as requested by City) for securing tables and folding chairs each evening. 15' Vinyl coated braided steel, 3/8" diameter with loops to receive locks at each end.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Moveable tables and Chairs) to be measured for payment will be the number of each Moveable tables and Chairs installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Moveable tables and Chairs) will be paid for at the Contract unit price for each. Payment will be full compensation for installing a complete Moveable tables and Chairs and necessary anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Moveable tables and Chairs)	LS

RAIN GARDEN

1. DESCRIPTION. This work shall consist of furnishing and installing Rain Gardens A, B & C, including the necessary concrete inlet pad, grate, concrete inlet structure, granite weirs, granite stepping stones, and concrete splash pad at the locations indicated in the plans.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Sections 604, 616 and 618 of the Standard Specifications, as appropriate.

2. MATERIALS. Materials shall meet the requirements of the following Subsections:

Concrete Inlet.....	604.18
Granite Weirs.....	616.21
Concrete Splash Pad.....	618.10

3. CONSTRUCTION REQUIREMENTS.

- (a) Excavation. The Contractor shall follow excavation requirements as outlined in the Plans or as directed by the Engineer.

- (b) Placing Materials. The materials specified above and in the Plans shall be installed with care so as to not compact or effect any of the bioretention soil and such the soil remains as specified in the plan.

- (c) Fill material. Fill soils shall be placed to the specifications outlined in Special Provision (Bioretention Soil). A field demonstration should be conducted to demonstrate this by filling the rain garden with water and measuring drawdown time.

4. METHOD OF MEASUREMENT. The quantity of Special Provision (Rain Garden) to be measured for payment will be on a lump sum basis for the complete and accepted work as shown on the Plans.

5. BASIS OF PAYMENT. The accepted quantity of Special Provision (Rain Garden) will be paid for at the contract lump sum price. Payment shall be full compensation for designing, performing the work specified and all labor, tools, materials, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Rain Garden A)	Lump Sum
900.645 Special Provision (Rain Garden B)	Lump Sum
900.645 Special Provision (Rain Garden C)	Lump Sum

RELOCATE MONUMENT & INSTALL NEW FLAGPOLE

- XX. DESCRIPTION. This work shall consist of removing and relocating an existing monument, at the location indicated in the Plans and as directed by the Engineer. The work under this Section shall be performed in accordance with these provisions and the Plans.
- XX. LOCATION. This work is specified for removing and relocating the WWII monument erected by the Gold Star Mothers which sits directly in front of City Hall and installing a new flagpole.
- XX. CONSTRUCTION REQUIREMENTS. Contractor shall carefully remove the existing monument in its entirety. Special care shall be taken when operating equipment and tools at or near the monument to avoid any damage to the existing monument. Damage caused by the Contractor's operations shall be repaired or replaced to the satisfaction of the Engineer, at no additional cost to the Owner. Method for transporting the monument shall be approved by the Engineer. Monument may need to be stored and / or protected in its current location or in a temporary location prior to placement in the final designated location to facilitate Contractor's construction operations. Such temporary relocation and protection shall be approved by the Engineer. Any existing concrete foundation under the existing monument not relocated with the monument, shall be completely removed and disposed in conformance with Section 203 of the Standard Specifications. Excavated areas shall be backfilled with material acceptable to the Engineer. Replacement foundation, if required, shall be constructed of reinforced concrete to the dimensions of the existing foundation or as directed by the Engineer. Bury depth of the new or relocated foundation shall meet or exceed existing bury depth. Monument and foundation shall be set on subbase of crushed gravel, fine graded and compacted per subsection 301, unless otherwise noted on the plans or directed by the Engineer. Final location and grade for the monument shall be as directed by the Engineer.
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Relocate Monument) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Relocate Monument) at the location specified will be paid for at the Contract lump sum price. Payment will be full compensation for removing, transporting, storing, protecting, and resetting the monument to the relocated position, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work. Subbase materials shall be paid for under the appropriate contract pay items. Concrete class B and reinforcing type 1, if required for foundation, shall be paid under the appropriate contract pay items. Excavation and backfill required at the existing or proposed location shall be incidental to Special Provision (Relocate Monument).

INSTALL NEW FLAG POLE

- XX. DESCRIPTION. This work shall consist of installing a new flag pole and flagpole foundation per the Plans at the location indicated in the Plans and as directed by the Engineer.

XX. MATERIALS. The flag pole shall be as provided by the manufacturer and shall meet the specifications outlined in the Plans. Concrete shall meet the requirements of Section 541 for Concrete.

xx. MANUFACTURER: The flagpole shall be by Concord American Flagpole

Manufacturer: Concord American Flagpole

26252 Hillman Highway

Abingdon, VA 24210

Phone: 276-525-4078

www.concordamericanflagpole.com

Model: 35' tall Sentry series, Internal Cam Cleat, Rope Halyard ISC35C61

ACL

Materials:

Patented, Heavy-Duty Gold Anodized Aluminum Ball

Cast Aluminum Revolving Truck with SEALED Stainless Steel Bearing

Assemblies, Aluminum Spindle, Cast Brass Exit Bushing and Removable Hood

Complete External Halyard Assembly

- Rope Halyard - 5/16" #10 Wire Center Polyester

- Two (2) Stainless Steel Flagsnaps

- Two (2) Neoprene Flagsnap Covers

Cam Cleat

Reinforced Raised Door Frame

Flush Mount Access Door with Lock and Keys

Spun Aluminum FC-11 Flash Collar

Galvanized 16-Gauge Corrugated Steel Ground Sleeve with Steel Grounding

Spike

xx. SUBMITTALS. Prior to ordering the flagpole, the Contractor shall submit manufacturer's literature and Working Drawings to the Engineer in accordance with Section 105.03. The submittal shall indicate materials, dimensions, tolerances, welding, fasteners, hardware, mount, finish, accessories, and the manufacturer's warranty.

xx. INSTALLATION. The flagpole shall be mounted per the manufacturer's specifications.

All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The Contractor shall protect all parts of the flagpole and maintain them in an undamaged condition until they are installed and accepted for payment.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 675 of the Standard Specifications.

Pay Item Pay Unit

900.645 Special Provision (Relocate Monument & Install New Flagpole) LS

RESTROOM FACILITIES

- XX. DESCRIPTION. This work shall consist of installing a prefabricated restroom facility (as provided by municipality and foundation in accordance with the Plans and as directed by the Engineer.
- XX. MATERIALS. Restroom facility shall be as specified by the manufacturer and shall meet the specifications outlined in the Plans.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The restroom facility shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The restroom facility shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the restroom facility and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. MANUFACTURER. The restroom facility shall be manufactured by Portland Loo:

2550 NW 25th Place
Portland, OR 97210
P (503) 226-3968
C (503) 481-9722
www.PortlandLoo.com

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Restroom Facility) to be measured for payment will be the number of each Restroom Facility installed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Restroom Facility) will be paid for at the Contract lump sum price for each. Payment will be full compensation for installing a complete Restroom Facility system and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for anchoring and any concrete required for anchor footings.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Restroom Facility)	LS

TRAFFIC CONTROL

- XX. DESCRIPTION. This work shall consist of establishing and maintaining traffic control measures to protect the traveling public and construction operations as indicated in the Plans and as directed by the Engineer. The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 641 of the Standard Specifications.
- XX. SUBMITTALS. Working Drawings shall be submitted to the Engineer for approval in accordance with Subsection 105.03. Submittal shall include a site-specific traffic control plan conforming to the requirements of the MUTCD and all applicable Agency Standard Drawings. Where conflicts exist, the MUTCD will govern. Each phase of construction shall be included in the submitted traffic control plan, and shall show all traffic control devices and signage proposed. Manufacturer's literature for temporary barrier and attenuators shall be included in the submittal.
- XX. TRAFFIC CONTROL DEVICES.
- (a) Temporary traffic barrier and temporary energy absorption attenuators shall meet the requirements of Section 621.
 - (b) Traffic control devices shall meet the requirements of Section 641.
 - (c) Temporary Pedestrian Barrier. Temporary pedestrian barrier shall be TL-2 approved portable water-filled plastic barrier with TL-2 approved end treatments. Barriers shall meet the ADA detection requirements of MUTCD Figure 6F.74. Barriers shall be installed per the approved manufacturer's recommendations. Approved manufacturer shall be one of the following or approved equal:

Energy Absorption Systems, Inc.
Product Name: Water-Filled TRITON Barrier®
70 W Madison Street, Suite 2350
Chicago, IL 60602
(312) 467-6750

Armorflex International, New Zealand
Product Name: ArmorZone™ TL-2 Barrier & End Treatment
US Distributor: Lindsay Corporation / Barrier Systems, Inc.
2222 North 111th Street
Omaha, NE 68164
(402) 829-6800

Rhino Safety Barriers, LLC
Product Name: RB1-1000 TL2-350
2500 Gaspar Avenue
Whiting, IN 46394-2175
(800) 292-1305
 - (d) Temporary Pavement Markings required to support the TCP shall meet the requirements of 646.

- (e) Temporary lighting required for traffic control for nighttime construction or at crosswalks as noted in the TTCP shall meet the requirements of NCHRP Report 476 - Guidelines for Design and Operational of Nighttime Traffic Control for Highway Maintenance and Construction, Section 2.9. Lighting shall be downcast and only used in the specific area of construction. All costs for temporary lighting required for traffic control shall be incidental to Special Provision (Traffic Control, All-Inclusive).
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Traffic Control, All-Inclusive) to be measured for payment will be on a lump sum basis for providing traffic control in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision Traffic Control, All-Inclusive) will be paid for at the Contract lump sum price. Partial payments will be made as follows:
 - (a) The first 15% of the Contract lump sum price will be paid upon approval of the Contractor's traffic control plan.
 - (b) The remaining 85% of the Contract lump sum price will be paid on a prorated basis for the estimated duration of the Contract work remaining. Payment will be full compensation for preparing, implementing, inspecting, maintaining, and removing the applicable traffic control plan and required traffic control devices, including but not limited to temporary traffic barrier and attenuators, temporary pedestrian barrier, temporary striping for traffic control, removal or covering of existing signing if necessary, installation and removal of all temporary signing for traffic control including temporary guide signs, temporary lighting required for traffic control; and for furnishing all labor, tools, materials, equipment, and incidentals necessary to complete the work.

Uniformed Traffic Officers, Flaggers, and Portable Changeable Message Signs will be paid for separately under Contract items 630.10, 630.15, and 641.15 respectively.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Traffic Control, All-Inclusive)	Lump Sum

TREE PROTECTION

- XX. DESCRIPTION. The purpose of this item is to prevent damage to branches, trunks, and root systems of existing individual trees to remain and to ensure their survival. Provisions under this item include steps to minimize soil and root disturbance, and to construct protection measures for trees and shrubs close to construction areas that are labeled on the Plans as either "save" or "protect." The Contractor shall install barrier fence labeled as Tree Protection Zone (TPZ) on the Plans adjacent to existing trees and, prior to any earth disturbance. Barrier fence shall not be removed until the final project inspection. There will be no activity within the TPZ except watering or installation of erosion prevention or sediment control measures where required. Tree protection methods and schedule of work shall be approved by the Engineer.

The Contractor shall consult with the City Arborist, certified by the ISA, International Society of Arboriculture or a certified arborist from the City tree crew, before construction to assist the Resident Engineer with tree protection measures as part of the Tree Protection Plan and site inspection.

City arborist:(802) 343-2303

- XX. LOCATION. This work is specified for protecting all trees marked as existing to remain within the limits of City Hall Park, and any adjacent street trees on Main Street, St. Paul or College Street that may be impacted by construction.
- XX. CONSTRUCTION REQUIREMENTS. A continuous level of protection shall be provided for trees marked "Save" or "Protect". At the direction of the Resident Engineer, the City Arborist shall inspect damage to trees and recommend mitigation treatment and replacement if damaged trees are determined to need replacement.
- XX. FENCED TREE PROTECTION ZONE: No construction may occur within the fenced Tree Protection Zone (TPZ) unless pre-approved. In locations where construction needs to occur within the TPZ due to the proximity of existing trees to the proposed work, construction may be approved on a case by case basis. Placement of protective, temporary fencing called barrier fence shall extend to the TPZ.
- XX. PROHIBITED ACTIVITIES WITHIN TREE PROTECTION ZONE: Breaking of branches, scraping of bark, or unauthorized cutting, nailing or bolting into trunks; use of plants as temporary support (i.e. cables, leaning equipment). No unauthorized filling, excavating, trenching or auguring within "root zone".

Compaction/driving over the "root zone" caused by heavy equipment or concentrated foot traffic which may significantly alter the soil conditions prior to construction.

Storage of any materials or vehicles within the "root zone". Dumping of construction waste or materials (including liquids). Unauthorized removal or relocation of woody plants.

Execution or pre-emption of pre-determined City Arborist responsibilities.

Removal of tree protection barricades or construction fencing prior to completion of project.

XX. PRIOR TO CONSTRUCTION: Site work may not commence until the contractor meets on-site with the Resident Engineer and the City Arborist to complete a pre-construction walk through to review and map all construction and work, procedures, access routes, storage and tree protection areas relating to the protection of trees marked "Save" or "Protect". Excavation measures beyond the protective fencing but within the drip-line area or TPZ shall be resolved.

Prior to construction, unless otherwise directed by the Resident Engineer, the Contractor shall install physical barrier to remain until all site work has been completed that will consist of:

- 1.) Installation of barrier fencing as detailed on the plans.
- 2.) Installation of weather proof signage, minimum size of 8-1/2" x 11", which reads: "Trees are being protected. No unauthorized trespass is allowed."
- 3.) Fences shall not be relocated or removed without the written permission of the Resident Engineer and City Arborist.
- 4.) The Contractor shall assign an individual on site responsible to oversee continuous maintenance of protective fencing, signs and to follow tree protection measures.
- 5.) If the fenced, tree protection zones are breached by the contractor or subcontractor, a cash fine shall be charged for each violation resulting in damage (this amount shall be determined by the Resident Engineer or City Arborist.)
- 6.) Monitor the water needs of the trees during and after construction.

XX. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch (50-mm) opening, 0.148-inch- (3.76-mm-) diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- (60-mm-) OD line posts, and 2-7/8-inch- (73-mm-) OD corner and pull posts; with 1-5/8-inch- (42-mm-) OD top rails and 0.177-inch- (4.5-mm-) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.

Height: 72 inches (1800 mm)].

XX. CONSTRUCTION: Construction shall be conducted so as to minimize impacts on the existing tree root structure. Excavation within the drip-line of the tree itself shall be completed using an air spade only to excavate to depth of base material and design elevation as shown on project cross-sections and typical details.

Barrier Fence shall be used as shown on the plans and as directed by the Engineer for the protection of trees and other landscape features for the delineation of areas as shown on the Plans.

All underground utilities and drain or irrigation lines shall be routed outside the Tree Protection Zone. If lines must traverse the protection area, they shall be tunneled or bored under the tree.

- XX. BRANCH PRUNING - Pruning should be performed to provide adequate clearance for the new sidewalk and for equipment and construction. Clearance during construction shall be identified in advance and approved by the Resident Engineer and the City Arborist. All pruning shall be in accordance with the International Society of arboriculture's Best Management Practices for tree pruning and the ANSI A300 Pruning Standard (American National Standard for Tree Care Operations) and adhere to the most recent edition of ANSI Z133.1.
- XX. ROOT PRUNING - The City Arborist and the Resident Engineer shall first inspect each tree marked "Save" or "Protect" to determine if the plant may tolerate root pruning considering tree species, age, crown size, site exposure, existing defects, vigor, and severity of necessary root pruning. If possible, roots shall first be pruned to sever them cleanly since soil excavation equipment may pull, rip or shatters roots, causing unnecessary damage for some distance towards the tree.

Root pruning shall be completed by root pruning equipment specifically designed for that purpose including large circular saws used to cut concrete and rock saws. The saws must cut through the wood roots to the depth of the required excavation. Root pruning equipment designed primarily for curb and sidewalk repair may cut only 8 to 12 inches deep. Where excavation must occur very close to trees, exposing the roots with an air spade may be necessary, and then cut the exposed root with a saw. Before grading, excavation for gravel base, or trenching, trees (as indicated on plan) shall be root pruned 1 foot outside the tree protection zone by cutting all roots cleanly to a depth of 24 inches, or to a depth of base material indicated on cross-sections or the typical details for the project. Roots shall be cut by manually digging a trench and cutting exposed roots with a saw, vibrating knife, rock saw, or other approved root-pruning equipment.

The following procedure is required:

- 1.) Stake the edge of excavation.
- 2.) Root pruning shall be done with equipment approved above. Do not use trenchers or backhoes, which may rip the roots closer to the root collar than the intended cut. Roots shall be exposed by air spade excavation. All roots 1" or greater in diameter shall be cut with a hand saw or chain saw. Cuts shall be made clean with no tearing of the roots.
- 3.) If it is determined by the Resident Engineer and the City Arborist that root pruning equipment cannot be used, dig a trench along the staked line. Equipment such as a backhoe can be used until

roots larger than 1 inch in diameter are encountered. Then, expose remaining roots with an air spade.

- 4.) When a root is encountered, expose it by removing soil by hand or with an air spade, and cut it cleanly with a saw at the outside edge of the trench (towards the tree). Do not paint the cut root end.
- 5.) Replace soil in the trench. Water when determined by the City Arborist following back-filling to compensate for root loss.
- 6.) Depth of root pruning is typically the same as the depth of excavation, up to 24" depth.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Tree Protection) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Tree Protection) will be paid for at the Contract lump sum price. Payment will be full compensation for fencing, trimming, pruning, air spading, of existing trees to remain and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Pay Item Pay Unit

900.645 Special Provision (Tree Protection) Lump Sum

WEATHERED STEEL SEATWALL

- XX. DESCRIPTION. This work shall consist of furnishing and installing a weathered steel seatwall system and foundation in accordance with the Plans and as directed by the Engineer. This includes but is not limited to Corten or Borcon steel plate, wood seat, concrete foundation, reinforcing, excavation and all required fasteners and granite steps.
- XX. MATERIALS. Steel shall be either 1/4" thick Corten or Borcon steel plate; 2" x 2" (1-13/16" x 1-13/16") Thermally Modified Ash slats, CIP concrete wall with reinforcing, non-reactive fasteners and hardware and shall meet the specifications outlined in the Plans, details and specifications. Concrete shall meet the requirements of Section 541 for Concrete, Class B. Reinforcing steel shall meet the requirements of Section 713.01.
- XX. INSTALLATION. All work shall be free of blemishes or defects which could affect durability, strength, or appearance. The weathered steel seatwall shall be installed true to line and grade as shown on the Plans or as directed by the Engineer.

The weathered steel seatwall shall be installed at the location indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.

The Contractor shall protect all parts of the weathered steel seatwall and maintain them in an undamaged condition until they are installed and accepted for payment.

- xx. SUPPLIERS of components:

Corten or Borcon:
Border Concepts
7621 Little Ave.
Suite 426
Charlotte, NC 28226
www.borderconcepts.com

Thermally modified ash lumber:
JOHNSON'S WORKBENCH
563 N Cochran Ave, Charlotte, MI 48813
(517) 543-1660
www.the-workbench.com

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (weathered steel seatwall) to be measured for payment will be on a lump sum basis in the complete and accepted work, at the location(s) indicated in the Plans.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (weathered steel seatwall) will be paid for at the Contract lump sum price. Payment will be full compensation for installing a weathered steel seatwall and necessary foundation and anchoring materials and labor in accordance with the Contract Documents, and for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work including but not limited to any materials required for operation.

Payment will be made under:

Pay Item

Pay Unit

900.645 Special Provision (Weathered Steel Seatwall)

LS

GRANITE DRAINAGE RUNNEL & ART DISC INSTALLATION

- XX. DESCRIPTION. This work shall consist of furnishing and placing granite pavers, concrete base, polymer modified setting bed / joint and edging to create a Granite Drainage Runnel either Type 1 or Type 2 as shown in the Plans / Details and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans and Sections 203, 404, 406, 541 and 616 of the Standard Specifications.

- XX. QUALIFICATIONS. The installer shall provide their installation history, including installation of granite pavers to the Engineer.

The installer's foreman shall have a minimum of 5 years of experience in the installation of unit paver systems of similar size and complexity.

- XX. MATERIALS. Materials shall meet the following requirements:

Granite Cobbles:
Vermont Stone Art
14 N Main St, Barre, VT 0564
(802)505-2503
www.vermontstoneart.com

Product: VSA Gray Granite Cobblestones
Finish: Split.
Size: Approximately 4" x 4" x 4"

Edging:
PERMALOC CORPORATION
13505 Barry ST
Holland, MI 49424
1-800-356-9660
www.permaloc.com

Product: Permaloc Asphalt Edge
Finish: Mill Finish.
Size: 2-1/2" x 2-1/4"

Setting bed and joint mortar:
SPECMIX
1230 Eagan Industrial Road, Suite 160
Eagan, MI 55121
1-888-SPEC-MIX
www.specmix.com

Product: Spec Mix Polymer Modified Setting bed Mortar, utilizing concrete sand complying with ASTM C33

- (d) Excavation. Excavation shall meet the requirements of Standard Specification Section 203.

- (f) Concrete. Concrete setting bed shall meet the requirements of Standard Specification Section 541.
- (g) Asphalt Adhesive for Setting Pavers. A coating of asphalt adhesive shall meet the requirements of emulsified asphalt in Standard Specification Section 404.
- (h) Joint Filler for Granite Pavers. Spec Mix Polymer Modified Setting bed Mortar, utilizing concrete sand complying with ASTM C33.
- (h) Restraint / Edging for Granite Pavers. Pavers shall be restrained on all sides by either concrete sidewalk or edging. Edging shall be 2-1/2" x 2/14" Asphalt Edge, Permaloc edging, mill finish. Edging ramset / hilti 3/4" - 1" into concrete.
- (j) Other conditions.
 - (1) Pavers shall be retained at edges of the pavement, curb and sidewalk.
 - (2) Colors shall be varied and evenly distributed.

XX. ART INSTALLATION. The drainage runnel that follows the arc walk from the NE corner of Park to the SW Corner of Park is to receive an art Installation. The artists Kat Clear and Tessa O'Brien will be fabricating and providing a series of circular discs that will be placed within the 4" x 4" Granite Cobbles. Discs to be placed by contractor at the guidance of the Artists:

- (40) 4" Diameter Discs
- (40) 6" Diameter Discs
- (40) 9" Diameter Discs

Art discs shall be set in runnel prior to installing the 4" x 4" granite cobbles. Following installation of Art Discs, contractor shall install the field of 4" x 4" granite cobbles in a grid pattern as shown on the drawings. Care shall be taken to cut cobbles to have a uniform 1/4" mortar joint surrounding the art discs.

Artists contact info:
Clear Greene Design
1318 Shellhouse Mountain Road
Ferrisburgh, VT 05456
(802)734-1603
(207)253-9633

XX. CONSTRUCTION REQUIREMENTS.

- (a) Excavation. Excavation shall be made to the required depth and to the width that will permit placing of base and setting beds as shown in the Plans.
- (b) Base. Crushed Gravel and a concrete base shall be placed and compacted to an elevation which will result in the top surface of the pavers being flush with the surrounding pavers.

- (c) Protection of the Pavers. The pavers shall be stacked at the job site on pallets or suitable platforms that do not unnecessarily obstruct pedestrians or motorists and are protected from damage.
- (d) Installation. Installation shall be performed in accordance with the Plans and the following requirements:
- (1) The depth control base must be set carefully to bring the pavers, when laid, to proper grade.
 - (2) After the polymer modified setting bed is applied, carefully place the pavers by hand in straight courses with hand tight joints and uniform top surface. Good alignment must be kept and the pattern shall be set in accordance with the existing pattern. Care shall be taken during the layout to minimize cutting.
 - (3) Cutting of the pavers may be necessary to accommodate field conditions and to achieve an accurate and consistent fit to the existing pattern. If pavers need to be cut, the cut shall be made with a masonry saw. Pavers shall be free from stain, dirt, or dust after cutting. Paver units shall not be cut to a size smaller than one-third of a whole paver.
 - (4) Any broken pavers shall be replaced with matching pavers.
 - (5) Installation shall be performed in one direction by building forward from previously installed pavers.
 - (6) Joints, for granite pavers, shall average $\frac{1}{2}$ " ranging from $\frac{3}{8}$ " - $\frac{5}{8}$ ". Joints types:

Runnel Type 1: Leave mortar 1" below surface of cobbles:
Runnel Type 2: Set mortar flush with top of cobbles.

- (e) Tolerances. Loose or uneven pavers with greater than $\frac{1}{2}$ " differential in elevation to the adjacent pavers, shall be tamped or removed and reset as required to attain a level surface.
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Granite Drainage Runnel) to be measured for payment will be the number of square feet placed in the complete and accepted work. The quantity of Special Provision (Art Disc Placement) to be measured for payment will be the number of each placed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Granite Drainage Runnel) will be paid for at the contract unit price per square foot. Payment will be full compensation for transporting, handling, and placing the material specified, including pavers, containment, concrete pavement, emulsified asphalt, replacing damaged pavers damaged at no fault to the Contractor; performing any other required excavation; cleaning the completed surface as required; and for all labor, tools, equipment and incidentals necessary to complete the work.

The accepted quantity of Special Provision (Art Disc Placement) will be paid for at the contract unit price per each. Payment will be full compensation for handling and placing the material specified, including

replacing damaged pavers damaged at no fault to the Contractor; performing any other required excavation; cleaning the completed surface as required; and for all labor, tools, equipment and incidentals necessary to complete the work.

The Contractor will be responsible for replacing, at no additional cost to the City, any pavers that are broken or otherwise damaged by the Contractor's operations.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.670 Special Provision (Granite Drainage Runnel)	Square Foot
900.620 Special Provision (Art Disc Placement)	Each

PERVIOUS PAVERS

XX. DESCRIPTION. This work shall consist of furnishing and installing pervious pavers in accordance with the plans, the manufacturers specifications, and as directed by the Engineer.

XX. QUALIFICATIONS. The installer shall provide their installation history, including installation of pervious pavers, to the Engineer.

The installer's foreman shall have a minimum of 5 years of experience in the installation of unit paver systems of similar size and complexity.

XX. MATERIALS. The pervious pavers shall be as provided by the manufacturer and shall meet the specifications outlined in the Plans.

Provide Permeable Joint Opening Aggregate conforming to ASTM C 33 and gradation requirements presented in Table 1:

Table 1
Permeable Joint Opening Aggregate Gradation Requirements

1/8 to 3/16 inch chips	
Sieve Size	Percent Passing
1/4 in (6 mm)	97 to 100
No. 4 (4.75 mm)	70 to 83
No. 8 (2.36 mm)	37 to 50
No. 16 (1.18 mm)	0 to 12
No. 200	< 1

xx. MANUFACTURER. The pervious pavers shall by Unilock

Manufacturer: Unilock
Tel.; (508) 278-4536
www.unilock.com

Paver Type 1: Eco-Line Permeable Paver
Size: Random Bundle, including:
10.875" X 3.25" X 3.875"
10.875" X 4.5" X 3.875"
12.5" X 3.25" X 3.875"
12.5" X 4.5" X 3.875"
14" X 3.25" X 3.875"
14" X 4.5" X 3.875"
9.375" X 3.25" X 3.875"
9.375" X 4.5" X 3.875"

Finish: Il Campo.
Initial color selection: Heritage Brown

XX. MOCKUPS.

(a) Mockups: Build mockups (min. 3' x 3' section) to verify initial selections made, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

- (b) Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- xx. INSTALLATION. The pervious pavers shall be handled and installed at the locations indicated in the Plans, to the configuration shown in the Plans, and in accordance with the manufacturer's recommendations. All locations shall be field approved by the Engineer prior to installation.
- XX. CONSTRUCTION REQUIREMENTS. Care should be taken to follow the manufacturer's installation specifications as improper handling or use of material may clog or damage the pervious pavers and reduce or eliminate their effectiveness at infiltrating water.
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Pervious Pavers) to be measured for payment will be the number of square feet placed in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Pervious Pavers) will be paid for at the contract unit price per square foot. Payment will be full compensation for transporting, handling, and placing the material specified, including pavers, stone chips, sand, replacing damaged pavers damaged at no fault to the Contractor; performing any other required excavation; cleaning the completed surface as required; and for all labor, tools, equipment and incidentals necessary to complete the work.

The Contractor will be responsible for replacing, at no additional cost to the State, any pavers that are broken or otherwise damaged by the Contractor's operations.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.670 Special Provision (Pervious Pavers)	Square Foot

UNIT PAVERS

- XX. DESCRIPTION. This work shall consist of furnishing and placing concrete pavers, asphalt tack coat, bituminous concrete pavement, aggregate setting beds and joint material as shown in the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans and Sections 203, 404, 406, 541 and 616 of the Standard Specifications.

- XX. QUALIFICATIONS. The installer shall provide their installation history, including installation of concrete pavers to the Engineer.

The installer's foreman shall have a minimum of 5 years of experience in the installation of unit paver systems of similar size and complexity.

- XX. MATERIALS. Materials shall meet the following requirements:

- xx. MANUFACTURER. Concrete pavers shall be by Unilock

Concrete Paver Manufacturer: Unilock
Tel.; (508) 278-4536
www.unilock.com

- (a) Concrete Pavers.

(1) Concrete Pavers: Solid interlocking paving units complying with ASTM C 936/C 936M and resistant to freezing and thawing when tested according to ASTM C 67, made from normal-weight aggregates. Average compressive strength 8000 psi (55MPa) with no individual unit under 7,200 psi (50 MPa). Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

- (2) Paver Types as indicated on plan:

Paver Type 2: Park Corners / Entries

Product: Promenade Paver
Size: 4" x 12" x 4"
Finish: Enduracolor, Smooth
Initial color selection for mockup: Charcoal Gray

Paver Type 3: Performance Area

Product: Promenade Paver
Size: 4" x 12" x 4"
Finish: Enduracolor, Smooth
Initial color selection for mockup: Charcoal Gray

Paver Type 4: Firehouse / Dining plaza

Product: Promenade Paver
Size: 4" x 16" x 4"
Finish: Enduracolor, Umbriano
Initial color selection for mockup: Autumn Sunset

Paver Type 5: Ellipse

Product: Promenade Paver

Size: 8" x 24" x 4"

Finish: Enduracolor, Umbriano

Initial color selection for mockup: Midnight Sky

Paver Type 6: Diagonal walk thru Ellipse

Product: Promenade Paver

Size: 8" x 24" x 4"

Finish: Enduracolor, Series 3000

Initial color selection for mockup: Christalline Basalt

Joint Filler Manufacturer: Alliance Designer Products
Alliance Designer Products Inc.
225 Boulevard Bellerose West
Laval, Quebec H7L 6A1
866-212-1611
www.alliancegator.com

Joint Product: Gator Maxx G2 Polymer sand

Color: As selected by landscape architect / City from mockups

- (d) Excavation. Excavation shall meet the requirements of Standard Specification Section 203.
- (f) Bituminous Concrete Base Course. Bituminous concrete base course shall meet the requirements of Standard Specification Section 406.
- (g) Sand Setting Bed. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate.
- (h) Joint Filler for Concrete Pavers. Joint filler shall be Polymeric Sand, Gator Maxx G2,
- (j) Other conditions.
 - (1) Vehicular traffic: If there is to be vehicular traffic over the pavers, prime the bituminous concrete base with emulsified asphalt (RS-1 or CRS-1)
 - (2) Pavers shall be retained at edges of the pavement, curb and sidewalk.
 - (3) Colors shall be varied and evenly distributed.

XX. MOCKUPS.

- (a) Mockups: Build mockups (min. 4' x 4' section) to verify initial selections made, to demonstrate aesthetic effects, and to set quality standards for materials and execution. Install Mockups in locations where colors come together as they do on plan. One

segment of Ellipse wall will need to be on site and adjacent to mockups.

- (b) Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

XX. CONSTRUCTION REQUIREMENTS.

- (a) Excavation. Excavation shall be made to the required depth and to the width that will permit placing of base and setting beds as shown in the Plans.
- (b) Base. Crushed Gravel and Asphalt base shall be placed and compacted to an elevation which will result in the top surface of the pavers being flush with the surrounding pavers.
- (c) Protection of the Pavers. The pavers shall be stacked at the job site on pallets or suitable platforms that do not unnecessarily obstruct pedestrians or motorists and are protected from damage.
- (d) Installation. Installation shall be performed in accordance with the Plans and the following requirements:
 - (1) The depth control base must be set carefully to bring the pavers, when laid, to proper grade.
 - (2) After the asphalt and sand setting bed is applied, carefully place the pavers by hand in straight courses with hand tight joints and uniform top surface. Good alignment must be kept and the pattern shall be set in accordance with the existing pattern. Care shall be taken during the layout to minimize cutting.
 - (3) Cutting of the pavers may be necessary to accommodate field conditions and to achieve an accurate and consistent fit to the existing pattern. If pavers need to be cut, the cut shall be made with a masonry saw. Pavers shall be free from stain, dirt, or dust after cutting. Paver units shall not be cut to a size smaller than one-third of a whole paver.
 - (4) Any broken pavers shall be replaced with matching pavers.
 - (5) Installation shall be performed in one direction by building forward from previously installed pavers.
 - (6) Hand tight joints, for concrete pavers, shall read from 0-inch to maximum 1/8-inch. Sweep a dry mixture of the Polymeric Sand over the paver surface. Follow manufacturer's written instructions.
- (e) Tolerances. Loose or uneven pavers with greater than 1/4" differential in elevation to the adjacent pavers, shall be tamped or removed and reset as required to attain a level surface.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Concrete Unit Pavers) to be measured for payment will be the number of square feet placed in the complete and accepted work.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Paver Type 2, Paver Type 3, Paver Type 4, Paver Type 5, Paver type 6) will be paid for at the contract unit price per square foot. Payment will be full compensation for transporting, handling, and placing the material specified, including pavers, containment, bituminous concrete pavement, sand setting bed, replacing damaged pavers damaged at no fault to the Contractor, joint filler; performing any other required excavation; cleaning the completed surface as required; and for all labor, tools, equipment and incidentals necessary to complete the work.

The Contractor will be responsible for replacing, at no additional cost to the City, any pavers that are broken or otherwise damaged by the Contractor's operations.

The cost of furnishing and installing aggregate base materials will be paid separately under the appropriate contract items.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.670 Special Provision (Paver Type 2)	Square Foot
900.670 Special Provision (Paver Type 3)	Square Foot
900.670 Special Provision (Paver Type 4)	Square Foot
900.670 Special Provision (Paver Type 5)	Square Foot
900.670 Special Provision (Paver Type 6)	Square Foot

CONCRETE WITH INTEGRAL COLOR

- XX. DESCRIPTION. This work shall consist of furnishing and installing concrete sidewalk with integral color at the locations shown in the Plans and as directed by the Engineer.
- XX. MATERIALS. Materials for concrete sidewalk with integral color shall meet the requirements specified in the Plans and as recommended by the manufacturer. All materials shall be approved by the Engineer prior to use.
- XX. SUBMITTALS. Contractor shall submit color samples and manufacturer's literature for approval, including proposed materials, installation procedures and construction requirements, in conformance with the requirements as stated in the Plans.
- xx. MANUFACTURER. Integral Color:

Manufacturer: Davis Colors
3700 East Olympic Blvd.
Los Angeles, CA 90023
www.daviscolors.com
- Colors shall be selected by landscape architect and the City from the manufacturer's standard color chart.
- XX. CONSTRUCTION REQUIREMENTS. The concrete sidewalk with integral color shall be constructed to the depths and widths shown in the Plans, as recommended by the manufacturer and as directed by the Engineer. Traffic shall only be allowed on the newly constructed concrete sidewalk with integral color as recommended by the manufacturer and as directed by the Engineer.
- XX. MOCKUPS. Mockups: Build mockups (min. 4' x 4' section) to verify initial selections made, to demonstrate aesthetic effects, and to set quality standards for materials and execution. Install Mockups in locations where colors come together as they do on plan. One segment of Ellipse wall will need to be on site and adjacent to mockups.
- xx. INSTALLATION. The concrete pigment shall be added, mixed, placed and cured per the manufacturer's specifications.
- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Concrete With Integral Color) to be measured for payment will be the number of square yards of concrete sidewalk with integral color applied in the complete and accepted work.
- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (concrete sidewalk with integral color) will be paid for at the Contract unit price per square yard. Payment will be full compensation for furnishing, handling, and placing the materials specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item

Pay Unit

900.675 Special Provision
(Concrete With Integral Color A and B)

Square Yard

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal,
(Corporation, Partnership, or Individual)

and _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

City of Burlington
(Name of Owner)

645 Pine Street, Suite A; Burlington, VT 05401
(Address of Owner)

hereinafter called Owner, in the penal sum of _____ Dollars,
\$(_____) in lawful money of the United States, for the payment of which sum well and truly
to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these
presents.

The condition of this obligation is such that whereas, the Principal entered into a certain contract
with the Owner, dated the _____ day of _____, 20_____,
a copy of which is hereto attached and made a part hereof for the construction of:

Now, therefore, if the principal shall well, truly and faithfully perform its duties, all the
undertakings, covenants, terms, conditions and agreements of said contract during the original term
thereof, and any extensions thereof which may be granted by the Owner, with or without notice to
the Surety and during the one year guaranty period, and if they shall satisfy all claims and demands
incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs
and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the

Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

Provided, further, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the Work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the Work or to the Specifications.

Provided, further, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts,
(No.)

each one of which shall be deemed an original, this the

_____ day of _____, 20_____.

ATTEST:

[Principal]

[Principal Secretary]

(SEAL)

By: _____(s)

Witness as to Principal

Address: _____

Address

Surety

ATTEST:

Witness as to Surety

By: _____
Attorney-in-Fact

Address

Address

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is Partnership, all partners should execute Bond.

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.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal,
(Corporation, Partnership, or Individual)

and _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

City of Burlington
(Name of Owner)

645 Pine Street, Suite A; Burlington, VT 05401
(Address of Owner)

Hereinafter called Owner, in the penal sum of _____ Dollars,
\$(_____) in lawful money of the United States, for the payment of which sum well
and truly to be made, we bind ourselves, successors, and assigns, jointly and severally,
firmly by these presents.

The Condition of this obligation is such that whereas, the Principal entered into a certain
contract with the Owner, dated the ____ day of _____, 20____,
a copy of which is hereto attached and made a part hereof for the construction of:

Now, Therefore, if the Principal shall promptly make payment to all persons, firms,
Subcontractors, and corporations furnishing materials for or performing labor in the
prosecution of the Work provided for in such contract, and any authorized extension or
modification thereof, including all amounts due for materials, lubricants, oil, gasoline,
coal and coke, repairs on machinery, equipment and tools, consumed or used in
connection with the construction of such Work and all insurance premiums on said Work,
and for all labor performed in such Work whether by Subcontractor or otherwise, then
this obligation shall be void; otherwise to remain in force and effect.

Provided, Further, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the Work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the Work or to the Specifications.

Provided, Further, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

In Witness Whereof, this instrument is executed in _____ counterparts,
(No.)
each one of which shall be deemed an original, this the ____ day of _____, 20_____.

ATTEST:

Principal (Principal Secretary)
(SEAL) By: _____(s)

Witness as to Principal Address: _____

Address _____

ATTEST: Surety

Witness as to Surety By: _____
Attorney-in-Fact

Address Address

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is Partnership, all partners should execute Bond.

IMPORTANT: Surety companies executing Bond 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.

END OF SECTION

APPLICATION FOR PAYMENT

To: _____ (OWNER)

From: _____ (CONTRACTOR)

Contract: _____

Project: _____

OWNER's Contract No. _____

For WORK accomplished through the date of: _____ Invoice No. _____

1.	Original Contract Price:	\$ _____
2.	Net change by Change Orders and Written Amendments (+ or -)	\$ _____
3.	Current Contract Price (1 plus 2):	\$ _____
4.	Total completed and stored to date:	\$ _____
5.	Less previous Application for Payments:	\$ _____
6.	DUE THIS APPLICATION (4 MINUS 5):	\$ _____

Accompanying Documentation: 1. Schedule of values and percent complete.

2. _____

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CHANGE ORDER

CHANGE ORDER NO. _____ Date: _____

Project No.: _____ Project Title: _____

Contract No: _____ Agreement Date: _____

Contract Title: _____ Original Price: _____

Owner: _____ Contractor: _____

The following changes are hereby made to the Contract Documents:

Description:

Justifications:

Change to Contract Price: \$ _____

Original Contract Price: \$ _____

Current Contract Price adjusted by previous Change Order: \$ _____

The Contract Price due to this Change Order
will be (increased) (decreased) by: \$ _____

New Adjusted Contract Price: \$ _____

Change to Contract Time:

The Contract Time will be (increased) (decreased) by _____ Calendar days

The date for completion of all work will be _____ (Date)

The attached Contractor's Revised Project Schedule reflects increases or decreases in the Contract Time as authorized by this Change Order. Stipulated price and time adjustment includes all costs and time associated with the above described change. Contractor waives all rights for additional compensation or time extension for said change. Contractor and Owner agree that the price(s) and time adjustment(s) stated above are equitable and acceptable to both parties.

REQUESTED BY: _____

SIGNATURES/APPROVALS

Recommended By: _____ (Project Manager)

Accepted By: _____ (Contractor)

Ordered By: _____ (Owner)

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CERTIFICATE OF FINAL COMPLETION OF WORK

Contract No.: _____ Agreement Date: _____

Contract Description: _____

Completion Date Per Agreement and Change Orders:

FINAL CERTIFICATION OF CONTRACTOR

I hereby certify that the Work as identified in the Final Estimate of Payment for construction Contract Work dated _____, represents full compensation for the actual value of Work completed. All Work completed conforms to the terms of the Agreement and authorized changes.

DATE

Contractor _____

Signature _____

Title _____

FINAL ACCEPTANCE OF OWNER

I, as representative of the Owner, accept the above Final Certifications and authorize Final Payment in the amount of \$ _____ and direct the Contractor's attention to the General Condition #20. The guaranty for all Work completed subsequent to the date of Substantial Completion, expires one (1) year from the date of this Final Acceptance.

Owner

Authorized Representative

Date

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APPENDICES

GENERAL SPECIAL PROVISIONS – AUGUST 8, 2018

WORKZONE SAFETY AND MOBILITY

LIVABLE WAGE RATES – JULY 1, 2018

ORDINANCE FORMS

LIVABLE WAGE

UNION DETERENCE

NON-OUTSOURCING

PREQUALIFICATION OF CONTRACTORS APPLICATION – CITY OF BURLINGTON

2019 CITY OF BURLINGTON HOLIDAYS

EPSC REQUIREMENTS AND SMALL PROJECTS APPLICATION

GENERAL SPECIAL PROVISIONS

GENERAL SPECIAL PROVISIONS FOR ALL PROJECTS
2018 STANDARD SPECIFICATIONS

SECTION 103 – TAXES AND INSURANCE

103.03 STATE SALES TAX is hereby modified by deleting the phrase “(see *Vermont Sales and Use Tax Regulations, No. 226-2 and 226-7 and 32 V.S.A. § 9743(4)*)” and the phrase “(see *32 V.S.A. § 9741(44)*).” from the first paragraph.

103.03 STATE SALES TAX is hereby further modified by adding the following reference to the end of the first paragraph:

(see *32 V.S.A. § 9743(4)*, *32 V.S.A. § 9741(30)*, *32 V.S.A. § 9741(44)*, and the *Vermont Sales and Use Tax Regulations, Reg. § 1.9741(34)-5 and Reg. § 1.9743*).

SECTION 105 – CONTROL OF THE WORK

105.14 SUNDAY, NIGHT, AND HOLIDAY WORK is hereby modified by relabeling part (c), “Application.”, as “(d) Application.” and part (d), “Other Provisions Not Affected.”, as “(e) Other Provisions Not Affected.”

105.16 LOAD RESTRICTIONS, part (c), Penalty and Reduction for Overweight Operation., is hereby modified by changing the phrase “*23 V.S.A. § 1391(a)*” to read “*23 V.S.A. § 1391a*”.

SECTION 406 – BITUMINOUS CONCRETE PAVEMENT

406.03C REQUIREMENTS FOR BOTH MARSHALL AND SUPERPAVE BITUMINOUS MIXTURES is hereby modified by changing the name of part (e) from “Pay Factor Determination.” to “Air Voids Pay Factor (PF_{AV}) Determination.”

406.19 METHOD OF MEASUREMENTS is hereby modified by changing the name of part (c) from “Longitudinal Joint Pay Factor.” to “Longitudinal Joint Pay Adjustment.”

SECTION 506 – STRUCTURAL STEEL

506.19 BOLTING AND CONNECTIONS, part (c), is hereby modified by adding the sentence “Unless otherwise indicated on the plans, *ASTM F 3125/F 3125 M Grade A 325* hex head bolts shall be used.” immediately following the sentence “Bolts shall be tightened to develop a tension not less than 5% more than the minimum bolt tension specified in Table 506.19A.”

506.19 BOLTING AND CONNECTIONS is hereby modified by relabeling part (d), “Acceptance of Bolt Tensioning.” as “(e) Acceptance of Bolt Tensioning.”

506.19 BOLTING AND CONNECTIONS is hereby further modified by adding a new part “(d) Bolt Tensioning Methods.” All of the text and tables following paragraph ten, beginning with the phrase “Bolts shall be tensioned by the Contractor in the presence of the Engineer...” and ending with Note 4 of Table 506.19B, shall be moved to the new part (d).

All references to “Column 3 of Table 506.19B” within the text identified above shall be replaced with the phrase “Column 4 of Table 506.19B”.

SECTION 510 – PRESTRESSED CONCRETE

510.12 GROUT, part (b), is hereby modified by deleting the phrase “requirements of Subsection 707.03(c)(1) and Subsection 707.03(c)(3).” from the fifth paragraph and replacing it with the phrase “requirements of Subsection 707.03(a)(1) and Subsection 707.03(a)(3).”

SECTION 540 – PRECAST CONCRETE

540.11 GROUT, part (b), is hereby modified by deleting the phrase “requirements of Subsection 707.03(c)(1) and Subsection 707.03(c)(3).” from the fifth paragraph and replacing it with the phrase “requirements of Subsection 707.03(a)(1) and Subsection 707.03(a)(3).”

540.12 POST-TENSIONING is hereby modified by deleting the phrase “requirements of Subsection 510.12(b).” from the second paragraph and replacing it with the phrase “requirements of Subsection 540.11(b).”

SECTION 605 – UNDERDRAINS

605.02 MATERIALS is hereby modified by adding the following as the eighth entry in the Subsection listing:

Geotextile for Underdrain Trench Lining720.05

605.02 MATERIALS is hereby further modified by deleting the sentence “Geotextile shall meet the requirements of Table 720.01A for Geotextile for Underdrain Trench Lining.”

SECTION 649 – GEOTEXTILE FABRIC

649.02 MATERIALS is hereby modified by being deleted in its entirety and replaced with the following:

649.02 MATERIALS. Materials shall meet the requirements of the following Subsections:

Geotextile for Roadbed Separator.....	720.02
Geotextile Under Railroad Ballast.....	720.03
Geotextile Under Stone Fill.....	720.04
Geotextile for Underdrain Trench Lining.....	720.05
Geotextile for Filter Curtain.....	720.06

Geotextiles shall conform to the following:

- (a) Where sewn seams are used, the Contractor shall furnish the manufacturer’s wide strip tensile test results as part of the certification. The results must verify that the seam meets or exceeds the specified average minimum roll values for the grab tensile strength of the geotextiles, or wide strip tensile strength for reinforcement applications.
- (b) Field seams, where used, shall be in accordance with the manufacturer’s recommendations.

SECTION 653 – EROSION PREVENTION AND SEDIMENT CONTROL

653.02 MATERIALS is hereby modified by inserting the following as the fourth and fifth entries in the Subsection listing:

Geotextile Under Stone Fill.....	720.04
Geotextile for Silt Fence.....	720.07

653.02 MATERIALS is hereby further modified by deleting the phrase “Geotextile Under Stone Fill shall be in accordance with Section 720 and Table 720.01A. Geotextile for Silt Fence shall be in accordance with Section 720 and Table 720.01A.”

653.08 RUNOFF CONTROL MEASURES is hereby modified by deleting the first paragraph of Subsection 653.08(a)(1) in its entirety and replacing it with the following:

- (1) Check Dam, Type I. Check Dam, Type I shall be placed in channels and on Geotextile Under Stone Fill meeting the requirements of Subsection 720.04.

653.08 RUNOFF CONTROL MEASURES is hereby further modified by deleting Subsection 653.08(b)(1) and Subsection 653.08(b)(2) in their entirety and replacing them with the following:

- (1) Silt Fence, Type I. Silt Fence, Type I shall be constructed of posts and Geotextile for Silt Fence meeting the requirements of Subsection 720.07.
- (2) Silt Fence, Type II. Silt Fence, Type II shall be constructed of posts, Geotextile for Silt Fence meeting the requirements of Subsection 720.07, and woven wire reinforcement.

653.09 TREATMENT MEASURES is hereby modified by deleting the second paragraph of Subsection 653.09(a), beginning with “Stabilized Construction Entrances shall be constructed of stone...”, in its entirety and replacing it with the following:

Stabilized Construction Entrances shall be constructed of stone meeting the requirements of Subsection 704.17 and shall be placed on top of Geotextile Under Stone Fill meeting the requirements of Subsection 720.04.

653.09 TREATMENT MEASURES is hereby further modified by deleting the third paragraph of Subsection 653.09(b)(1), beginning with “Stake and fabric devices...”, in its entirety and replacing it with the following:

Stake and fabric devices shall be constructed of Geotextile for Silt Fence meeting the requirements of Subsection 720.07 and stakes approved by the Engineer.

653.09 TREATMENT MEASURES is hereby further modified by deleting the second paragraph of Subsection 653.09(b)(3), beginning with “Inlet Protection Device, Type III shall be constructed of Aggregate...”, in its entirety and replacing it with the following:

Inlet Protection Device, Type III shall be constructed of Aggregate for Erosion Prevention and Sediment Control and shall be placed on top of Geotextile Under Stone Fill meeting the requirements of Subsection 720.04.

SECTION 677 – OVERHEAD TRAFFIC SIGN SUPPORTS

677.03 GENERAL is hereby modified by adding the sentence “Field verification testing for Direct Tension Indicators is not required.” immediately following the sentence “High-Strength Bolts, Nuts, and Washers shall be tensioned in accordance with Subsection 506.19.”

SECTION 678 – TRAFFIC CONTROL SIGNALS

678.09 ERECTION OF POSTS AND POLES is hereby modified by adding the sentence “Field verification testing for Direct Tension Indicators is not required.” immediately following the sentence “High-Strength Bolts, Nuts, and Washers shall be tensioned in accordance with Subsection 506.19.”

SECTION 720 – GEOTEXTILES

SECTION 720 – GEOTEXTILES is hereby modified by being deleted in its entirety and replaced with the following:

SECTION 720 – GEOTEXTILES

720.01 GENERAL. Geotextiles shall be evaluated in accordance with the NTPEP geotextiles work plan and in compliance with the NTPEP audit program for geotextiles. Geotextiles shall be one of the products listed on the Agency’s *Approved Products List* for the respective material specification.

720.02 GEOTEXTILE FOR ROADBED SEPARATOR. Geotextile for Roadbed Separator shall conform to *AASHTO M 288*, Table 1, Class 1 for Geotextile Strength Property Requirements, and shall conform to *AASHTO M 288*, Table 3 for Separation Geotextile Property Requirements.

720.03 GEOTEXTILE UNDER RAILROAD BALLAST. Minimum Average Roll Values (MARV) for Geotextile Under Railroad Ballast shall be as required in Table 720.03A.

TABLE 720.03A – MARV FOR GEOTEXTILE UNDER RAILROAD BALLAST

Geotextile Property	Test Method	MARV
Elongation Criteria at Failure ¹	<i>ASTM D 4632/ D4632 M</i>	≥ 50%
Grab Strength (lbs)	<i>ASTM D 4632/ D4632 M</i>	225
Tear Strength (lbs)	<i>ASTM D 4533/ D 4533 M</i>	115
Puncture Strength (lbs)	<i>ASTM D 6241</i>	850
Permittivity (s ⁻¹)	<i>ASTM D 4491/ D 4491 M</i>	0.70
Apparent Opening Size (mm)	<i>ASTM D 4751</i>	0.21 max. (No. 70 Sieve)
UV Resistance (% Strength Retained)	<i>ASTM D 4355/ D 4355 M</i>	70% at 500 hours of exposure
Structure	--	Nonwoven only

¹ Elongation corresponds to Maximum Grab Tensile Strength as measured in accordance with the requirements of *ASTM D 4632/D 4632 M*.

720.04 GEOTEXTILE UNDER STONE FILL. Geotextile Under Stone Fill shall conform to *AASHTO M 288*, Table 1, Class 1 for Geotextile Strength Property Requirements, and shall conform to *AASHTO M 288*, Table 5 for Stabilization Geotextile Property Requirements. Geotextile structure shall not be slit film.

720.05 GEOTEXTILE FOR UNDERDRAIN TRENCH LINING. Geotextile for Underdrain Trench Lining shall conform to *AASHTO M 288*, Table 1, Class 3 for Geotextile Strength Property Requirements, with a minimum elongation of 20%. Geotextile for Underdrain Trench Lining shall conform to *AASHTO M 288*, Table 2 (> 50% of in situ soil passing the No. 200 (0.075 mm) sieve) for Subsurface Drainage Geotextile Requirements. Geotextile structure shall be nonwoven and shall not be slit film.

720.06 GEOTEXTILE FOR FILTER CURTAIN. Minimum Average Roll Values (MARV) for Geotextile for Filter Curtain shall be as required in Table 720.06A.

TABLE 720.06A – MARV FOR GEOTEXTILE FOR FILTER CURTAIN

Geotextile Property	Test Method	MARV
Elongation Criteria at Failure ¹	<i>ASTM D 4632/ D4632 M</i>	20% max.
Grab Strength (lbs)	<i>ASTM D 4632/ D4632 M</i>	200
Tear Strength (lbs)	<i>ASTM D 4533/ D 4533 M</i>	50
Puncture Strength (lbs)	<i>ASTM D 6241</i>	430
Permittivity (s ⁻¹)	<i>ASTM D 4491/ D 4491 M</i>	0.28
Apparent Opening Size (mm)	<i>ASTM D 4751</i>	0.21 max. (No. 70 Sieve)
UV Resistance (% Strength Retained)	<i>ASTM D 4355/ D 4355 M</i>	70% at 500 hours of exposure
Structure	--	Woven only

¹ Elongation corresponds to Maximum Grab Tensile Strength as measured in accordance with the requirements of *ASTM D 4632/D 4632 M*.

720.07 GEOTEXTILE FOR SILT FENCE. Geotextile for Silt Fence shall conform to *AASHTO M 288*, Table 8 for Temporary Silt Fence Property Requirements. Geotextile structure shall be woven.

WORK ZONE SAFETY AND MOBILITY

WORK ZONE SAFETY & MOBILITY GUIDANCE DOCUMENT APPENDIX A TEMPORARY TRAFFIC CONTROL DEVICES

May 2011



Prepared by:

Vermont Agency of Transportation



Work Zone Safety and Mobility Guidance Document Appendix A Temporary Traffic Control Devices

Overview –

The following Appendix was drafted in response to updates made to the work zone regulations in 23 CFR 630, Subpart K, published by the Federal Highway Administration. This document applies to all federal aid projects that have a pre-contract/step submittal date after July, 1, 2011.

The purpose of the Appendix is to provide guidance on the use of temporary traffic control devices, flaggers and uniformed traffic officers to control and minimize worker exposure to traffic hazards and to increase road user safety. Additional guidance for preparing site specific traffic control plans can be found in Chapter 6 of the Manual on Uniformed Traffic Control Devices (MUTCD).

The primary users of this Appendix will be project managers, project design engineers and technicians and construction resident engineers.

Framework:

Procedures –procedures, and guidance established under the WZ Safety & Mobility Rule for the systematic consideration and management of WZ impacts **shall** include consideration and management of road user and worker safety by Exposure addressing:

- Use of positive protection devices to prevent intrusions;
- control measures to avoid or minimize exposure;
- Other traffic control measures to minimize crashes; and
- Safe entry/exit of work vehicles onto/from the travel lanes.

Positive Protection Devices – use **shall** be based on an engineering study.

An engineering study **may** be used to develop positive protection guidelines for the agency, or to determine the measures to be applied on an individual project; (See MUTCD Section 1A.13.65 FOR DEFINITION OF Engineering Study);

Use of positive protection **shall** be considered in work zone situations that place workers at increased risk from motorized traffic and where positive protection devices offer the highest potential for increased safety for workers and road users.

Exposure Control Measures – **should** be considered to avoid or minimize exposure for workers and road users.

Other Traffic Control Measures – **should** be considered to reduce work zone

crashes, and risks and consequences of intrusions into the work space.

Uniformed Law Enforcement – includes guidance for the use of uniformed law enforcement on Federal-aid highway projects.

Work Vehicles and Equipment – Safe means for work vehicles and equipment to enter and exit traffic lanes and for delivery of construction materials to the work space **should** be addressed at the project level.

Payment for Traffic Control Features and Operations – **shall** not be incidental to the contract, or included in payment for other items of work not related to traffic control and safety.

Separate pay items **shall** be provided for major categories of traffic control devices, safety features, and work zone safety activities. For minor projects, the major category may be 641.10 Traffic Control, Lump Sum.

Quality Guidelines – **shall** be implemented to help maintain the quality and adequacy of the temporary traffic control devices for the duration of the project.

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1.0 DESIGN GUIDELINES FOR POSITIVE PROTECTION IN WORK ZONES

Positive protection is an essential part of numerous works zones where workers are exposed to nearby traffic for an extended period of time or where errant vehicles would be in significant jeopardy by entering the work area. The proposed use of positive protection should be considered based on one or a combination of the following site characteristics.

1.1 Project Characteristics (When to consider using positive protection)

Site Operating Speed – Work zones where the non-work zone posted speed limit or 85th percentile speed is equal to or greater than 45 mph.

Volumes – On roadways where the AADT is 15,000 or greater.

Project Duration - Projects greater than **two weeks** in length where workers are in close proximity to traffic thereby increasing the risk of a vehicle intrusion in the work area.

Longitudinal Drop-offs - Project construction characteristics and phasing should be evaluated on the basis of Standards T-35 and T-36 (E-108 and E-108A).

Fixed Objects - Equipment, materials or other fixed objects that remain in the work area overnight.

Interstate or divided limited access facilities - Bypasses for bridge construction or roadway reconstruction. Longer bypasses 1 mile or greater may use positive protection devices for shifts and approaches, and use surface mounted vertical delineation devices (tubular markers) on tangents based on an economic analysis

1.2 Positive Barrier Use guidelines

When positive barrier is utilized in projects, the following guidelines should be considered:

- Positive barrier should be installed tangentially with a desired minimum 2 ft offset from the traveled lane to the face of the barrier at its widest point. The lateral offset should not be less than 1 ft. On higher speed facilities, the lateral offsets should be maximized to the extent possible.
- If there is no tolerance for deflection within the work area, consider anchoring barrier to roadway surface or bridge deck.
- Tapers for positive barrier are based on operating or 85th percentile speed of the facility as seen in the chart on Standard T-22 (E- 106)
- Unprotected ends of the barrier on US and State Routes should be tapered at least 10 ft. outside the edge of the traveled lane. If the positive barrier cannot be tapered outside the minimum clear zone of 10ft, then an appropriate crash attenuator shall be provided to protect the end of the barrier. Truck mounted attenuators should

not protect the ends of barrier but may be used to close off or protect the work area if adequate roll distance is available.

- Unprotected ends of the barrier on interstates and other limited access multi-lane facilities should be tapered to the clear zone as defined in the latest edition of the AASHTO Roadside Design Guide. If the positive barrier cannot be tapered outside the minimum clear zone, then an appropriate crash attenuator shall be provided to protect the end of the barrier.
- Consider and plan for how construction materials will be delivered to the job site. Positive barrier may need to be opened temporarily.
- Access to businesses and residences must be delineated and proper treatment of the blunt ends of the barrier.

1.3 Exceptions

For moving operations such as paving projects where barrier is not practical but exposure is still long duration, other methods should be incorporated to protect workers and motorists, see “Exposure Control Measures” section for alternate methods of reducing worker exposure. Limited access facility projects employing long crossovers and two lane two way operations may use surface mounted vertical delineation devices (tubular markers) instead of concrete barrier on tangents based on an economic analysis and engineering judgment. Consider tubular markers when the risk to motorists and workers of placing a large length of temporary barrier along with the high overall cost of placing the barrier offsets the advantages of providing positive separation.

1.4 Truck Mounted Attenuators

Truck Mounted Attenuators (TMA's) have proven to be an effective piece of equipment for improving safety in work zone traffic control areas. This effectiveness is dependent on the proper use of the device.

When to use TMA's:

- At the leading end of the Work Activity Area (after the buffer space) where errant vehicles could enter the Work Activity Area causing a danger to the workers and/or the vehicle operators themselves. Be sure to add sufficient length to the work area to allow for TMA forward roll if struck. The chart below, taken from Michigan DOT's TMA guidelines, provides some guidance for designers to consider when employing TMA's in work zones.
- Where access is maintained for construction materials and equipment. The TMA's prevent errant vehicles from impacting construction equipment, workers or from areas of significant hazard to the motorists. (ie. Bridge out, deep excavation, etc.)
- On shadow vehicles for moving operations.

When to NOT use TMA's:

- For crash attenuation at the terminal ends of temporary traffic barrier
- Without a channelizing taper in a static work zone.

MDOT Chart Test Level 3 – Guidelines for Roll-ahead Distance for TMA Vehicles

Weight of TMA Vehicle	Prevailing Speed (mph) (Posted Speed Prior to Work Zone)	Roll-Ahead Distance* (Distance from front of TMA Vehicle to Work Area)
5 Tons	60-70	175 ft
	50-55	150 ft
	45	100 ft
12 Tons	60-70	50 ft
	50-55	25 ft
	45	25 ft

* Roll-ahead distances are calculated using a 10,000 pound impact vehicle weight.

2.0 EXPOSURE CONTROL MEASURES

Exposure Control Measures should be considered where appropriate to avoid or minimize worker exposure to motorized traffic and exposure of road users to work activities, while also providing adequate consideration to the potential impacts on mobility. A wide range of measures may be appropriate for use on individual projects, such as:

2.1 Full road closures;

When and What to consider:

- When viable alternate routes exist and full road closure will accelerate construction,
- When construction is only feasible with the roadway closed.
- When Emergency vehicle access can be accommodated in another manner.
- Public relations campaign is essential for off-site detours. See Section 2.4 for detour information.

2.2 Ramp closures;

When and What to consider:

- When construction on ramp will not allow adequate width (15 ft) to be maintained, (Temporary ramp widening may be a feasible alternative to ramp closure. For short durations, lesser widths may be acceptable; notice of the roadway restriction must be sent to DMV.)
- When mainline lane closures are close to ramps and adequate distances for safe merging cannot be obtained,
- Night work when ramp volumes are very low,
- Traffic impact to alternate routes must be considered. See Section 2.4,
- Public relations campaign is essential.

2.3 Median crossovers;

When and What to consider:

- When construction could adversely affect adjacent travel lane, such as ledge blasting, or slow heavy construction vehicle traffic moving in and out of work area.
- When construction can be accelerated or work quality can be improved by closing one barrel
- Capacity of remaining barrel must be considered. AADT should be less than 25,000 (DHV < 3000) unless an engineering study shows that capacity is sufficient.
- Crossovers should avoid interchange areas, to the extent possible
- Crossovers should be located so as to maximize sight distance for merging.
- Crossovers must be designed carefully to minimize rollover potential for large trucks. See Standard T-19 (E-104).

2.4 Full or partial detours or diversions;

Consider when traffic volumes exceed tables below:

For work zones on two lane highways with one lane open for traffic

Length of Closure	Max. DHV	Max. ADT
2500 ft	500	4000
1500 ft	1000	7500
1000 ft	1500	11500

The above values are based on:

Two phase operation (no intervening intersections)

50-50 directional split

25 mph avg. speed through work zone

$v/c \leq 1.0$

ADT's may be exceeded if flagging operations cease during peak hours of traffic (work during hours below DHV volumes)

Definitions:

Partial detour – one direction of traffic is maintained on alignment, but the other is detoured. Or, a particular type of traffic is detoured (i.e. trucks) while other traffic is maintained.

Full detour – full road closure with traffic maintained off-alignment. Detour may consist of temporary roadway or signed detour on existing highways.

Diversions – two way traffic is maintained on alignment but because of real or perceived capacity constraints, substantial numbers of drivers can be expected to seek alternate routes not officially signed as detours.

When and What to consider:

- Capacity, condition and safety of detours/alternate routes must be considered.
- Off-site improvements, especially at intersections, may be necessary to accommodate additional traffic. This may include temporary signalization, changes in signal timings, paving or temporary widening, signing/pavement markings improvements, brush cutting to improve sight distance at intersections.
- Truck traffic and truck turning characteristics must be considered.
- Legal load restrictions on town highways or bridges may be lower than state highway limits. Town highways may require upgrades to accommodate increased truck traffic if detour is allowed by town.
- Separate truck detours may be considered.

- Bicycle and pedestrian access must be considered.
 - Long detours are not acceptable for these modes of traffic.
 - Bicycles and pedestrians shall not be detoured onto limited access highways.
 - Detour route for these modes does not have to be the same as for vehicular traffic, if signed separately.
 - Road surface conditions may need to be upgraded.
- Access to businesses (including directional signing) and residences must be considered.
- Emergency vehicle access must be considered.
- Detour route shall be adequately signed
- For town highway bridge projects, town should designate detour route prior to ROW process commencing, and the designated detour route should be included in the project plans.

2.5 Road work during nighttime or off-peak periods when traffic volumes are lower;

When to consider:

- When capacity is constrained but detours are not a viable option.
- Consider night work for high volume non-residential roads, especially with substantial day-time business traffic.
- Consider imposing seasonal constraints near schools or high volume seasonal traffic generators such as fairgrounds or fall tourist destination areas.

Pros:

- May be able to avoid use of detours,
- May increase worker safety due to reduced exposure to high volume traffic,
- May be able to complete work faster by closing off more of the roadway,
- May reduce affect on adjacent traffic generators

Cons (Night Work):

- Reduced ability to get materials, inspectors, upper level decision making,
- Higher costs,
- Lower temperatures, especially at either end of construction season; may be difficult to meet materials specifications,
- Work quality may suffer due to lighting conditions and worker fatigue,
- Unexpected condition for drivers; higher speeds,
- Local ordinances may limit type of work (such as noise ordinances),

Cons (Daytime off-peak work):

- Additional time/cost of setting up/removing traffic control to avoid am/pm peak periods; increased worker exposure to adjust traffic control devices,
- Shortened work periods may increase duration of project

Cons (Seasonal off-peak work):

- May be difficult to predict/control when project will be constructed.

2.6 Rolling road blocks;

When to consider:

- Activities taking less than one hour affecting both lanes of an interstate barrel, such as ledge blasting, crossover bridge launching, utility line pulls, major material deliveries,
- Should be done at low volume daylight period,
- Should be warned at least one week in advance using PCMS,
- Requires UTO's.

2.7 Accelerated construction techniques;

- Consider cost/benefit of accelerated construction vs. normal construction practices; longer detours may be palatable for shorter construction periods.
- Accelerated construction may include full roadway closures, round the clock work, or off site prefabrication.
- Inconvenience to the travelling public and businesses should be balanced by shorter overall durations and reduced worker exposure to traffic.

3.0 TRAFFIC CONTROL MEASURES

Listed Below are Traffic Control Measures that may be used in the Temporary Traffic Control Plan (TCP). Designers, Resident Engineers and Contractors should consider these when developing, reviewing, proposing changes or implementing traffic control plans. These have been arranged starting with the most commonly used at the top of the list. The arrangement of this list should not stop the designer, resident engineer or contractor from considering any of these measures when preparing traffic control plans or resolving traffic control issues.

From 23 CFR 630.1108 (c) "Other Traffic Control Measures should be given appropriate consideration for use in work zones to reduce work zone crashes and risks and consequences of motorized traffic intrusion into the work space. These measures, which are not mutually exclusive and should be considered in

combination as appropriate, include a wide range of other traffic control measures such as:"

3.1 Effective, credible signing:

When to consider:

- This is used on every project. Guidance on work zone signing can be found in MUTCD (Manual on Uniform Traffic Control Devices) and the VTrans T – Standards. The MUTCD can be found online at <http://mutcd.fhwa.dot.gov/> and signing for work zones can be found in chapter 6.

What to consider:

- What is the message that needs to be provided to the driver?
- Are there any permanent traffic control devices that conflict with the work zone signing? (conflict can either be visual – blocking, screening etc or the conflict can be with message on the permanent sign.)

3.2 Changeable message signs:

When to consider PCMS / VMS:

- To give drivers notice of the date or time of upcoming construction activities or traffic pattern changes which might lead to seeking alternate routes or changing travel plans.
- When long term work zones change traffic control phases, and traffic pattern has changed (i.e., left lane was closed for a long period, now right lane is closed.)
- When additional directional guidance is required (i.e., use exit 10 for Montpelier)

What to consider:

- PCMS shall not take the place of static signs, and should not display the same message for more than 2 weeks. If message is required for longer than 2 weeks static signs should be used.
- Each message shall consist of no more than two phases. A phase shall consist of no more than three lines of text and eight characters per line. Each phase shall be understood by itself regardless of the sequence in which it is read. More detailed guidance for this can be found in the MUTCD. The provisions in Chapter 2L apply to both permanent and portable changeable message signs with electronic displays. Additional provisions that only apply to portable changeable message signs can be found in Section 6F.60.
- Consider pay item by day instead of each when traffic flow through project area will not change over time

3.3 Arrow panels:

Shall only be used for lane drops (merging conditions), and not for shifting traffic within a lane. Refer to Section 6F.61 of the 2009 MUTCD

3.4 Longitudinal and lateral buffer space:

When to consider:

- All projects.
- The buffer space is a lateral and/or longitudinal area that separates road user flow from the work space or roadside hazards, and might provide some recovery space for an errant vehicle.
- Neither work activity nor storage of equipment, vehicles, or material should occur within a buffer space. The width of a lateral buffer space should be determined by engineering judgment.

What to consider:

- Will the site allow for longitudinal buffer? (capacity needs on one lane/two way traffic space, driveways, side roads, curve/grade sight distance restrictions could lead to longer or shorter buffer spaces)
- What is the speed limit approaching the workzone ? (Stopping sight distance SSD is baseline for longitudinal buffer – see MUTCD Table 6C-2)
- What are the traffic volumes. (high volumes = increased worker exposure)
- Are there going to be drop offs (even if no devices required by Standard T-35/T-36 (E-108/E-108A), lateral buffer may increase safety)
- Curves and grades – longitudinal buffer may be increased to provide better sight distance to approach on curves (vertical/horizontal), longitudinal buffer may be increased for downhill grades especially with high truck volumes.
- Is there enough room for traffic to safely pass when the buffer space is provided? (i.e.. what are the lane widths for traffic through the work zone) For one lane – two way traffic, 15 feet of travel space is ideal, with 1-2 feet of lateral buffer space.
- Can I use a temporary lane closure to provide lateral buffer space? (lane closure next to shoulder work)
- Are pedestrian and bicycle accommodations needed ? (may require wider travel space, therefore reducing available space to use for lateral buffer.) Bicycle accommodation where cyclists cannot keep up with speed of traffic in longer work zones can be another issue to consider.
- Will the site allow for lateral buffer without barrier? (Refer to positive barrier Section 1.2)

- Will positive protection be used? If positive protection is used the longitudinal buffer area buffer may be shorter than what is shown in Table 6C-2 of 2009 MUTCD.

3.5 Trained flaggers and spotters:

For reference please refer to VTrans Standard Specifications for Construction (latest edition) Section 630 and Section 6E.01 of the 2009 MUTCD:

Flaggers are only allowed to stop and release traffic. A UTO is required for intersection traffic direction.

When to consider flaggers:

- When maintaining two way traffic in a single travel lane
- When side roads enter into a flagger controlled travel space
- When haul roads require stopping one direction of traffic to allow construction vehicles to enter and exit.

When to consider using flaggers as spotters:

- When high speed traffic near workers (slow paddle only) for example, long paving operations, spotter may be used next to paver where there is less lateral buffer space
- When the lane closure is long and the flaggers may not be visible to each other

3.6 Automated Flagger Assistance Devices

Automated Flagger Assistance Devices (AFADs) enable a flagger(s) to be positioned out of the lane of traffic and are used to control road users through temporary traffic control zones. These devices are designed to be remotely operated either by a single flagger at one end of the TTC zone or at a central location, or by separate flaggers near each device's location.

There are two types of AFADs:

- Remotely controlled STOP/SLOW sign on either a trailer or a movable cart system to alternately control right-of-way.
- Remotely controlled red and yellow lenses and a gate arm to alternately control right-of-way.

When to consider:

- Bridge maintenance;
- Haul road crossings; and
- Pavement patching.
- Night work, because AFAD using red and yellow lenses and gate may be more visible than flagger, and will lead to less worker exposure by moving flagger out of roadway.

What to consider:

- Must be operated manually so not for use on long term closures
- AFAD's take additional time to set up and remove, so not for very short or mobile operations.

3.7 High quality work zone pavement markings and removal of misleading markings;

When to consider:

- When new traffic pattern will be in place for greater than 3 days

What to consider when specifying materials to be used for pavement markings:

- Time of year for placement may affect type of marking suitable for application,
- If pavement markings to be in place for greater than 1-2 months, consider normal paint pay items rather than temporary paint,
- If temporary markings are on final pavement layer, removable tape should be considered rather than any type of paint, which will have to be ground off when no longer valid.

Line Striping Targets (LST) or Raised Pavement Markers (RPM) can also be used instead of temporary tape or paint.

- LST's should not be used for over 14 days, nor where heavy traffic is expected to drive over the line (such as passing maneuvers)
- See MUTCD for appropriate device spacing to mimic solid and dashed lines
- Adjacent to barriers, RPM's shall be used in addition to solid edgeline.

Refer to current edition of VTrans Standard Specifications for Construction section 646.08 for more guidance on Temporary Pavement Markings.

3.8 Channelizing device spacing reduction;

When to consider:

- when high volume traffic near workers,
- when cones are at risk of blowing over,
- on curves,
- where additional guidance is needed for drivers to safely negotiate work zone
- when using channelizing devices for pedestrian pathways

What to consider:

- Where multiple channelizing devices are aligned to form a continuous pedestrian channelizer, connection points should be smooth to optimize long-cane and hand railing.

- The maximum allowable spacing between cones, tubular markers, vertical panels, drums, and barricades is a distance in feet equal to 1.0 times the speed limit in mph when used for taper channelization, and a distance in feet equal to 2.0 times the speed limit in mph when used for tangent channelization. Spacing should be reduced as needed.
- When channelizing devices have the potential of leading vehicular traffic out of the intended vehicular traffic space the channelizing devices should be extended a distance in feet of 2.0 times the speed limit in mph beyond the downstream end of the transition area. *(At the end of a taper, it might be helpful to the driver to continue the line of cones/barrels on tangent to get them straightened out again.)*
SEE Section 6F.63 of the 2009 MUTCD

3.9 Work zone speed management (including changes to the regulatory speed and/or variable speed limits); Speed reductions Taken from section 6C.01 of the 2009 MUTCD.

When to consider:

- Reduced speed limits should be used only in the specific portion of the (temporary traffic control) TTC zone where conditions or restrictive features are present. However, frequent changes in the speed limit should be avoided. A TTC plan should be designed so that vehicles can travel through the TTC zone with a speed limit reduction of no more than 10 mph.
- Reduced speed zoning (lowering the regulatory speed limit) should be avoided as much as practical because drivers will reduce their speeds only if they clearly perceive a need to do so.
- A reduction of more than 10 mph in the speed limit should be used only when required by restrictive features in the TTC zone. Where restrictive features justify a speed reduction of more than 10 mph, additional driver notification should be provided. The speed limit should be stepped down in advance of the location requiring the lowest speed, and additional TTC warning devices should be used.

3.10 Law enforcement; See Section 4.0 of this document

3.11 Worker and work vehicle/equipment visibility;

From the 2009 edition of the MUTCD.

“Standard: All workers, including emergency responders, within the right-of-way (ROW) who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment within the TTC zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107–2004 publication entitled “American National Standard for High-Visibility Safety Apparel and Headwear” (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004 standard performance for Class 2 or 3 risk exposure, except as provided in Paragraph 5. A person designated by the employer to be responsible for worker safety shall make the selection of the appropriate class of garment.”

What this means: Everyone in the ROW needs to have the appropriate vest.

In addition to high visibility garments for workers, an internal work zone traffic control plan should be developed for projects with traffic management plans. For short term projects all workers on site should have an understanding of how equipment will access and exit the work zone.

3.12 Temporary traffic signals.

When to consider:

- One lane – two way traffic is maintained 24 hours per day. (Otherwise flaggers or AFADs are typically used.)
- Often used on bridge projects that maintain traffic on a portion of the existing bridge. When significant traffic is diverted or detoured to an unsignalized intersection, creating capacity or safety issues.

3.13 Public relations and traveler information;

When to consider:

- All projects need some form of public outreach,
- The extent required should be determined based on the project category,
- A minor project may only need property owner visits during the design phase, and notification of local officials during construction,
- A significant project may have a Public Relations Officer (PRO), project website, weekly bulletins, etc.
- Designated Public Relations Officers are typically used for longer term projects affecting large volumes of traffic, especially projects with multiple phases where traffic patterns change and potential for significant congestion exists.

What to consider:

- The needs of all road users should be assessed such that appropriate advance notice is given and clearly defined alternative paths are provided,
- The cooperation of the various news media should be sought in publicizing the existence of and reasons for TTC zones because news releases can assist in keeping the road users well informed,
- The needs of abutting property owners, residents, and businesses should be assessed and appropriate accommodations made,
- The needs of emergency service providers (law enforcement, fire, and medical) should be assessed and appropriate coordination and accommodations made,
- Special provision are required when utilizing PROs,
- The needs of railroads and transit should be assessed and appropriate coordination and accommodations made,
- The needs of operators of commercial vehicles such as buses and large trucks should be assessed and appropriate accommodations made.

3.14 Warning flags and lights on signs;

When to consider:

- Where changes to the intersection or roadway may not be expected to driver and consequences of not obeying traffic control devices are severe,
- Converting an intersection to 4 way stop during construction,
- Adding a temporary signal during construction,
- Adding a permanent signal,
- Converting an intersection to a roundabout,
- Traffic is not responding to signs (stop, yield, speed limit),
- Traffic pattern/intersection control has been altered (new signal or stop sign).

What to consider:

- Will the flags block another traffic control device,
- Will the flags hang over the travel way and be hit by large trucks.

3.15 Pace or pilot vehicle:

When to consider:

- When traffic is routed through an extended work zone with multiple activity areas. These work zones many times have a serpentine travel path for motorists which is not intuitively obvious thus requiring a pilot car,

- When traffic may need to come to a stop on the interstate (rolling road block).

3.16 Longitudinal channelizing barricades

These are not barriers – this refers to lightweight barricades used for channelization only (plastic “jersey barrier”)

When to consider:

- Lower speed roadways (Speed limit 40 mph or less),
- Projects where there is no lighting provided during nighttime hours,
- Drivers need extra visual cues to get through work zone at night (more retroreflectivity than a barrel),
- Work zones with limited lateral buffer space. In such cases other channelizing devices would require constant resetting.

What to consider:

- Existing speed limit of the roadway prior to the work zone,
- Is there recovery area behind the barricade for an errant vehicle,
- Barricade should not replace barriers,
- Is worker protection needed behind the barricade. If impacted by a vehicle is there sufficient lateral deflection distance before entering the work area.

3.17 Worker training

When to consider:

- On all projects, all workers need to have sufficient training for their safety,
- Additional training may be required if project is unique and or has one unique element that is not normally seen in Vermont.

What to consider:

- What is unique about the project and what are the risks to workers
- Who needs to be trained, and at what level, based on their risk exposure.

3.18 Enhanced flagger station setups

When to consider:

- When flagger is in a less than ideal environment (such as shadow, low light, visually congested area with high driver attention load)

What to consider:

- Additional device(s), typically a flag tree, to enhance the visibility of the flagger.
- A high-level warning device shall consist of a minimum of two flags with or without a Type B high intensity flashing warning light.
- The distance from the roadway: to the bottom of the lens of the flashing light and/or to the lowest point of the flag material shall be not less than 8 feet.
- The flag shall be 16 inches square or larger and shall be orange or fluorescent orange in color.

3.19 Intrusion alarms

When to consider:

- Daily lane closures in high volume/high speed areas where positive barrier is not in use.

3.20 Transverse Rumble strips

When to consider:

- Where longitudinal and lateral buffer is limited and it is important that the driver see and understand the next traffic control device after rumble strips,
- In long lane closures, to reduce the speed of traffic (traffic calming),
- At the beginning of speed reduction zones,
- Not for use in mobile operations.

What to consider:

- If the color of a transverse rumble strip used within a travel lane is not the color of the pavement, the color of the rumble strip shall be white, black, or orange.
- Transverse rumble strips should be placed perpendicular to vehicular traffic movement. They should not adversely affect overall pavement skid resistance under wet or dry conditions.
- Transverse rumble strips should not be placed on sharp horizontal or vertical curves.
- Rumble strips should not be placed through pedestrian crossings or on bicycle routes.
- Transverse rumble strips should not be placed on roadways used by bicyclists unless a minimum clear path of 4 feet is provided at each edge of the roadway or on each paved shoulder
- These are placed 150 to 300' feet in advance (WZ speed dependent) of the next traffic control feature you want the driver to see (merge, speed limit etc)
- Proximity to residences and noise sensitive businesses
- No signing is required

3.21 Drone radar and Radar Speed Feedback Signs (RSFS);

When to consider:

- Work zone speeding is a problem
- Enforcement cannot be on the project everyday
- RSFS may be used instead of UTO presence

What to consider:

- Drone radar only affects drivers with radar detectors
- Use Drone Radar with spot enforcement so drivers do not ignore drone
- Typically use only when workers are present
- Some PCMSs have drone radar

3.22 Automated speed enforcement (where permitted by State/local laws);

Vermont State Statutes currently do not allow this

3.23 Consecutive Work Zone Spacing

For short term interstate lane closures, work zone length should be based on contractor's capacity to conduct work within the closure that day. Lanes should only be closed if work is imminent, so that drivers can perceive the need for the closure and obey temporary traffic control. In most cases, lane closures should not exceed 3 miles, and consecutive closures should be spaced at least 1 mile apart. This will allow queues to dissipate and traffic to develop appropriate gaps.

4.0 UNIFORMED TRAFFIC OFFICERS

4.1 General Guidance:

The goal of these guidelines is to reduce the likelihood of injuries and fatalities to workers and road users in Work Zones, while maintaining a fiscally responsible approach in the use of flaggers and uniformed traffic officers. These guidelines provide parameters to identify the appropriate need and consistent use of flaggers and uniformed traffic officers addressed by the following categories:

Traffic control (guiding and directing traffic in, through, and around a work zone).

Presence (deter speeding and aggressive driving, encourage drivers to cautiously proceed through the work zone)

Enforcement (actively enforce traffic laws within the work zone on an as needed basis to gain driver awareness rather than as a full-time operation).

Emergency assistance (assist and coordinate activities at accident sites within the work zone, report accidents)

4.2 Traffic Control Operations

Flaggers shall be used to the greatest extent possible for “dynamic” traffic control operations. However, the use of uniformed traffic officers may be necessary in some instances.

Examples of dynamic traffic control operations where **flaggers** should be used include:

- Alternating 1-way traffic (stop/slow paddles must be used).
- Controlling traffic at low volume intersections (one flagger per approach).
- Assisting trucks and equipment in and out of work areas.
- Controlling traffic at side roads and driveways during mobile operations (i.e. paving, striping, etc.).
- Directing pedestrians and bicyclists through the work zone.
- Providing detour guidance beyond work zone limits, if needed.

Examples of dynamic traffic control operations where **uniformed traffic officers** may be used include:

- Directing traffic through complex intersections, especially where signal indications are being countermanded (signal shall be placed in flashing mode).

- Assisting construction vehicles and equipment in and out of work areas on high speed, high volume facilities. Note: If an access area is anticipated to be in place for an extended period of time and it is determined that assistance is required for the safe exit and entry of construction vehicles, then a cost analysis should be completed to determine if stationary measures (i.e. signals) would be more cost effective than officers or flaggers.
- Rolling roadblock operations on interstates and other multi-lane limited access highways.
- If a uniformed officer is already on site for other needs (**enforcement** or **presence**), then the officer may be asked to supplement these duties by providing limited duration traffic control that would otherwise be covered by a flagger. However, the officer must be adequately trained for the flagger operation to be performed and must use appropriate equipment and techniques (which may include the use of stop/slow paddles).

4.3 Presence

The use of flaggers or uniformed traffic officers for **presence** should only be used when there is an added safety risk to the workers and road users due to speeding, other aggressive driving behaviors, and/or high traffic crash/incident rates attributed to other features such as poor highway geometrics.

Flaggers may be used for **presence** to alert and slow traffic with the use of hand signals and “slow” face of stop/slow paddles as described in Part 6 of the MUTCD.

Uniformed traffic officers should be used for **presence** on high-speed facilities when workers are not behind barrier and are in close proximity to high volume traffic for extended periods of time (long term or intermediate term stationary projects lasting more than one daylight period, or at night) or where unique work zone conditions require a higher level of driver awareness to ensure safety. Facilities where this application may be appropriate include, but are not necessarily limited to:

Interstate facilities

Roads with a posted speed of 45 mph or higher **and** an average daily traffic (ADT) volume of 10,000 vpd or greater.

If all work is behind positive barrier, neither officers nor flaggers are typically necessary.

The use of police vehicles should be considered for nighttime operations in most instances, as the use of flashing blue lights, visible from 360

degrees, has been proven to deter aggressive driving behavior. However, the manner of their use during nighttime operations should be carefully considered as police vehicle lights provide no positive direction to motorists traveling through the work zone and are often overpowering and distracting. Excessive use of police vehicles with lights at night, or the inappropriate positioning of these vehicles, may actually detract from the positive guidance the work zone traffic control devices (TCDs) provide. When used for nighttime work, flashing blue lights shall be dimmed if capable.

Though typically not necessary, **uniformed traffic officers** may also be used for **presence** on roads with posted speeds of less than 45 mph or ADT volumes less than 10,000 vpd if the resident engineer determines that a **police presence** is needed to address a specific safety issue.

Examples of traffic control safety issues where a uniformed officer may be needed include:

- A work zone with a high rate of crashes.
- A work zone with vehicles traveling at excessive speeds.
- A work zone with poor highway geometrics.
- A work zone with excessive East-West sun glare.

NOTE: Using the flashing blue lights from a police vehicle to slow traffic approaching a work zone with poor visibility (i.e. East-West sun glare) or poor sight distance due to geometric features should be considered only after other measures have been determined to be ineffective.

4.4 Enforcement

The following guidelines are recommended to reduce the likelihood of injuries and fatalities to workers and road users by enforcing traffic laws within work zones. **Enforcement** can only be performed by uniformed traffic officers.

Enforcement may be used during work zone operations where excessive speed and/or other aggressive driving behaviors are likely to jeopardize the safety of the workers and other road users.

Enforcement may be used on an as needed basis within a work zone either by itself or where another officer is being used for **presence** to improve that officer's effectiveness.

Uniformed traffic officers being used for **presence** should typically not be used for **enforcement** except for flagrant violations of traffic law.

If an arrest is necessary, the work-zone detail uniformed officer shall either:

- call in, and turn the arrest over to, an on-duty officer,
- call in a replacement UTO to cover work zone duties.

4.5 Emergency Assistance

While on site, work-zone detail uniformed traffic officers may offer immediate assistance in emergency situations, such as a motor vehicle crash within the limits of the work-zone. The detail officer may investigate minor property damage crashes that occur within the work-zone if the time required to complete the investigation is minimal and the detail officer is not actively engaged in directing traffic. The detail officer should limit investigation of minor property damage crashes to assurance that no injuries are involved. Crashes involving injury should be investigated by the appropriate personnel once other emergency personnel arrive at the scene, not the detail officer.

5.0 WORK VEHICLES AND EQUIPMENT

FROM 23 CFR 630.1108 (e) *Work Vehicles and Equipment*. In addition to addressing risks to workers and road users from motorized traffic, the agency processes, procedures, and/or guidance established in accordance with 23 CFR 630.1006 should also address safe means for work vehicles and equipment to enter and exit traffic lanes and for delivery of construction materials to the work space, based on individual project characteristics and factors.

5.1 Introduction

Wherever possible, construction, maintenance and utility work zones shall be designed to allow for safe access from or entrance to travel lanes by work vehicles or equipment and for delivery of construction materials.

The project designer should address the access of work vehicles and equipment in the traffic control plans for significant projects. The contractor has the option of proposing alternative traffic control plans and entry and exit of work and delivery vehicles should be addressed. Anything below a significant project shall be addressed by the contractor prior to starting construction even if the contractor is using standard plans for TTC.

When to consider:

- Significant projects in the design phase
- All other projects need to be developed by the contractor and reviewed by the RE before construction starts

What to consider:

- What is the classification and speed limit of the roadway? (limited access vs a local road. i.e. traffic would expect to be stopped on a local road but not on a limited access facility)
- How will the work be phased?
- What type of work is being performed? Will work vehicles be exiting/entering the project once a day or many times through out the day? (i.e. a concrete pour versus a steel beam delivery)
- Will the project have many visitors or does the project have environmental concerns that may require monitoring from other agencies besides Vtrans?

5.2 Strategies for Enhancing Safety at Work Zone Access Points

Strategies which may aid in this objective include, but are not limited to:

- flaggers stationed and signed appropriately,
- advance warning signs for driveway locations,
- advance warning using “TRUCKS ENTERING” signs,
- advance warning using portable changeable message signs,
- temporary turn lanes or shoulder lanes approaching access points.

Used to slow approaching traffic:

- temporary transverse rumble strips,
- radar feedback signs,
- uniformed law enforcement officers in marked vehicles.

6.0 MAINTENANCE OF TEMPORARY TRAFFIC CONTROL DEVICES

When project construction begins all TTC devices should be new or like new. In the course of the project, TTC devices should be maintained to meet the ATSSA “acceptable” level

¹ The American Traffic Safety Services Association's (ATSSA) Quality Guidelines for Work Zone Traffic Control Devices uses photos and written descriptions to help judge when a traffic control device has outlived its usefulness. These guidelines are available for purchase from ATSSA through the following URL:

http://www.atssa.com/store/bc_item_detail.jsp?productId=1.

7.0 PAYMENT GUIDELINES FOR WORK ZONE TRAFFIC CONTROL

Another critical piece of the traffic control puzzle is specifying the proper pay items to include in the traffic control plan. The contract documents must provide sufficient detail and information to give contractors the ability to develop reasonable bids for the work required. In addition to the contractor's requirements, items must be specific enough to develop useable bid histories with time. These allow the contracting agency to determine reasonable estimates for budgeting purposes.

7.1 Item Categories

Traffic Control Devices

608.45	Truck Mounted Attenuator	Hour
621.56-59	Energy Absorption Attenuator	Each
621.90	Temporary Traffic Barrier	Linear Foot
621.95	Remove and Reset Temporary Traffic Barrier	Linear Foot
641.10	Traffic Control	Lump Sum
641.12	Public Relations Officer	Lump Sum
641.15	Portable Changeable Message Sign	Each
641.16	Portable Arrow Board	Each
641.17	Portable Changeable Message Sign	Day
641.18	Portable Arrow Board	Day
646.600 to 646.715	Temporary Pavement Marking Items	Linear Foot
646.75	Temporary Raised Pavement Markers, Type II	Each
646.76	Line Striping Targets	Each
646.85	Removal of Existing Pavement Markings	Square Foot
646.86	Pavement Marking Mask	Square Foot
678.40	Temporary Signal Item	Each
678.41	Temporary Flashing Beacon	Each
678.42	Temporary Detector	Each

Safety Features

900.XX	Various traffic control Specialty items	Each
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For items not currently listed, such as PIO, AFAD, Smart Work Zone, I-Cones, etc

Work Zone Activities

630.10	Uniformed Traffic Officers *	Hour
630.15	Flaggers	Hour

* UTO's for law enforcement are not paid under item 630.10. Designers can request law enforcement by adding a estimated dollar amount on the Contract Plan Submittal form under the line, "Worksite Traffic Control \$\$." This is not a bid item but is paid under a statewide contract between the Agency and Vermont State Police and is used at the discretion of the Resident Engineer. Resident engineers can also access this contract during construction via a change order.

7.2 Plan Development

Temporary traffic control plans should be developed to allow a contractor the ability to determine the quantities of the various channelizing devices, pavement markings and signs needed to maintain traffic during the project.

The plans should provide the contractor with a feasible means of controlling traffic while maintaining adequate capacity during the various phases of the project. Every traffic control plan should address the four main sections of a work zone traffic control plan as defined in the MUTCD: the Advance Warning Area, the Transition Area, the Work Activity Area, and the Termination Area. Given a good traffic control plan with sufficient detail and the appropriate pay items, contractors should be able to develop a reasonable bid for the work required. Over time the Agency's bid histories should improve and provide a better tool for designers.

7.3 Specifications

The Standard Specifications for Construction , 2011 edition, provide the explanation dealing with payment for the installation, interim movement and removal of all traffic control items.

For Lump sum items, the scope of work should be well defined. If that scope changes due to unforeseen field conditions, the contractor can submit a claim or the resident engineer can submit a change order to address the additional effort required.

Unit pay items allow the resident engineer and the contractor more flexibility to address changing conditions. However, this also requires additional book keeping.

7.4 Selecting Appropriate Items and Pricing

621.56-59	Energy Absorption Attenuators	Each
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When blunt end of temporary barrier warrant attenuation add this item and specify what type of attenuator is desired. This will depend on the available space at the site. If sufficient space is available in front of the

blunt barrier end, use the plastic barrel type of attenuation. If adequate space is not available, specify a temporary attenuator similar to the Quad-guard.

One spare attenuator should be included in the quantities in order to have a spare on site in case of a vehicle impact.

621.90 Temporary Traffic Barrier Lineal Foot

Estimate the total length of barrier needed to be brought to the construction site for any work zone traffic control phase necessary during construction of the project. This item also pays for the final removal of barrier from the site.

621.95 Remove and Reset Temporary Traffic Barrier Lineal Foot

Add this item if more than one traffic control phase is needed which requires moving temporary traffic barrier to different locations on the construction site. This item pays the contractor only for moving barrier a few feet on site and excludes trucking costs. Estimate the lineal feet of barrier needed for all traffic control phases beyond the initial traffic control phase.

630.10 Uniformed Traffic Officers Hour

630.15 Flaggers Hour

See Section 4 for guidance on the use of flaggers and UTOs.

641.10 Traffic Control Lump Sum

Add this item to all projects to cover the site specific traffic control plan for the project. The item covers all items needed for the successful implementation for the plan other than those items which have their own separate pay items, such as signs, barricades, cones and barrels.

This item will include all necessary traffic control phases during construction.

641.15/641.17 Portable Changeable Message Sign(PCMS) Each/Day

PCMS should be used to inform motorist of changing conditions in the work zone when temporary static signs do not convey the same message. In most cases they should be paid for by the unit day item. This item pays for the signs and only for the days that they are in use.

641.16/641. 18 Portable Arrow Board Each/Day

Arrow boards are to be used only when vehicles are to merge from one lane into another. Arrow boards are not to be used when vehicles are being redirected to follow a detour or a bypass.

Similar to the PCMS signs in most situations, the unit day item should be used. Using the unit day item helps the Agency build a bid history for this item and also only pays for the item when it is in use.

646.6-646.715 Temporary markings Lineal foot

These items should be used only for projects or traffic control phases which are proposed to last one to two months. If traffic control phases are estimated to last more than two months, then the regular paint items should be used.

646.75 Raised Pavement Markers, Type II Each

Raised Pavement markers, Type II should be used where the temporary pavement markings need to be supplemented, such as next to barrier, or may be used in lieu of temporary paint or LST's where temporary markings are required for more than two weeks

RPMs should be placed at maximum 20 ft spacing to mimic solid lines. Double lines (centerlines) should have side by side RPMs. Dashes consist of 3 RPMs per dash at 5 ft spacing.

646.76 Line Striping Targets Each

On projects where temporary or permanent markings cannot be placed for up to 14 days. They should not be used if permanent markings are not expected to be installed within two weeks due to their lack of long term durability. LST's should be placed at maximum 20 ft spacing to mimic solid lines. Double lines (centerlines) should have side by side LSTs. Dashes consist of 3 LSTs per dash at 5 ft spacing.

646.85 Removal of Existing Pavement Markings Square Foot

This item should be used when existing pavement markings may confuse motorists as to the proper travel path through a work zone. This removal is usually accomplished via a mechanical means. Consideration should be given to whether the permanent pavement will be scarred by the pavement marking removal process. Sometimes scarred pavement can confuse motorists.

646.86	Pavement Marking Mask	Square Foot
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This item should be used if scarring the pavement surface is not desirable. In some areas the existing pavement marking material can remain by just covering the lines however, the MUTCD does not allow markings to be covered over with a black paint.

678.40	Temporary Traffic Signal	Lump Sum
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For temporary bridge or roadway projects that can only maintain one direction of traffic at a time and for projects where rerouted traffic causes unacceptable congestion at existing non-signalized intersections, this item can be used. If it is used for intersections the traffic signal warrants should be met. This item includes all signal equipment, signs, markings and various accessories to create an operating temporary signal per plan (see Section 678.12 Standard Specifications for Construction, 2011 ed.)

678.41	Temporary Flashing Beacons	Each
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Temporary flashing beacons should be used when motorists have limited sight distance in advance of the upcoming traffic control. Also flashing beacons can be incorporated into a traffic control scheme when additional emphasis is needed.

900.xxx	Specialty Items	Varies
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Specialty items are those items that are infrequently used on projects or are items that have just been developed and have not made it into the Vermont Standard Specifications for Construction. These items include: Public Relations Officers (PRO), Smart work zones, I-cones, AFADs, etc. Check with Contract Administration to ensure that the proper item descriptions are called for in the special provisions.

8.0 TRAFFIC MANAGEMENT PLAN CHECKLIST

Project Design – Traffic Management Plan Checklist

Project Name and Number: _____

Project Manager: _____

Conceptual Design Phase

1. Classify Project:

___ Significant (Major reconstruction; high impacts on traffic both inside and outside project limits. Projects that on their own might be moderate could be significant in combination with concurrent projects in the vicinity.)

___ Moderate (most projects; most traffic impact is localized within project limits)

___ Minor (mobile and short term operations; minimal impact to the traveling public)

2. Identify necessary Traffic Management Plan Components:

___ Temporary Traffic Control Plan (required for all projects)

___ Transportation Operations Component (strategies to mitigate off-site impacts; required for significant projects, may be needed for moderate projects)

___ Public Information Component (communications with public and property owners before and during construction; required for significant projects, may be beneficial for any project.)

Preliminary Design Phase:

1. Temporary Traffic Control Plan:

___ Identify features which will require adjustments to E-standards or MUTCD Typical Applications (curves and other geometric constraints, commercial and residential driveways, intersecting roads, adjacent/concurrent projects, special road users)

___ Determine feasible phasing for construction with regard to where and how traffic will be maintained.

___ Identify potential ROW or Environmental permitting needs associated with maintenance of traffic. (Specific limits will be needed for ROW plans)

2. Transportation Operations Component:

___ Identify off-project impacts and determine whether off-project improvements are required to maintain traffic mobility. (This may include signalization improvements, pedestrian upgrades, paving, widening. Improvements may be needed on official detour routes and also on major expected diversion routes if project is open to traffic but cannot handle ADT.)

___ Can impacts be mitigated by adjusting timing of project? (This could include night work, avoiding school terms, opening project to traffic during known high traffic events, or full road closure to expedite work.)

___ Consider whether special accommodations need to be made for emergency service access (Ambulance, Fire, Police)

3. Public Information Component

___ Identify stakeholders (emergency responders, municipalities, businesses, schools, property owners, etc.)

___ Can stakeholders be kept informed by Resident Engineer and Project Manager, or will there be enough information flow required to justify a public relations officer?

Final Design Phase:

1. Temporary Traffic Control Plan:

___ Can all anticipated users safely get from one side of the project to the other in a reasonable amount of time? (Bike/Ped, Cars, Trucks, emergency vehicles)

___ Is access to side roads, commercial drives, and residences accounted for?

___ Are workers adequately protected from traffic?

___ All projects: include traffic control notes specific to project needs, and applicable T-Standards (E-standards). (For example, paving projects usually include a list of side roads requiring road work ahead/end road work signs)

___ Project where T-Standards (E-Standards) or MUTCD typical applications do not account for site specific conditions: include TCP layout sheets detailing sign placement and placement of other traffic control devices.

___ Project requiring phased construction: provide enough detail in TCP layout sheets to demonstrate constructability, that sufficient space exists to maintain traffic, and to develop quantities. (As defined at the Preliminary Plans Stage) Provide traffic control notes specifying time/space constraints and other project specific requirements.

___ Project requiring detour: provide detailed detour sign locations, including affected existing signs that need to be covered or removed; consider whether different detours are applicable to trucks, cars, and bike/peds. Cars may be able to use local routes not legal for trucks, bike/peds can't be sent on miles of detour or on limited access roadways. (If ROW is required, these details should be addressed at Preliminary Plans stage)

___ Project requiring night work: require contractor to submit site specific lighting plan.

___ Include necessary pay items in quantity sheet (temporary markings, pavement marking removal/replacement, RPMs and/or LST's, barriers and attenuators, TMA's, arrow boards, PCMS, flaggers, UTO's, etc.)

2. Transportation Operations Component:

___ Include plan sheets detailing off-site improvements.

___ Document other mitigation strategies as appropriate (as traffic control plan notes, special provisions, agreements with municipalities, etc.)

3. Public Relations Component:

___ include PRO in Quantities if needed. Document expectations in special provisions.

9.0 SITE SPECIFIC TRAFFIC CONTROL PLAN GUIDANCE

Purpose: To ensure that all roadway users can get through the project area safely without undue delay.

Site specific traffic control plans are needed when project conditions do not closely resemble E-standards or MUTCD Typical applications, or there are project specific issues that must be addressed.

If needed, site specific control plans may be included in the project plans, or may be required of the contractor, or both. In some cases, project plans may contain phased construction traffic control plans in order to demonstrate constructability and determine ROW requirements, but still require additional information from the contractor based on methods and means.

Site specific traffic control plans should include:

- Layouts showing existing site conditions (may be based on CADD layouts, aerial photo, map, or hand drawn)
 - Location of pertinent features such as sidewalks, utility poles, ramps, drives, and side roads
 - Lane configurations
 - Existing traffic control devices such as signs, signals, and pavement markings
 - Location of pertinent traffic generators, such as shopping centers, schools, large businesses
 - Pertinent dimensions should be labeled
 - Layout may need to include features which are outside the project limits if they affect traffic control considerations, such as nearby intersections or ramps
- Proposed Temporary Traffic Control on layouts
 - Location of devices such as cones, temporary signals, barriers, temporary markings
 - Location of flagger stations if used
 - Taper lengths and device spacing
 - Pedestrian accommodations where appropriate
 - Pertinent dimensions should be labeled
- Narrative describing work activities and how materials and equipment will be transported to and from the work area and stored, as they relate to temporary traffic control. Narrative may also address emergency vehicle accommodations.

LIVABLE WAGE RATES – JULY 1, 2018



Livable Wage Ordinance

****EFFECTIVE JULY 1, 2018****

Are You
Receiving
A Livable
Wage?

The Burlington Livable Wage Ordinance requires that if you are working on a specific City of Burlington service contract or subcontract above a certain amount your employer must pay you at least \$14.52 an hour **if the employer offers health insurance.**

\$14.52

If you are working on a specific City of Burlington service contract or subcontract above a certain amount your employer must pay you at least \$16.20 an hour **if the employer does not offer health insurance.**

\$16.20

What Are
Your Rights
Under the
Livable Wage?

All employees who work directly on a City of Burlington service contract or a subcontract may be eligible. To find out if you are covered by the Livable Wage Ordinance you may call the Office of the Chief Administrative Officer at 802/865-7000.

Are You
Eligible to
Receive The
Livable Wage?

Covered employees are required to be paid at least the above amounts. If you are covered and your employer reduces your pay, your employer shall be considered in violation. You are protected by law if you assert your rights under the Livable Wage Ordinance. Any employee to whom the Livable Wage has been applied in the past shall not have their wage reduced because of this annual adjustment.

Why Report A
Livable Wage
Violation?

If your employer is required to be paying you the Livable Wage and is not, he or she may be required to pay you back wages and be subject to any other appropriate action as outlined in the Ordinance.

Employee
Earned
Income Tax
Credit

Individuals and families with lower incomes could be eligible to receive the Earned Income Tax Credit (EITC.) You may even be eligible if your income is so low that you do not owe any taxes. The EITC can reduce your taxes or provide a cash refund. There is a federal and state EITC, so ask about both. To find out if you qualify and how to get this benefit speak to your employer's payroll clerk, call the IRS at 1.800.TAX.1040 or visit www.irs.gov.

ORDINANCE FORMS

LIVABLE WAGE

UNION DETERRENCE

NON-OUTSOURCING

Sec. 21-81. - Definitions.

As used in this article, the following terms shall be defined as follows:

a) Contractor or vendor is a person or entity that has a service contract with the City of Burlington primarily for the furnishing of services (as opposed to the purchasing of goods) ~~where Burlington where~~ the total amount of the service contract or service contracts exceeds fifteen thousand dollars (\$15,000.00) for any twelve-month period, including any subcontractors of such contractor or vendor. ~~A person or entity that has a contract with the City of Burlington for the use of property under the jurisdiction of the board of airport commissioners, or any person or entity that has a sublease or other agreement to perform services on such property, shall also be considered a contractor under this article.~~

(b) Grantee is a person or entity that is the recipient of financial assistance from the City of Burlington in the form of grants ~~administered by the city~~, including any contractors or subcontractors ~~grantees~~ of the grantee, that exceeds fifteen thousand dollars (\$15,000.00) for any twelve-month period.

(c) Covered employer means the City of Burlington ~~(except that the Burlington School Department shall not be considered a covered employer)~~, a contractor or vendor or a grantee as defined above. The primary contractor, vendor, or grantee shall be responsible for the compliance of each of its subcontractors (or of each subgrantee) that is a covered employer.

(d) Covered employee means an "employee" as defined below, who is employed by a "covered employer," subject to the following:

(1) An employee who is employed by a contractor or vendor is a "covered employee" during the period of time he or she expends on furnishing services under a service contract with the City of Burlington funded by the city, notwithstanding that the employee may be a temporary or seasonal employee;

(2) An employee who is employed by a grantee who expends at least half of his or her time on activities funded by the ~~city~~ City of Burlington is a "covered employee."

(e) Designated accountability monitor shall mean a nonprofit corporation which has established and maintains valid nonprofit status under Section 501(c)(3) of the United States Internal Revenue Code of 1986, as amended, and that is independent of the parties it is monitoring.

OFFENSES AND MISCELLANEOUS PROVISIONS--
ARTICLE VI - Livable Wages

(ef) Employee means a person who is employed on a full-time or part-time regular basis (i.e., nonseasonal). In addition, commencing with the next fiscal year, a seasonal or temporary employee of the City of Burlington who works ten (10) or more hours per week and has been employed by the City of Burlington for a period of four years shall be considered a covered employee commencing in the fifth year of employment. "Employee" shall not refer to volunteers working without pay or for a nominal stipend, persons working in an approved apprenticeship program, persons who are hired for a prescribed period of six months or less to fulfill the requirements to obtain a professional license as an attorney, persons who are hired through youth employment programs or student workers or interns participating in established educational internship programs.

(fg) Employer-assisted health care means health care benefits provided by employers for employees (or employees and their dependents) at the employer's cost or at an employer contribution towards the purchase of such health care benefits, provided that the employer cost or contribution consists of at least one dollar and twenty cents (\$1.20) per hour. (Said amount shall be adjusted every two (2) years for inflation, by the chief administrative officer of the city.)

(gh) Livable wage has the meaning set forth in section 21-82.

(i) Retaliation shall mean the denial of any right guaranteed under this article, and any threat, discipline, discharge, demotion, suspension, reduction of hours, or any other adverse action against an employee for exercising any right guaranteed under this article. Retaliation shall also include coercion, intimidation, threat, harassment, or interference in any manner with any investigation, proceeding, or hearing under this article.

(j) Service contract means a contract primarily for the furnishing of services to the City of Burlington (as opposed to the purchasing or leasing of goods or property). A contract involving the furnishing of financial products, insurance products, ~~and~~ or software, even if that contract also includes some support or other services related to the provision of the products, shall not be considered a service contract.

Sec. 21-82. - Livable wages required.

(a) Every covered employer shall pay each and every covered employee at least a livable wage ("Livable Wage") ~~as established under this article~~ no less than:

OFFENSES AND MISCELLANEOUS PROVISIONS--
ARTICLE VI - Livable Wages

(1) For a covered employer that provides employer assisted health care, the livable wage shall be at least ~~nine dollars and ninety cents~~thirteen dollars and ninety four cents (\$~~13.949.90~~) per hour on the effective date of the ~~amendments is to this article [Dec. 19, 2001].~~

(2) For a covered employer that does not provide employer assisted health care, the livable wage shall be at least ~~eleven dollars and sixty eight cents~~fifteen dollars and eighty three cents (\$~~15.8344.68~~) per hour on the effective date of the amendments to this article [Dec. 19, 2001].

(3) ~~Tipped covered employees and other ee~~Covered employees whose wage compensation consists of more or other than hourly wages, including, but not limited to, tips, commissions, flat fees or bonuses, shall be paid so that the total of all wage an hourly wage which, when combined with the other compensation, will at least equal the Livable wWage as established under this article.

(b) The amount of the Livable wWage established in this section shall be adjusted by the chief administrative officer of the city, as of July ~~1st~~first of each year based upon a report of the Joint Fiscal Office of the State of Vermont that describes the basic needs budget for a single person but utilizes a model of two (2) adults residing in a two-bedroom living unit in an urban area with the moderate cost food plan. Should there be no such report from the joint fiscal office, the chief administrative officer shall obtain and utilize a basic needs budget that applies a similar methodology. The livable wage rates derived from utilizing a model of two (2) adults residing in a two-bedroom living unit in an urban area with a moderate cost food plan shall not become effective until rates meet or exceed the 2010 posted livable wage rates. Prior to the first day of May preceding any such adjustment and prior to the first day of May of each calendar year thereafter, the chief administrative officer will provide public notice of this adjustment by ~~publishing a notice in a newspaper of general circulation, by posting a written notice in a prominent place in City Hall, by sending written notice to the city council and, in the case of covered employers that have requested individual notice and provided contact information an address of record to the chief administrative officer, by notice written letter to each such covered employer. However, once a Livable Wage is applied to an individual employee, no reduction in that employee's pay rate is permissible due to this annual adjustment.~~

OFFENSES AND MISCELLANEOUS PROVISIONS--
ARTICLE VI - Livable Wages

(c) Covered employers shall provide at least twelve (12) compensated days off per year for full-time covered employees, and a proportionate amount for part-time covered employees, for sick leave, vacation, ~~or personal~~, or combined time off leave.

Sec. 21-83. - Applicability.

(a) This article shall apply to any service contract or grant, as provided by this article that is awarded or entered into after the effective date of the article [~~Dec. 19, 2001~~]. After the effective date of the article, entering into any agreement or an extension, renewal or amendment of any contract or grant as defined herein shall be subject to compliance with this article.

(b) The requirements of this article shall apply during the term of any service contract subject to the article. Covered employers who receive grants shall comply with this article during the period of time the city's funds awarded by the City of Burlington are being expended by the covered employer.

Sec. 21-84. - Enforcement.

(a) ~~The City of Burlington shall require, as a condition of any~~ Each service contract or grant covered by this article section, shall contain provisions requiring that the affected-covered employer or grantee submit a written certification, under oath, during each year during the term of the service contract or grant, that the covered employer or grantee (including all of its subcontractors and subgrantees, if any) is in compliance with this article. The failure of a contract to contain such provisions does not excuse a covered employer from its obligations under this ordinance. -confirming payment of a livable wage as a condition of entering into said contract or grant. The affected-covered employer shall agree to post a notice regarding the applicability of this section in any workplace or other location where employees or other persons contracted for employment are working. The affected-covered employer shall agree to provide payroll records or other documentation for itself and any subcontractors or subgrantees, as deemed necessary by the chief administrative officer of the City of Burlington within ten (10) business days from receipt of the City of Burlington ~~city's~~ request.

(b) The chief administrative officer of the City of Burlington may require that a covered employer submit proof of compliance with this article at any time, including but not limited to

(1) verification of an individual employee's compensation,

(2) production of payroll, health insurance enrollment records, or other relevant documentation, or

(3) evidence of proper posting of notice.

If a covered employer is not able to provide that information within ten (10) business days of the request, the chief administrative officer may turn the matter over to the city attorney's office for further enforcement proceedings.

(c) The City of Burlington shall appoint a designated accountability monitor that shall have the authority:

(i) To inform and educate employees of all applicable provisions of this article and other applicable laws, codes, and regulations;

(ii) To create a telephonic and electronic accountability system under this article that shall be available at all times to receive complaints under this article;

(iii) To establish and implement a system for processing employees' complaints under this article, including a system for investigating complaints and determining their legitimacy and initial credibility; and

(iv) To refer credible complaints to the City Attorney's office for potential enforcement action under this article.

The designated accountability monitor shall forward to the City of Burlington all credible complaints of violations within ten (10) days of their receipt.

(ed) Any covered employee who believes his or her covered employer is not complying with this article may file a complaint in writing with the City Attorney's office within one (1) year after the alleged violation. The City Attorney's office shall conduct an investigation of the complaint, during which it may require from the covered employer evidence such as may be required to determine whether the covered employer has been compliant, and shall make a finding of compliance or noncompliance within a reasonable time after receiving the complaint. Prior to ordering any penalty provided in subsections (e), (f), or (g) below, the City Attorney's office shall give notice to the covered employer. The covered employer may request a hearing within thirty (30) days of receipt of such notice. The hearing shall be conducted by a hearing

OFFENSES AND MISCELLANEOUS PROVISIONS--
ARTICLE VI - Livable Wages

officer appointed by the City Attorney's office, who shall affirm or reverse the finding or the penalty based upon evidence presented by the City Attorney's office and the covered employer.

(eeb) The City of Burlington shall have the right to modify, terminate and/or seek specific performance of any contract or grant with an-affecteda covered employer from any court of competent jurisdiction, if the affected-covered employer has not complied with this article.

(fde) Any covered employer who violates this article may be barred from receiving a contract or grant from the city for a period up to two (2) years from the date of the finding of violation.

(edg) A violation of this article shall be a civil offense subject to a civil penalty of from two hundred dollars (\$200.00) to five hundred dollars (\$500.00). All law enforcement officers and any other duly authorized municipal officials are authorized to issue a municipal complaint for a violation of this article. Each day any covered employee is not compensated as required by this article shall constitute a separate violation.

(h) If a complaint is received that implicates any City of Burlington employee in a possible violation of this ordinance, that complaint will be handled through the City's personnel procedures, not through the process outlined in this ordinance.

(fi-) Any covered employee aggrieved by a violation of this article may bring a civil action in a court of competent jurisdiction against the covered employer within two (2) years after discovery of the alleged violation. The court may award any covered employee who files suit pursuant to this section, as to the relevant period of time, the following:

- (i) The difference between the livable wage required under this article and the amount actually paid to the covered employee;
- (ii) Equitable payment for any compensated days off that were unlawfully denied or were not properly compensated;
- (iii) Liquidated damages in an amount equal to the amount of back wages and/or compensated days off unlawfully withheld or of \$50 for each employee or person whose rights under this article were violated for each day that the violation occurred or continued, whichever is greater;
- (iv) Reinstatement in employment and/or injunctive relief; and
- (v) Reasonable attorneys' fees and costs.

(gj) It shall be unlawful for an employer or any other person to interfere with, restrain, or deny the exercise of, or the attempt to exercise, any right protected under this article. No person

shall engage in retaliation against an employee or threaten to do so because such employee has exercised rights or is planning to exercise rights protected under this article or has cooperated in any investigation conducted pursuant to this article.

Sec. 21-85. - Other provisions.

(a) No ~~affected~~-covered employer shall reduce the compensation, wages, fringe benefits or leave available to any covered employee in order to pay the livable wage required by this article. Any action in violation of this paragraph shall be deemed a violation of this article subject to the remedies of section 21-84.

(b) No covered employer with a current contract, as of the effective date of this provision, with the City of Burlington for the use of property located at the Burlington International Airport may reduce, during the term of that contract, the wages of a covered employee below the Livable Wage as a result of amendments to this ordinance.

(bc) Where pursuant to a contract for services with the city, the contractor or subcontractor incurs a contractual obligation to pay its employees certain wage rates, in no case except as stated in subsection 21-85(ed), shall the wage rates paid pursuant to that contract be less than the minimum livable wage paid pursuant to this article.

(ed) Notwithstanding subsection 21-85(bc), where employees are represented by a bargaining unit or labor union pursuant to rights conferred by state or federal law and a collective bargaining labor agreement is in effect governing the terms and conditions of employment of those employees, this chapter shall not apply to those employees, and the collective bargaining labor agreement shall control.

(ée) Covered employers shall inform employees making less than twelve dollars (\$12.00) per hour of their possible right to the Earned Income Tax Credit under federal and state law.

(ef) The chief administrative officer of the city shall have the authority to promulgate rules as necessary to administer the provisions of this article, which shall become effective upon approval by the city council.

Sec. 21-86. - Exemptions.

An partial or complete exemption from the any requirement of this article may be requested for a period not to exceed two (2) years:

- (a) By a covered employer where payment of the livable wage authorized based upon a determination that compliance with the livable wage requirement would cause substantial economic hardship; and
- (b) By the City of Burlington where application of this article to a particular contract or grant is found to violate specific state or federal statutory, regulatory or constitutional provision or provisions or where granting the exemption would be in the best interests of the City.

A covered employer or grantee granted an exemption under this Section 21-86 may reapply for an exemption upon the expiration of the exemption.

Requests for exemption may be granted by majority vote of the City Council. All requests for exemption shall be submitted to the chief administrative officer. The finance committee board of the city-City of Burlington shall first consider such request and make a recommendation to the City Council. The decision of the City Council shall be final. shall consider the request for exemption with prior notice provided to the city council. A unanimous decision by the finance board shall be final. A split decision by the finance board is reviewable by the city council not later than the next meeting of the city council which occurs after the date of the finance board decision.

Sec. 21-87. - Severability.

If any part or parts or application of any part of this article is held invalid, such holding shall not affect the validity of the remaining parts of this article.

Section 21-88. Annual Reporting.

On or before April 15th of each year, the City Attorney's office shall submit a report to the City Council that provides the following information:

An Ordinance in Relation to

(a) a list of all covered employers broken down by department;

(b) a list of all covered employers whose service contract did not contain the language required by this article; and

(c) all complaints filed and investigated by the City Attorney's office and the results of such investigation.

Sec. 21-89. Effective Date.

The amendments to this ordinance shall take effect on January 1, 2014, and shall not be retroactively applied.

* Material stricken out deleted.

** Material underlined added.

Certification of Compliance with the City of Burlington's Livable Wage Ordinance

I, _____, on behalf of _____ ("the Contractor") in connection with a contract for _____ services that we provide to the City, hereby certify under oath that the Contractor (and any subcontractors under this contract) is and will remain in compliance with the City of Burlington's Livable Wage Ordinance, B.C.O. 21-80 et seq., and that

(1) as a condition of entering into this contract or grant, we confirm that all covered employees as defined by Burlington's Livable Wage Ordinance (including the covered employees of subcontractors) shall be paid a livable wage (as determined, or adjusted, annually by the City of Burlington's chief administrative officer) and provided appropriate time off for the term of the contract;

(2) a notice regarding the applicability of the Livable Wage Ordinance shall be posted in the workplace(s) or other location(s) where covered employees work;

(3) we will provide verification of an employee's compensation, produce payroll or health insurance enrollment records or provide other relevant documentation (including that of any subcontractor), as deemed necessary by the chief administrative officer, within ten (10) business days from receipt of a request by the City;

(4) we will cooperate in any investigation conducted by the City of Burlington's City Attorney's office pursuant to this ordinance; and

(5) we will not retaliate (nor allow any subcontractor to retaliate) against an employee or other person because an employee has exercised rights or the person has cooperated in an investigation conducted pursuant to this ordinance.

Date _____ By: _____
Contractor

Subscribed and sworn to before me:

Date _____
Notary

BURLINGTON'S OUTSOURCING ORDINANCE

ARTICLE VII. OUTSOURCING

21-90 Policy.

It is the policy of the City of Burlington to let service contracts to contractors, subcontractors and vendors who perform work in the United States.

(Ord. of 11-21-05/12-21-05)

21-91 Definitions.

(a) *Contractor or vendor.* A person or entity that has a contract with the City of Burlington primarily for the furnishing of services (as opposed to the purchasing of goods), including any subcontractors of such contractor or vendor.

(b) *Government funded project.* Any contract for services which involves any city funds and the total amount of the contract is fifty thousand dollars (\$50,000.00) or more. Burlington School Department contracts shall not be considered government funded projects under this article.

(c) *Outsourcing.* The assigning or reassigning, directly, or indirectly through subcontracting, of services under a government funded project to workers performing the work outside of the United States.

(Ord. of 11-21-05/12-21-05)

21-92 Implementation.

(a) No contract for a government funded project shall be let to any contractor, subcontractor, or vendor who is outsourcing, or causing the work to be performed outside of the United States or Canada.

(b) Prior to the commencement of work on a government funded project a contractor, subcontractor or vendor shall provide written certification that the services provided under the contract will be performed in the United States or Canada.

(Ord. of 11-21-05/12-21-05)

21-93 Exemption.

An exemption from requirements of this article may be authorized by the chief administrative officer based upon a determination that the services to be performed for the government funded project are not available in the United States or Canada at a reasonable cost. Any such exemption decision by the chief administrative officer shall be reported to the board of finance in writing within five (5) days. The board of

finance may, if it should vote to do so, override the exemption decision if such vote occurs within fourteen (14) days of the date of the chief administrative officer's communication to such board.

(Ord. of 11-21-05/12-21-05)

21-94 Enforcement.

(a) Any contractor, subcontractor or vendor who files false or materially misleading information in connection with an application, certification or request for information pursuant to the provisions of this article or outsources work on a government funded project shall be deemed to be in violation of this article.

(b) A violation of this article shall be a civil offense subject to a civil penalty of from one hundred dollars (\$100.00) to five hundred (\$500.00). All law enforcement officers and any other duly authorized municipal officials are authorized to issue a municipal complaint for a violation of this article. Each day any violation of any provision of this article shall continue shall constitute a separate violation.

(c) The City of Burlington shall have the right to modify, terminate and or seek specific performance of any contract for a government funded project if the contractor, subcontractor or vendor has not complied with this article.

(Ord. of 11-21-05/12-21-05)

21-95—21-99 Reserved.

Certification of Compliance with the City of Burlington's Outsourcing Ordinance

I, _____, on behalf of _____ (Contractor)
and in connection with _____ (City contract/project/grant),
hereby certify under oath that (1) Contractor shall comply with the City of
Burlington's Outsourcing Ordinance (Ordinance §§ 21-90 – 21-93); (2) as a
condition of entering into this contract or grant, Contractor confirms that the
services provided under the above-referenced contract will be performed in the
United States or Canada.

Dated at _____, Vermont this ___ day of _____, 20__.

By: _____
Duly Authorized Agent

Subscribed and sworn to before me: _____
Notary

BURLINGTON'S UNION DETERRENCE ORDINANCE

ARTICLE VIII. UNION DETERRENCE

21-100 Policy.

It is the policy of the City of Burlington to limit letting contracts to organizations that provide union deterrence services to other companies.

(Ord. of 3-27-06/4-26-06)

21-101 Definitions.

(a) *Contractor or vendor.* A person or entity that has a contract with the City of Burlington primarily for the furnishing of services (as opposed to the purchasing of goods), including any subcontractors of such contractor or vendor.

(b) *Government funded project.* Any contract for services which involves any City funds and the total amount of the contract is fifteen thousand dollars (\$15,000.00) or more. Burlington School Department contracts shall not be considered government funded projects under this article.

(c) *Union deterrence services.* Services provided by a contractor, subcontractor or vendor that are not restricted to advice concerning what activities by an employer are prohibited and permitted by applicable laws and regulations, but extend beyond such legal advice to encouraging an employer to do any of the following:

- 1) Hold captive audience, (i.e., mandatory) meetings with employees encouraging employees to vote against the union;
- 2) Have supervisors force workers to meet individually with them to discuss the union;
- 3) Imply to employees, whether through written or oral communication, that their employer may have to shut down or lay people off if the union wins the election;
- 4) Discipline or fire workers for union activity;
- 5) Train managers on how to dissuade employees from supporting the union.

(d) *Substantial portion of income.* For the purposes of this article, substantial portion of income shall mean greater than ten (10) percent of annual gross revenues or one hundred thousand dollars (\$100,000.00), whichever is less.

(Ord. of 3-27-06/4-26-06)

21-102 Implementation.

(a) No contract for a government funded project shall be let to any contractor, subcontractor, or vendor who

- 1) Advises or has advised an employer to conduct any illegal activity in its dealings with a union.
- 2) Advertises union deterrence services as specialty services;
- 3) Earns a substantial portion of its income by providing union deterrence services to other companies in order to defeat union organizing efforts.

(b) Prior to the commencement of work on a government funded project a contractor, subcontractor or vendor shall provide written certification that it has not advised the conduct of any illegal activity, it does not currently, nor will it over the life of the contract provide union deterrence services in violation of this article.

(Ord. of 3-27-06/4-26-06)

21-103 Enforcement.

(a) Any contractor, subcontractor or vendor who files false or materially misleading information in connection with an application, certification or request for information pursuant to the provisions of this article or provided union deterrence services during the life of a contract for a government funded project shall be deemed to be in violation of this article.

(b) The City of Burlington shall have the right to modify, terminate and or seek specific performance of any contract for a government funded project if the contractor, subcontractor or vendor has not complied with this article.

(Ord. of 3-27-06/4-26-06)

21-104—21-110 Reserved.

Certification of Compliance with the City of Burlington's
Union Deterrence Ordinance

I, _____, on behalf of _____ (Contractor)
and in connection with _____ (City contract/project/grant),
hereby certify under oath that _____ (Contractor) has not
advised the conduct of any illegal activity, it does not currently, nor will it over the
life of the contract provide union deterrence services in violation of the City's union
deterrence ordinance.

Dated at _____, Vermont this ___ day of _____, 20__.

By: _____
Duly Authorized Agent

Subscribed and sworn to before me: _____
Notary

**PREQUALIFICATION OF CONTRACTORS
APPLICATION – CITY OF BURLINGTON**

City of Burlington



Pre-Qualification of Construction Contractors Application

Project Name: _____

Bid Due Date: _____

TO BE FILLED OUT BY CITY OF BURLINGTON ONLY:

Date Received: _____

Date Checked: _____

Checked By: _____

Available for Electronic Mailing

Check List for Required Items:

- One copy of the questionnaire completed in its entirety.
- Questionnaire must be completely executed and properly sworn to before a Notary Public.
- Financial Statements which are compiled, reviewed, or fully-audited must be prepared and certified by an Independent Certified Public Accountant (CPA).
- Verification of OSHA statement and reported events with the establishment search feature at: <https://www.osha.gov/oshstats/>
- State of Vermont Pre-Qualified approved work type documentation, if applicable

Pre-Qualification of Construction Contractors Application

This is an application for pre-qualification of construction contractors for the City of Burlington under Chapter 21 of the Code of Ordinances. The purpose of the application is to solicit information necessary to determine whether a contractor applying for work on a government funded project is a responsible contractor.

1. Policy

It is the policy of the City of Burlington to let contracts for city construction projects only to contractors and subcontractors that demonstrate that they are responsible contractors.

2. Responsible Contractor

Responsible contractors are those contractors and subcontractors who have demonstrated to the city that they are financially responsible, have experience suggesting that they have the ability to perform government projects responsibly, have demonstrated that they are responsible employers, and have demonstrated that they have fair subcontractor relations, or that they perform all work with their own forces.

3. Minimum Contract Amount

This pre-qualification requirement applies to any construction contract by a department, board or council of the City, or those construction projects financed by tax exempt bonds issued by the Burlington Community Development Corporation, in which the total project cost is \$100,000 or more.

4. Contracting Authority

This application is to be delivered to the contracting authority under the schedule determined by that authority as part of the bidding process. The contracting authority is the department, board or council, agency, or entity that is sponsoring the contract on behalf of a government funded project.

5. Proprietary Information

All information submitted by contractors and subcontractors in connection with a pre-qualification application shall be considered proprietary information. The City shall not release the information except as may be required by the Access to Public Records Law, or by court order.

6. Subcontract Work

The pre-qualification requirement does not apply to subcontractors where the total value of the work to be performed is less than \$7,500.

Instructions for Filing the Questionnaire, Financial Statement and Other General Information For Contractors

1. Preparation of Statement:

One copy of the questionnaire is required by the City. It must be completely executed and properly sworn to before a Notary Public. Financial Statements which are compiled, reviewed, or fully-audited must be prepared and certified by an Independent Certified Public Accountant (CPA). A Certified Public Accountant is considered on who, in Vermont, is registered by the State of Vermont Board of Public Accountancy as a CPA. For other states, the City will consider a CPA whose registration qualifications in their state equal those established in Vermont. This questionnaire must be submitted at least five (5) working days before the date of opening bids in order to ensure consideration for pre-qualification for a particular bid opening.

2. Notification of Action Taken:

The City will send in writing to the applicant a notification of its decision. Questionnaires will be considered in the order received and acted upon at all times as promptly as circumstances permit. Contractors duly pre-qualified will be appraised in writing of both the amount and type of work on which they will be eligible to bid.

3. Duration of Pre-Qualification:

The duration of any pre-qualification will not exceed one (1) year and will expire annually three (3) months subsequent to the closing date of the contractors fiscal year, as evidenced in their financial statement.

4. Revision of Pre-Qualification Rating:

Requests for revision of pre-qualification rating will be considered at any time provided credentials showing increased assets, equipment or ability to perform work are submitted. These must be submitted at least five (5) working days prior to a bid opening to receive consideration for that bid opening. Contractors shall also report any substantial increase in liabilities that occurs during the pre-qualification period.

5. Request for Plans, Specifications and Proposal Form:

Contractors having been duly pre-qualified will receive notices from time to time inviting submission of proposals for the contracts to be let on specified dates. A Contractor desiring to receive plans, proposal and specifications for any contract may obtain them upon written request only, utilizing the special form entitled A Standard Form B Request for Proposal and/or Plans. This form is furnished to all pre-qualified contractors by the City and this form must show the status of all work under contract or otherwise executed by the Contractor, both inside and outside the State of Vermont, as of the date of request.

**PRE-QUALIFICATION OF
CONSTRUCTION CONTRACTORS
APPLICATION**

Submitted by _____

Corporation Partnership Individual Other

Mailing Address _____

Location Address _____

Telephone Number _____ Federal ID Number _____

The signatory of this questionnaire guarantees the truth and accuracy of all statements and of all answers to interrogatories hereinafter made.

Authorized Signature

Date

Experience Questionnaire

How many years has your organization been in business as a general contractor under your present business name? _____ Under other names? (List)

How many years experience in construction work has your organization had, (a) As a general Contractor, (b) As a Sub-Contractor: _____

Has your organization, or any officer, partner, director or principal individual thereof ever admitted to or been convicted of any criminal violation, including but not limited to discrimination, anti-trust or labor violations, other than traffic offences; or been convicted of or is currently being sued for any civil antitrust violation or other civil suit involving fraud; or been debarred from performing work on any contract?

If so, give full details, including the name of any individual involved and the court and docket number of any civil or criminal actions:

Date of reinstatement _____

2. Is your organization currently debarred from performing work on any contract? YES / NO

If yes, by whom? _____

Date of reinstatement: _____

3. Has your organization ever been denied pre-qualification? YES / NO

If so, by whom and for what reason? _____

4. Have you ever failed to complete any work awarded to you? YES / NO

If so, where and why? _____

5. Has any officer, director or partner of your organization ever been an officer or partner of some other organization that failed to complete a construction contract? YES / NO

If so, state the name of individual, other organization and reason therefore:

6. Has any officer, director or partner of your organization ever failed to complete a construction contract handled in his own name? YES / NO

If so, state name of individual, name of owner and reason therefore: YES / NO

7. Has the organization been cited in the past three (3) years for violations of OSHA? YES / NO
If so, please explain:

8. Has the organization currently any outstanding legal action against it by a subcontractor on a current or former job? YES / NO
If so, please explain:

9. List all parents, subsidiaries, affiliates or divisions of your firm, and any related parties included in disclosures in your most recent financial statements or the notes thereto:

10. List any of your officers, shareholders or directors that are affiliated with any other contractor and/or supplier:

11. Identify all persons having final bidding authority and/or the Chief Estimator:

12. Give names and complete addresses of three (3) major material suppliers and/or subcontractors with whom your firm has done business in the past 3 years:

13. List the names and addresses of the following:

Bank:

Amount of Letter of Credit:

Bonding Co. and limit (Please specify per project and aggregate limits):

Bonding Agent:

Liability Insurance:

Name of Carrier:

Limits of Liability:

Worker's Compensation:

Name of Carrier:

14. Does the organization have a company safety program, such as, YES / NO
a currently approved VOSHA plan in place?

If so, briefly describe:

15. List the average wages and benefits paid by the organization over the past year for the skills, trades and job classifications intended to be employed for the contract (s) under consideration in this pre-qualification:

<u>Job Title</u>	<u>Hourly wages</u>	<u>Health Insurance</u>
<u>CARPENTER</u>		
<u>ELECTRICIAN</u>		
<u>PAINTERS</u>		
<u>PIPEFITTERS</u>		
<u>PLUMBERS</u>		
<u>ROOFERS</u>		
<u>POWER EQUIPMENT OPERATORS</u>		
<u>TRUCKER DRIVERS</u>		
<u>LABORERS</u>		
<u>OTHERS</u>		

16. List specific projects which your organization has completed in the last five years (Attach additional sheet if required):

<u>Contract Amount</u>	<u>Type of Work</u>	<u>% of Subcontract</u>	<u>When Completed</u>	<u>Location</u>	<u>Name, Address and Telephone of Owner</u>

17. List all field supervisory personnel and indicate their construction experience:

<u>Name</u>	<u>Present Position or Office</u>	<u>No. of Years With this Firm</u>	<u>Construction Experience</u>	<u>Magnitude and Type of Work</u>	<u>In what Capacity</u>

18. Is your firm pre-qualified by the State of Vermont?

YES / NO

If so, please state rating and type of work qualified to perform:

RATING

TYPE OF WORK

Experience and Work Preference

In the following tabulation indicate the various types of work in which you are experienced and for which you desire to be qualified:

Bridge Construction	_____	Bridge Rehabilitation	_____
Railroad Signals	_____	Roads Culverts	_____
Building Construction	_____	Building Demolition	_____
Surface Rehabilitation	_____	Maintenance	_____
Tank Removal/Replacement	_____	Foundation	_____
Guard Rail, Fencing & Signs	_____	Hazardous Material Removal	_____
Construction &	_____	Landscaping	_____
Rehabilitation	_____	Pavement Markings	_____
Traffic Signals & Lighting	_____	Water & Sewer	_____
Road Construction	_____	Other (as specified)	_____

19. Financial Capability.

The City reserves the right to request additional information if necessary to establish financial capability.

2019 CITY OF BURLINGTON HOLIDAYS



HUMAN RESOURCES DEPARTMENT

City of Burlington

200 Church Street, Suite 102, Burlington, VT 05401

Voice (802) 865-7145

Fax (802) 864-1777

Vermont Relay: 7-1-1 or 800-253-0191

CITY OF BURLINGTON HOLIDAYS – 2019

NEW YEAR'S DAY	TUESDAY, JANUARY 1, 2019
MARTIN LUTHER KING, JR. DAY	MONDAY, JANUARY 21, 2019
PRESIDENTS' DAY	MONDAY, FEBRUARY 18, 2019
TOWN MEETING DAY	TUESDAY, MARCH 5, 2019
MEMORIAL DAY	MONDAY, MAY 27, 2019
INDEPENDENCE DAY	THURSDAY, JULY 4, 2019
BENNINGTON BATTLE DAY	FRIDAY, AUGUST 16, 2019
LABOR DAY	MONDAY, SEPTEMBER 2, 2019
COLUMBUS DAY	MONDAY, OCTOBER 14, 2019
VETERANS DAY (observed)	MONDAY, NOVEMBER 11, 2019
THANKSGIVING DAY	THURSDAY, NOVEMBER 28, 2019
CHRISTMAS DAY	WEDNESDAY, DECEMBER 25, 2019

IN ADDITION:

- * One Floating Holiday Per Fiscal Year.
- * The day after Thanksgiving shall be a Limited Service Day. A Limited Service Day shall be defined as a day that all City offices are open and all City services are provided. Department Heads shall ensure minimum staffing is available to carry out necessary functions. Employees required to work a Limited Service Day shall be entitled to another day off, which shall be taken during the fiscal year in which it is earned or it will be forfeited.

The City of Burlington will not tolerate unlawful harassment or discrimination on the basis of political or religious affiliation, race, color, national origin, place of birth, ancestry, age, sex, sexual orientation, gender identity, marital status, veteran status, disability, HIV positive status or genetic information.

The City is also committed to providing proper access to services, facilities, and employment opportunities. For accessibility information or alternative formats, please contact Human Resources Department at 865-7145.

EPSC REQUIREMENTS AND SMALL PROJECTS APPLICATION

Street Paving Program Erosion Prevention and Sediment Control Guidelines

Required:

- The Contractor shall be required to file a Small Project Erosion and Sediment Control Plan for the overall street list identifying BMPs, phasing etc. that will be put in place to minimize discharge of sediment, gravel, asphalt grindings or new asphalt to downstream streets and our collection system.
 - This EPSC shall be accompanied with a table listing:
 - Streets that are being reclaimed vs. mill and fill
 - Steeper streets (> 5%) vs. flatter streets
 - These considerations should be used to identify where additional EPSC measures or phasing should apply, i.e. Steeper streets need to receive base course ASAP vs. leaving open for long time; need to identify, protect and monitor CBs downstream of reclaimed streets since structures on the project street are covered.
 - The EPSC should name the On-Site Erosion Plan Coordinator who is the individual responsible for ensuring and documenting compliance with the EPSC Plan.
 - There should be a daily log on which inspection and compliance of each of the BMPs is documented:
 - Protection of downgradient structures
 - Sweeping effectiveness
 - Phasing (i.e. how long mobile particles have been exposed)
 - Retrieval of asphalt piles from green belt
 - Inspection of any structures for material deposited from the project and action taken (vactored by contractor)
 - Best Management Practices (BMPs)
 - For reclaimed streets where structures will be covered, the on-site plan EPSC coordinator needs to identify possibly susceptible structures down gradient and monitor the paving project site for discharge to these structures. Catch basin protection should be considered (dandy bags, non-woven geotextile or other proprietary devices are acceptable) to minimize amount of material deposited in structures, but these MUST be monitored and be able to be removed or modified during larger, extreme storm events such that flooding does not occur due to reduced flow capacity.
 - Need to do high level of service for sweeping grindings (it is not acceptable to leave a berm of grindings in the gutter line)
 - Need to inspect CB's/structures for asphalt grindings and sediment that has entered our structures and make provisions for vactoring by contractor.



Small Project Erosion Prevention & Sediment Control Plan

This questionnaire, at a minimum, is required to accompany all zoning or building permit applications which involve 400 sq. ft. or more of land disturbance. Please also provide a simple site plan indicating the locations of all erosion prevention and sediment control measures (silt fence, hay bales etc). Properties with greater than 2500 sq. ft. of total impervious surfaces, that are adding more impervious, will also be required to comply with additional long term stormwater management requirements.

1. Project Location _____

2. Brief Project Description (i.e. house foundation, swimming pool)

3. Owner Name: _____

4. Owner Mailing Address: _____

5. Owner Phone: _____ 6. Owner email: _____

7. Contractor Name: _____

8. Contractor Phone: _____ 9. Contractor Email: _____

10. Estimated Project Start Date _____ Estimated End Date _____

11. Area of Land Disturbance _____ sq. ft.

12. Total proposed (existing + new) amount of impervious: _____ sq. ft.

13. Estimated distance in feet from disturbance to nearest:

- a. City Sidewalk or Street _____ ft
- b. Drainage Ditch _____ ft
- c. Catch Basin (storm drain) _____ ft
- d. Lake/River/Stream _____ ft

14. Site plan/sketch MUST BE ATTACHED showing the following:

- Limits of disturbance
- Direction of stormwater flow on site
- Location of stockpiles (if any)
- Location of sediment control BMP's (silt fence etc.)

EPSC QUESTIONNAIRE (See last page for typical solutions to these questions)

A) Nature of all site disturbances (check all that apply):

- Underground utility trench(es)
- curb cut/driveway
- foundation
- cut/fill/regrading
- landscaping
- other _____

B) Do you anticipate the need for any dewatering of excavations during the construction? Yes No

- If yes, how will the pumped water be managed or filtered to prevent the discharge of dirty water?

C) Will excavated soil be stockpiled on the site? Yes No

- If yes, how long will the stockpile be on site? (i.e. 1 day, 1 week) _____

How do you propose to control erosion of the stockpile? _____

- If no, where is the ultimate disposal of excess soil? _____

D) How do you propose to prevent sediment from leaving the site and entering nearby city sidewalks/streets and storm drains and/or lakes, rivers and streams? (see page 4 for examples)

E) Do you plan to park construction vehicles on or disturb City owned property like the greenbelt area? Yes No

- If yes, tell us how you agree to repair all disturbances or damage to City owned property and provide a written approval from the City allowing construction vehicles to park on City owned property.

- If no, then please monitor all construction and visitor vehicles and advise all not to park on City owned property.

F) How do you propose to either prevent or clean sediment generated from construction vehicles and activities that becomes deposited on City streets, sidewalks, or bikepaths and how frequently this will be done.

G) Will stockpiles or disturbed soils be present and/or exposed after Nov. 1st of any construction year? Yes No

- If yes, tell us how you plan to stabilize any stockpile and/or disturbed soils.

Do you agree to abide by the following conditions?

Y N Applicant will call 540-1748 or email mmoir@burlingtonvt.gov at least 24 hours prior to initiating earth disturbance and submit the name and contact (cell phone and email) of the erosion control coordinator for the project

Y N Applicant will post the notice in a visible location

Y N I acknowledge that it is the responsibility of the owner and his/her representatives to ensure that:

- sediment does not enter surface water bodies (streams, ditches, ponds, lakes, wetlands etc.)

- sediment does not enter City conveyance infrastructure (catch basins, sewers etc.) and

- All sediment must be removed from the city ROW (sidewalks and roadways) by the end of each work day.

Y N Sediment control measures will be installed prior to the initiation of earth disturbance.

- Y N During the non-winter construction season (April 15 – November 1): After an initial 14 day period of initial disturbance, temporary or permanent stabilization (mulching, erosion control matting or tarps for stockpiles, or other approved method) of exposed areas and stockpiles will occur at the end of each work day unless:
 - Earthwork is to continue in the area within the next 24 hours and there is NO liquid precipitation forecast for the next 24 hours; or
 - If work is occurring in a self contained excavation (no outlet) with a depth of 2 feet or greater (e.g. house foundation excavation or utility trenches).
- Y N During the winter construction period from November 1 to April 15, any new disturbance must be temporarily or permanently stabilized (mulching, erosion control matting or tarps for stockpiles, or other approved method) will occur at the end of each work day unless:
 - Earthwork is to continue in the area within the next 24 hours and there is NO liquid precipitation forecast for the next 24 hours; or
 - If work is occurring in a self-contained excavation (no outlet) with a depth of 2 feet or greater (e.g. house foundation excavation or utility trenches)
- Y N The perimeter of the site and all BMPs will be inspected at the end of each workday to ensure that sediment will not leave the site. If sediment has travelled beyond the site boundary, it shall be swept up or otherwise removed and deposited on-site in an upgradient area at the end of each work day.
- Y N The owner and his/her representatives shall abide by the best management practices (BMPs) indicated in this plan and conditions and in the Vermont DEC Low Risk Site Handbook for Erosion Prevention and Sediment Control (2006). Contact 802-540-1748 for a hard copy or go to the web:
http://vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf
- Y N If soils will be exposed after November 1st and winter construction has not been permitted the project will notify DPW prior to October 15th. If the project is completed during the winter months, an additional inspection will be required to ensure that the site is buttoned up for the winter.
- Y N Within 48 hours of reaching final grading, the exposed soil will be seeded and mulched or covered with erosion control matting (for slopes steeper than 3:1 or high wind prone areas). Erosion control matting is preferred.
- Y N The owner will contact DPW to schedule a stabilization inspection when site work is finished and stabilization measures (seeding and mulching or matting) have been installed.

AGREEMENT

By filling out and signing this plan, I agree to abide by the terms and conditions outlined above. Failure to follow this plan can result in a stop work order by the City of Burlington, fines, or both.

By: Owner Contractor Architect/Engineer

Name

Signature

Date

Additional Conditions of Approval:

Required Compliance Items:

- Notification of start/identification of EPSC responsible party
- Winter Stabilization Inspection (if applicable)
- Final Stabilization

AN EROSION PREVENTION AND SEDIMENT CONTROL PLAN

FOR THE PROJECT AT:

HAS BEEN FILED WITH THE CITY OF BURLINGTON
STORMWATER MANAGEMENT PROGRAM IN ACCORDANCE
WITH CHAPTER 26 OF THE BURLINGTON CODE OF ORDINANCES

THIS REQUIRES THAT MEASURES BE INSTALLED OR TAKEN TO
PREVENT SEDIMENT FROM LEAVING THE SITE AND ENTERING
WATERWAYS AND IMPACTING CITY INFRASTRUCTURE
(RIGHT OF WAY AND STORMDRAINS)

FOR QUESTIONS OR TO REPORT SEDIMENT LEAVING THE SITE
CALL 802-540-1748

This notice to be posted in full view at all times during earth
disturbance. Additional conditions on attached.

Plan Approved by: _____ Date: _____

Burlington Stormwater Program

TYPICAL SOLUTIONS TO PREVENT OR CONTROL SEDIMENT AND EROSION

STOCKPILES

- Cover small stockpiles with a tarp when not being used.
- Install silt fencing or other appropriate devices around the stockpiles to filter sediment.
- Cover stockpiles with straw or other approved mulching material.
- Plan to remove any unusable material as soon as possible from the site to an approved location.
- Plant grass and mulch stockpiles that will be on site for more than 14 days.
- Cover, vegetate or install erosion matting on stockpiles that will remain disturbed over the winter.

DISTURBED AREAS

- Maintain vegetated buffers around disturbed areas.
- Install silt fencing or other appropriate device to filter sediment washing off from disturbed areas. Remember that the bottom of the silt fence must be “keyed in” (dug into ground) to work correctly.
- To prevent sediment from running off your site via your driveway (or other paved areas where you can’t install silt fence) use a row of hay bales or tube sand.
- Cover disturbed areas as soon as possible with straw or other approved mulching material. Use erosion control matting in high wind, traffic or slopes steeper than 3:1 (horizontal to vertical), and follow the manufacturer’s guidelines staple the matting down.
- Plant grass and mulch or use erosion control matting all disturbed areas that will remain exposed for more than 14 days.
- Cover, vegetate or install erosion matting on areas that will remain disturbed over the winter.
- Protect ditches, catch basins or water bodies off-site by using silt fencing, gravel check dams or other approved sediment control methods.

CONSTRUCTION VEHICLES

- Do not park construction vehicles on City owned green space. Vehicles disturb vegetation and compact the soil, thereby reducing its ability to infiltrate stormwater. Any green belt disturbance will need to be permanently stabilized with grass seed and erosion control matting.
- Prevent sediment from leaving the project by cleaning the tires of vehicles, or use clean gravel at project access points to clean tires.
- Sweep city streets, sidewalks and bikepaths daily or as needed to remove sediment transported from the project.

RESOURCES

The Vermont Handbook for Erosion Prevention and Sediment Control at:

http://vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf

The City of Burlington Stormwater Program Page at

<http://www.dpw.ci.burlington.vt.us/stormwater/>

The City of Burlington Conservation Board Stormwater and Erosion Control Fact sheet at

<http://www.ci.burlington.vt.us/planning/cb/stormwater/management.html>