

REQUEST FOR RESPONSE

BID #5546

**NORTH MEADOW & SOUTH MEADOW PUMP STATIONS
TRASH RACK REPLACEMENT
HARTFORD, CONNECTICUT**



City of Hartford
Procurement Services Unit
550 Main Street
Hartford, CT 06103

DEADLINE: Tuesday, July 15, 2014 2:00pm

Susan Sheppard
Procurement Specialist
860-757-9616
SMSHEPPARD@HARTFORD.GOV

STANDARD INSTRUCTIONS:

- **Questions & Addenda**

- Questions related to this project must be submitted via email to the buyer referenced on the Invitation to respond within seventy-two (72) hours in advance of the response submittal deadline. Responses to such questions will be posted electronically on the DAS website within twenty-four (24) hours of the response submittal deadline. Respondents are responsible for obtaining all addenda related to this RFR and thus advised to check for any addenda a minimum of twenty-four (24) hours in advance of the response deadline.

- **Taxpayer's Identification Number**

- Respondents must provide their Taxpayer Identification number on the response form (Tax ID#). Award recipients, whether an individual, proprietor, partnership or a non-profit corporation or organization must file the Internal Revenue Service Form W-9, Request for Taxpayer Identification Number and Certification with the City.

- **Responsible Candidate**

- Respondent must not have any delinquent taxes or financial obligations due
- Respondent must execute an affidavit to comply with all federal and state requirements
- Respondent must be certified as an Equal Opportunity Employer

- **Calendar days allowed for contract work / Substantial completion date:**

260

- **Liquidated damages for late completion:**

\$1000/DAY

- **Bid Bond / Performance & Payment bonds (*required if checked on invitation to respond*)**

- 10% bid bond, cashiers or certified check with your response. The City of Hartford provides contractors with the option of submitting an electronic Bid Bond through the Surety2000 website. Surety 2000 is an Internet-based surety processing, verification and security system, developed in cooperation with the surety industry. You may contact Surety 2000 at 1-800-660-3263 or www.surety2000.com, for more information.
- Performance and payment bonds for 100% of the project upon award if the contract value exceeds \$50,000.00.

- **DAS prequalification program (*construction / infrastructure projects only*)**

- The DAS Contractor Prequalification Program, Connecticut General Statutes Section 4a-100, requires all contractors to prequalify "before they can bid on any construction, alteration, remodeling, repair or demolition of any public building (does not apply to road construction), for work by the state or a municipality, estimated to cost more than \$500,000 and which is funded in whole or in part with state funds. "

- **Drawings (*construction / infrastructure projects only*)**

- Drawings are available from Merritt Graphics' PlanWell site located at <http://www.merrittgraphics.com> . Click on the PlanWell link, select "Public Plan Room" and select this project. You can also contact Merritt Graphics at 800-344-4477. Fees to purchase sets are non-refundable.

- **In addition to your hand delivered response, submit #**

hard-copies to:

- Hartford City Hall, Procurement Services, 550 Main Street, Room 100, Hartford, CT 06103

Updated 8/10/12



INVITATION TO RESPOND

Dear Sir/Madam:

The City of Hartford (the City) invites responses for:

RFR #: 5546	SOLICITATION DATE: June 12, 2014
SOLICITATION TITLE: North Meadow & South Meadow Pump Stations Trash Rack Replacement, Hartford Levee System	
SOLICITATION DESCRIPTION: Replacement of North Meadow and South Meadow pump stations Trash Rack.	
SITE LOCATION (if applicable): Hartford Levee System, Hartford, Connecticut.	
RESPONSE DATE : July 15, 2014	RESPONSE TIME: 2:00 p.m.
DEPT. ASSIGNED CONTRACT #: DPW #14-42	EST. COST OF CONSTRUCTION: \$1,200,000.00

A PRE-BID / RESPONSE CONFERENCE HAS BEEN SCHEDULED FOR Tuesday, June 25, 2014 AT 11:00 am 1010 Wethersfield Avenue
 (Date / Time) Rear (Location)

This pre-bid conference is: **Not Applicable**
 Mandatory (All prospective bidders are REQUIRED to attend to discuss specifications)
 Non-mandatory (All prospective bidders are encouraged to attend to discuss specifications)

This solicitation contains the following sections:

Invitation to Respond

Standard Instructions

Project Site Location – (for construction projects only)

Table of Contents – (for construction projects only)

Section 1 – Response Forms

1.1 Response Information & Signature Form

Contract Compliance

- Affirmative Action / Equal Employment Opportunity Requirements – See Section 3.6
- Surety Bond Requirements Bid Bond Performance & Payment Bonds
- Insurance Requirements – see exhibits below
- Set Aside – Ord. Section 2-660 MWBE Small Contractor
- City-Based Small Business Bid Preference – Ord. Section 2-661
- 15% Minority Utilization (City of Hartford Certified MWBE) – Ord. Section 2-682
- State of Connecticut DAS Prequalification (Public Construction Project > \$500,000)
- OSHA Compliance (Public Works Project > \$100,000)
- Wage Requirements – Complete & attach Wage Certification Form

1.2 Response Pricing

1.3 Statement of Qualifications

1.4 Subcontractor Information

Section 2 – Specifications/Scope of Services

Special Instructions / Conditions included

Section 3 – General Information for Preparation and Delivery of a Response

Section 4 – Terms and Conditions / Labor Compliance

Exhibits

Plans & Drawings included

Sincerely,

Susan Sheppard

Procurement Specialist

860-757-9616

SMSHEPPARD@HARTFORD.GOV

**Hartford Affirmative Action Plan (HAAP) /
Equal Employment Opportunity
Agreement & Affidavit**

Project # & Title: _____

Each contractor, subcontractor and supplier subject to the provisions of Article XII, Section 2-680, et seq. of the Hartford Municipal Code, must execute this Agreement & Affidavit, prior to the execution of any binding agreements with the City of Hartford. This agreement shall form a part of and be deemed attached to all contracts or purchase orders between the City of Hartford (the City) or it's Agent and the undersigned.

During the performance of this contract, the Contractor agrees to comply with the following:

1. Each Contractor will comply with all provisions of Executive Order No. 11246, Executive Order No. 11375 and Executive Order No. 11063, Connecticut Fair Employment Act, the Vocational Rehabilitation Act of 1973, including all standards and regulations which are promulgated by the government authorities which established such acts in said requirements, and all standards, and regulations incorporated herein by reference.
2. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, age, sex or national origin or physical or mental handicap, religion and sexual orientation. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated, during employment, without regard to their race, creed, color, age, sex, national origin or physical or mental handicap, religion and sexual orientation. Such actions shall include, but not be limited to, the following Employment, Upgrading, Promotion, Demotion, or Transfer, Recruitment or Recruitment Advertising, Layoff, or Termination; Rates of Pay or other forms of compensation; and Selection for Training, including Apprenticeship.
3. The Contractor will designate a person to handle affirmative action matters for the company who will have the responsibility for assuring compliance.
4. The Contractor will submit their company's written Affirmative Action / EEO policy statement to the City of Hartford as part of the EEO Certification.
5. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive considerations for employment without regard to race, creed, color, age, sex, national origin or physical or mental handicap, religion and sexual orientation.
6. Contractor certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control, where segregated facilities are maintained. As used in this Agreement, the terms "segregated facilities" means any waiting rooms, work areas, restrooms, and wash rooms, restaurants, and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, creed, color, age, national origin or physical or mental handicap, religion and sexual orientation because of habit, local custom otherwise.
7. The contractor shall comply with the City of Hartford's "Ban the Box" Ordinance sections 2-785 to 2-793, which prohibits discrimination in hiring policies against persons previously convicted and provides a mechanism to ensure that persons and businesses supplying goods and/or services to the City of Hartford have adopted and employ fair hiring policies and practices that are consistent with the City's goal of removing obstacles to the employment of persons with prior convictions. Furthermore, job applications shall not contain a "checkbox" or inquiry regarding a job applicant's prior convictions and applicant's criminal record shall not be revealed to the individuals who are making the hiring decision until a conditional offer of employment has been made. Rejection of an applicant shall only be considered lawful if the contents of the criminal record have a direct bearing on the nature of employment or the offer of employment would violate state or federal law.
8. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or workers' representative of the contractor's commitments.

9. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the compliance officer setting forth the provisions of this nondiscrimination clause.
10. The Contractor will furnish and submit all documents, information and reports required by the City of Hartford, Executive Order No. 11246, as amended, the Vocational Rehabilitation Act of 1973, and by the rules, regulations and orders of the Secretary of Labor, pursuant thereto, and will permit access to their books, records and accounts by the Contracting Agency, the City and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders. Contractor further agrees to submit periodic reports of employment and subcontracting practices in such a form, in such a manner and at such time as required by the City of Hartford. All records must be retained for a period of 3 years following the completion of work and shall be available at reasonable times and places for inspection by authorized representative of the City. The contractor will also permit its employees to participate in on-site interviews conducted by City staff for the purpose of assuring wage compliance.
11. The Contractor will include the provisions of paragraphs (1) through (10) in every subcontract or purchase order and it is the responsibility of the contractor to assure subcontractor compliance with all of the above terms. These provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Owner may direct as a means of enforcing such provisions.
12. The Contractor shall set aside 15% of the total project costs for certified Minority & Women Business Enterprises.
13. Prior to awards of subcontractors or purchase orders for this work, the Contractor will conduct informal meetings with interested MBE/WBE suppliers and contractors for the scope of the work to be awarded. Contractor will inform associations and consortia of minority and female contractors of bid specifications well in advance of the closing date for bid submission. Contractors and subcontractors must document and maintain records of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations. Copies of MBE/WBE contracts must be provided to the City prior to the execution of contract with the City.
14. The Contractor assures that no less than 15% of the total project work hours, by trade, will be worked by minority trades-workers.
15. The Contractor assures that no less than 30% of the total project work hours will be worked by Hartford Residents.
16. The Contractor will contact the business agent for the labor unions with whom he has an agreement and request minority persons and Hartford residents be referred for work on this project.
17. The Contractor and its subcontractors shall notify the City of Hartford of all job openings located within the Hartford Labor Market Area and shall require their subcontractors or vendors to advise the Contract Compliance Officer as to the opportunities for employment within the vendor's or subcontractor's organization, for the duration of this project. Notification of job openings shall include criteria and minimum qualifications, rates of pay, hours of work, duration of employment, work to be performed, job skills and type of training required for each position.
18. The Contractor shall make all good faith efforts to comply with the Affirmative Action goals of the City by consulting with the City of Hartford's Contract Compliance Manager, regarding specific affirmative steps to undertake and by maintaining documentation of all communication, advertising, recruiting and training efforts. The contractor shall notify the City of Hartford immediately shall any problems arise in meeting any of these requirements.
19. In the event of the Contractor's noncompliance with the nondiscrimination and equal employment clauses of this contract, this contract may be canceled, terminated or suspended, in whole or in part, without penalty to the City or its Agent.

My organization hereby agrees to comply with all the terms noted above in the Hartford Affirmative Action Plan / Equal Employment Opportunity Agreement.

(Signature of authorized agent)

(Date)

Project # & Title: _____

AFFIDAVIT FOR BECOMING SIGNATORY TO THE "HARTFORD AFFIRMATIVE ACTION PLAN"

I, _____, being duly sworn do depose and say:
(Insert name and title of authorized agent)

1. I am an official of the following organization and I am authorized to submit this affidavit for and on behalf of my organization, thereby binding it to the terms and statements contained herein.
2. My organization hereby acknowledges its agreement with the intent; purpose and scope of the Hartford Affirmative Action Plan adopted pursuant to Section 2-680 et seq. of the Municipal Code of the City of Hartford, and will make all good faith efforts to comply with its provisions.
3. My organization hereby agrees and certifies as a condition of participating on construction projects of the City of Hartford that it will not practice discrimination in regard to minority group individuals and women and will eliminate any continuing effects, if any, of past discrimination.
4. My organization does not discriminate against persons previously convicted and has adopted policies that employ fair hiring policies and practices that are consistent with the City of Hartford's goal of removing obstacles to the employment of persons with prior convictions.
5. My organization hereby agrees to comply with the contractual responsibilities regarding Minority Business Utilization, Minority & Female trades-worker participation and Hartford Residency requirements of City of Hartford.

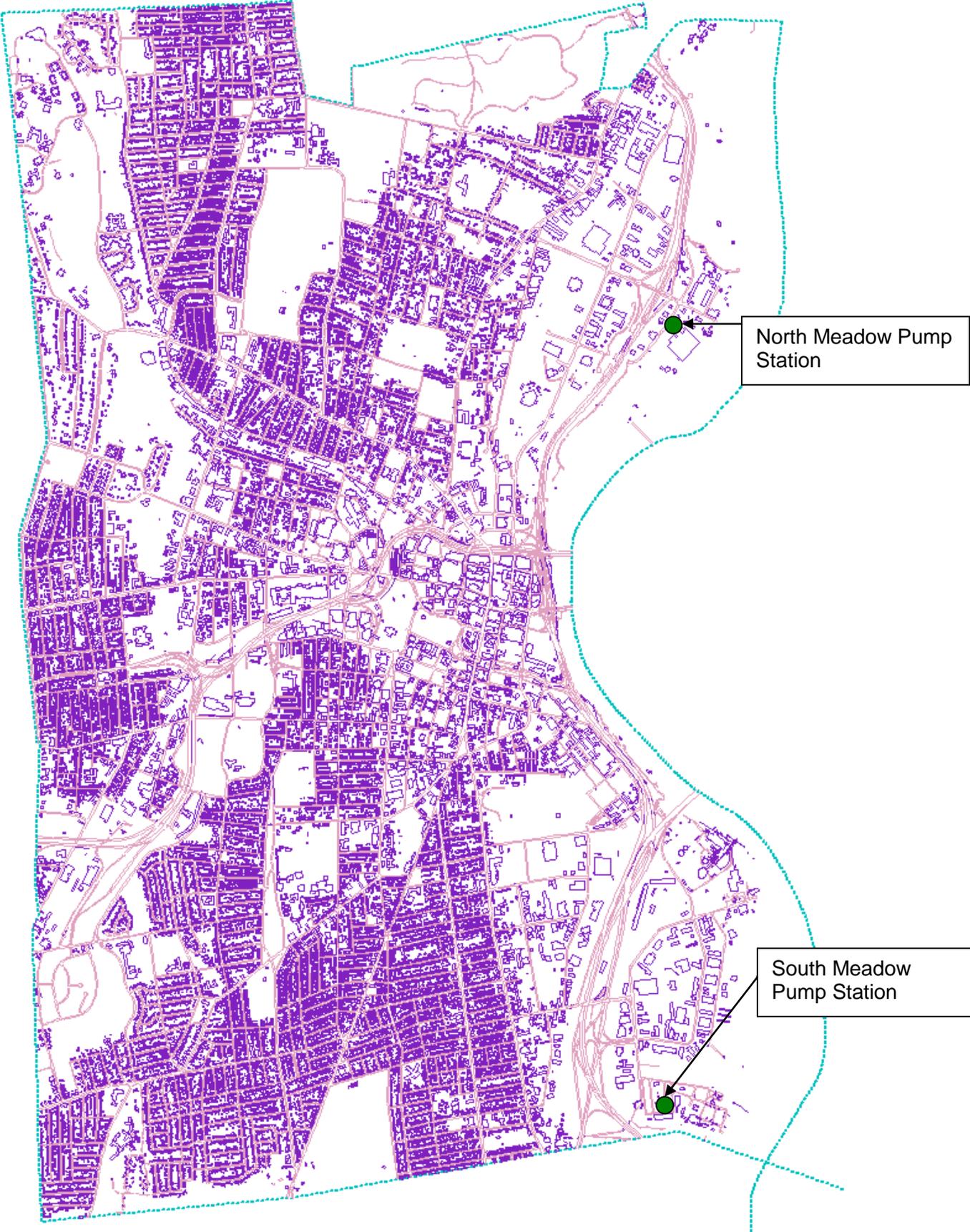
(Insert name of company)

(Signature of authorized agent)

Subscribed to and sworn to before me this _____ day of _____, 20_____

(Check appropriate box) _____
() Commissioner of Superior Court

() Notary Public, my commission expires:



North Meadow Pump Station

South Meadow Pump Station

Invitation To Respond

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CD-501		Site Details
CD-502		Site Details

Invitation To Respond

Section 1 RESPONSE FORMS

1.1 RESPONSE INFORMATION & SIGNATURE FORM

Vendor Name -				
Trade Name -				
Address -				
Phone # -		Fax # -		Email Address -
Contact Person -			Tax ID# -	
Delivery / Service Start Date:			# Calendar days after receipt of executed contract:	
Bid Surety - 10%	For electronic bonds enter bond number, otherwise check the appropriate box	Electronic Bond #	<input type="checkbox"/> Bond (hard copy)	<input type="checkbox"/> Cashiers / Certified Check
Cost of Performance Bond included in base bid (if applicable)			\$	Per thousand
EEO Certification Status (check one) See General Information for Preparing a Response paragraph 3.6.3			<input type="checkbox"/> Current & on file	<input type="checkbox"/> EEO form attached
DAS Prequalified Contractor? (non highway construction projects >\$500,000) http://das.ct.gov/cr1.aspx?page=10			<input type="checkbox"/> Certificate attached	<input type="checkbox"/> Update Statement attached
Insurance Agent Name		Phone #		
Insurance Agent Address				

Vendor acknowledges receipt of all addenda issued during the bidding period (if applicable) and understands that they are a part of the bidding documents.

The undersigned hereby declares that he/she or they are thoroughly familiar with the specifications, the various sites, the City's requirements, and the objectives for each element of the project item or service and understands that in signing this proposal all right to plead any misunderstanding regarding the same is waived. The undersigned further understands and agrees that he will furnish and provide all the necessary material, machinery, implements, tools, labor, services, and other items of whatever nature, and to do and perform all the work necessary under the aforesaid conditions, to carry out the contract and to accept in full compensation therefore the amount of the contract as agreed to by the Contractor and the City.

The undersigned hereby declares that no reason or persons other than those named herein are interested in this proposal, which is made without any connection with any other person or persons making any proposal for the same work and is in all respects fair and without collusion or fraud; that no person acting for or employed by the City of Hartford is directly or indirectly interested therein, or in the supplies or works to which it relates, or will receive any part of the profit or any commission there from in any manner which is unethical or contrary to the best interest of said City of Hartford.

The undersigned additionally declares that they are not debarred or suspended, or otherwise excluded from, or ineligible for, participation in City of Hartford, State of Connecticut or federally funded projects (Executive Order 12549).

The undersigned certifies under penalty of false statement that the information provided in this response is true.

Submitted by (<i>Signature</i>)		
Printed name and title		Date

(Authorized Agent of Company)

1.2 RESPONSE PRICING

Base or Lump Sum Bid and, if called for in the documents, Alternates and Unit Pricing

The City of Hartford is exempt from all sales and use tax; therefore bid prices shall not incorporate such taxes. Upon request by the successful respondent, a sales tax exemption certificate will be issued.

A. BASE BID / LUMP SUM and ALTERNATES

BASE BID / LUMP SUM as shown on the contract drawings & specifications (Including the Owner's Contingency Allowance of \$200,000.00)		\$
Bid in words (Including the Owner's Contingency Allowance of \$200,000.00)		
Alternate #1 Fabrication and Installation of Stainless Steel Trash Rack – South Meadow	\$	
Alternate #2 Fabrication and Installation of Galvanized Trash Rack – South Meadow	\$	
Alternate #3 Fabrication and Installation of Stainless Steel Trash Rack – North Meadow	\$	
Alternate #4 Fabrication and Installation of Galvanized Trash Rack – North Meadow	\$	

B. UNIT PRICES

ITEM NO.	APPROX. QTY	UNITS	DESCRIPTION AND WRITTEN UNIT PRICE	UNIT PRICE	AMOUNT
1	1	LS	Mobilization (to include all submittals) at _____ dollars and _____ cents per unit	\$_____	\$_____
2	1	LS	Demobilization at _____ dollars and _____ cents per unit	\$_____	\$_____
3	1	LS	Pond Drawdown – South Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Pond Drawdown at _____ dollars and _____ cents per unit	\$_____	\$_____
4	1	LS	Demolition – South Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Demolition of the trash rake, and trash rack at _____ dollars and _____ cents per unit	\$_____	\$_____

5	1	LS	<p>Concrete Rehabilitation – South Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Concrete Rehabilitation including selective demolition, forming, reinforcing steel, concrete placement and curing at</p> <p>_____ dollars and</p> <p>_____ cents</p> <p>per unit</p>	\$ _____	\$ _____
6	1	LS	<p>Furnish Trash Rake Assembly – South Meadow: Payment of the lump sum price for this item will constitute full compensation for engineering, fabrication and delivery of all materials related to Trash Rake Assembly at</p> <p>_____ dollars and</p> <p>_____ cents</p> <p>per unit</p>	\$ _____	\$ _____
7	1	LS	<p>Install Trash Rake Assembly – South Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, incidentals, disposal fees, and all other costs necessary to install the Trash Rake Assembly at</p> <p>_____ dollars and</p> <p>_____ cents</p> <p>per unit</p>	\$ _____	\$ _____
8	1	LS	<p>Site Improvements and Restoration – South Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Site Improvements and Restoration at</p> <p>_____ dollars and</p> <p>_____ cents</p> <p>per unit</p>	\$ _____	\$ _____

9	1	LS	Pond Drawdown – North Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Pond Drawdown at _____ dollars and _____ cents per unit	\$ _____	\$ _____
10	1	LS	Demolition – North Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Demolition of the trash rake, and trash rack at _____ dollars and _____ cents per unit	\$ _____	\$ _____
11	1	LS	Furnish Trash Rake Assembly – North Meadow: Payment of the lump sum price for this item will constitute full compensation for engineering, fabrication and delivery of all materials related to Trash Rake Assembly at _____ dollars and _____ cents per unit	\$ _____	\$ _____
12	1	LS	Install Trash Rake Assembly – North Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, incidentals, disposal fees, and all other costs necessary to install the Trash Rake Assembly at _____ dollars and _____ cents per unit	\$ _____	\$ _____

13	1	LS	Site Improvements and Restoration – North Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Site Improvements and Restoration at _____ dollars and _____ cents per unit	\$ _____	\$ _____
14	1	LS	Contingency Allowance (North Meadow) for Extra Work at _____ dollars and _____ cents per unit	\$100,000.00	\$100,000.00
15	1	LS	Contingency Allowance (South Meadow) for Extra Work at _____ dollars and _____ cents per unit	\$100,000.00	\$100,000.00
Total Base Bid					\$ _____

Alternates #1-2

ITEM	APPROX.	UNITS	DESCRIPTION AND WRITTEN	UNIT	AMOUNT
NO.	QTY		UNIT PRICE	PRICE	
1	1	LS	Fabrication and Installation of Stainless Steel Trash Rack – South Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Site Improvements and Restoration at _____ dollars and _____ cents per unit	\$ _____	\$ _____
2	1	LS	Fabrication and Installation of Galvanized Trash Rack – South Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Site Improvements and Restoration at _____ dollars and _____ cents per unit	\$ _____	\$ _____

Alternates #3-4

3	1	LS	<p>Fabrication and Installation of Stainless Steel Trash Rack – North Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Site Improvements and Restoration at</p> <p>_____ dollars and</p> <p>_____ cents</p> <p>per unit</p>	\$ _____	\$ _____
4	1	LS	<p>Fabrication and Installation of Galvanized Trash Rack – North Meadow: Payment of the lump sum price for this item will constitute full compensation for all labor, supervision, materials, equipment, submittals, incidentals, disposal fees, and all other costs necessary to complete all work for Site Improvements and Restoration at</p> <p>_____ dollars and</p> <p>_____ cents</p> <p>per unit</p>	\$ _____	\$ _____

1.3 STATEMENT OF QUALIFICATIONS

Please complete the following information. Failure to respond to all items may result in the rejection of your response.

1. Number of years in business - _____ D-U-N-S Number: _____

2. Number of personnel employed Part time - _____, Full time - _____,

3. List up to six past contracts of this type/size your firm has completed within the last three (3) years:

Project	Date	Contact Person	Phone No.

4. DAS CONTRACTOR PREQUALIFICATION <i>(required for construction / infrastructure projects only)</i> DAS prequalified? <input type="checkbox"/> Yes <input type="checkbox"/> No	You certify that there has been no substantial change in your financial position or corporate structure since your most recent prequalification certificate was issued or renewed, other than those changes noted in the update statement (attached).	YES	NO
		<input type="checkbox"/>	<input type="checkbox"/>

5. ORGANIZATIONAL STRUCTURE OF BUSINESS ENTITY (select one)	<input type="checkbox"/> General partnership (GP)
	<input type="checkbox"/> Limited partnership (LP)
	<input type="checkbox"/> Limited liability corporation (LLC)
	<input type="checkbox"/> Limited liability partnership (LLP)
	<input type="checkbox"/> Corporation
	<input type="checkbox"/> Individual doing business under a trade name (sole proprietor)
	<input type="checkbox"/> other (specify)

6. CITY OF HARTFORD TAX STATUS / OTHER FINANCIAL OBLIGATIONS	Hartford Businesses – All City of Hartford taxes & financial obligations (real, motor & personal property) are current and paid in full or subject to a current and approved payment plan. Please attach RFR Affidavit.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Non-Hartford Businesses - All City of Hartford financial obligations are current and paid in full or subject to a current and approved payment plan. Please attach RFR Affidavit.	Yes <input type="checkbox"/>	No <input type="checkbox"/>

7. STATUS OF THE BUSINESS AND ITS CURRENT STANDING WITH THE SECRETARY OF STATE'S OFFICE	Connecticut businesses - Are all required filings current with the Secretary of State and will the Secretary of State be able to issue a Certificate of Legal Existence?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Out-of –State (foreign) businesses – Have you filed a Certificate of Authority / Application of Registration with the Connecticut Secretary of State? If so, submit a copy of your filing with your response. If not, submit a copy of your Certificate of Good Standing from your state of incorporation.	Yes <input type="checkbox"/>	No <input type="checkbox"/>

8. Is your local organization an affiliate of a Parent company? If so, Indicate the principal place of business of the parent company and the name of agent for service.

Business Name	.		
Address	.		
City	.	State	.
Name of Agent	.		

9. List all Affiliated Businesses (attach additional sheets as necessary):

Business Name	Address	Ownership Interest %
.	.	.
.	.	.
.	.	.
.	.	.

10. Based on the organizational structure of your business, provide a current listing of all corporate officers, principals, general or managing partners, limited partners, managers and members. If sole proprietorship or general partnership, attach trade name certificate filed with the town clerks office.

11. Submit copies of all required business (trade & occupational) licenses with your response.

12. Your company may be asked to submit information relative to your company's financial statements and/or a Dun & Bradstreet report may be obtained prior to receiving an award. This information will be protected to the fullest extent required by law.

13. Additional information/documentation may be requested subsequent to your responding to this solicitation.

1.4 SUBCONTRACTOR UTILIZATION

Forms labeled Section 1.4 are provided below to accommodate the Base Bid (or Lump Sum) and alternates (if called for) in this Request for Response (RFR).

The information provided below applies to: (Check one box as appropriate)

Base Bid	Alternate 1	Alternate 2	Alternate 3	Alternate 4
<input type="checkbox"/>				

1.4 SUBCONTRACTOR UTILIZATION

If subcontractors are to be used, indicate the firm name, address, portion or section of work the subcontractor will be performing, the subcontract value, percentage of base bid and if the subcontractor is a City certified (MWBE).

Respondent agrees to subcontract the portion of the work stipulated below to (MWBE) businesses. A copy of the contract between the respondent and the subcontractor will be required prior to execution of contract.

Note: Connecticut General Statutes Section 4a-100, Prequalification now applies to subcontractors also.

Trade or Nature of Work	Business Name and Address	CITY OF HARTFORD CERTIFIED MWBE	% of Base Bid	Subcontract \$ Value
		<input type="checkbox"/>		
TOTAL SUBCONTRACT VALUE				
TOTAL (MWBE) SUBCONTRACT VALUE				

Subcontract % to total project %

MWBE Subcontract % to total project %

Additional information may be requested subsequent to your responding to this bid request.

The information provided below applies to: (Check one box as appropriate)

Base Bid	Alternate 1	Alternate 2	Alternate 3	Alternate 4
<input type="checkbox"/>				

1.4 SUBCONTRACTOR UTILIZATION

If subcontractors are to be used, indicate the firm name, address, portion or section of work the subcontractor will be performing, the subcontract value, percentage of base bid and if the subcontractor is a City certified (MWBE).

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Note: Connecticut General Statutes Section 4a-100, Prequalification now applies to subcontractors also.

Trade or Nature of Work	Business Name and Address	CITY OF HARTFORD CERTIFIED MWBE	% of Base Bid	Subcontract \$ Value
		<input type="checkbox"/>		
TOTAL SUBCONTRACT VALUE				
TOTAL (MWBE) SUBCONTRACT VALUE				

Subcontract % to total project %

MWBE Subcontract % to total project %

Additional information may be requested subsequent to your responding to this bid request.

The information provided below applies to: (Check one box as appropriate)

Base Bid	Alternate 1	Alternate 2	Alternate 3	Alternate 4
<input type="checkbox"/>				

1.4 SUBCONTRACTOR UTILIZATION

If subcontractors are to be used, indicate the firm name, address, portion or section of work the subcontractor will be performing, the subcontract value, percentage of base bid and if the subcontractor is a City certified (MWBE).

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Trade or Nature of Work	Business Name and Address	CITY OF HARTFORD CERTIFIED MWBE	% of Base Bid	Subcontract \$ Value
		<input type="checkbox"/>		
TOTAL SUBCONTRACT VALUE				
TOTAL (MWBE) SUBCONTRACT VALUE				

Subcontract % to total project %

MWBE Subcontract % to total project %

Additional information may be requested subsequent to your responding to this bid request.

The information provided below applies to: (Check one box as appropriate)

Base Bid	Alternate 1	Alternate 2	Alternate 3	Alternate 4
<input type="checkbox"/>				

1.4 SUBCONTRACTOR UTILIZATION

If subcontractors are to be used, indicate the firm name, address, portion or section of work the subcontractor will be performing, the subcontract value, percentage of base bid and if the subcontractor is a City certified (MWBE).

Respondent agrees to subcontract the portion of the work stipulated below to (MWBE) businesses. A copy of the contract between the respondent and the subcontractor will be required prior to execution of contract.

Note: Connecticut General Statutes Section 4a-100, Prequalification now applies to subcontractors also.

Trade or Nature of Work	Business Name and Address	CITY OF HARTFORD CERTIFIED MWBE	% of Base Bid	Subcontract \$ Value
		<input type="checkbox"/>		
TOTAL SUBCONTRACT VALUE				
TOTAL (MWBE) SUBCONTRACT VALUE				

Subcontract % to total project %

MWBE Subcontract % to total project

Additional information may be requested subsequent to your responding to this bid request.

SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Project consists of removal and replacement of the existing trash racks and trash rake assembly.

- 1. Project Location:

- a. North Meadows Pump Station

- 1) Leibert Road, Hartford, CT 06112

- b. South Meadows Pump Station

- 1) Near vicinity of 1010 Wethersfield Avenue, Hartford, CT 06112

- 2. Owner: City of Hartford

- B. Engineer Identification: The Contract Documents, dated June 2014, were prepared for Project by Fuss & O'Neill, Inc. 146 Hartford Road, Manchester, CT 06040..

- C. Project Directory

- 1. The Owner's Representative is:

- 2. P. Bob Umashanker,

- 3. Civil Engineer

- 4. City of Hartford

- 5. Department of Public Works

- 6. 50 Jennings Road

- 7. Hartford, Connecticut 06120

- 8. (860) 757-9985

- 9. The Engineer is:

- 10. Keith A. Bowman, P.E.

- 11. Fuss & O'Neill, Inc.

- 12. 146 Hartford Road

- 13. Manchester, CT 06040

14. (860) 646-2469, ext. 5502

1.3 BASIS OF SELECTION

- A. The City of Hartford shall select the lowest responsive, responsible bidder based on the sum total of base bid and all alternate bid items.
- B. The City of Hartford reserves the right to award the selected bidder all of the work, the base bid work without alternates, or only a portion of the base bid work, at its sole discretion.
- C. The Work includes the following.
 - 1. Removal and disposal of the trash rake systems at the North and South Meadows Pump Stations
 - 2. Removal and disposal of the trash racks for the suction intake at the North Meadows Pump Station and the gravity/suction intake at the South Meadows Pump Station
 - 3. Repair of concrete at the South Meadows Pumping Station intake structure
 - 4. Installation of trash racks for the suction intake at the North Meadows Pump Station and the gravity/suction intake at the South Meadows Pump Station
 - 5. Installation of trash rake systems at the North and South Meadows Pump Stations
 - 6. Installation of concrete foundations for the support of the trash rake systems at the North and South Meadows Pump Stations
 - 7. Installation of concrete dumpster pads at the North and South Meadows Pump Stations
 - 8. Installation of guardrails at the North and South Meadows Pump Stations
 - 9. Other miscellaneous and ancillary work identified in the contract documents.

1.4 CONTRACT

- A. Project will be constructed under a general construction contract.

1.5 ACCESS TO SITE

- A. Minimize damage to access routes, and restore damaged areas to their original condition or better.
- B. Remove and restore to original condition walls, fences, structures, utility lines, poles, guy wires, anchors, and other improvements required to be relocated for construction of the Work. Costs for such activity shall be borne by the Contractor unless otherwise indicated. Notify the Engineer, the Owner, and utilities of intended modification or disruption to their property prior to the start of construction and cooperate with them in the scheduling and performance of operations.

- C. If the Contractor, by direct negotiation and bargain with any land owner, lessee or tenant, has secured any right to use more space or greater privileges in the space provided by the Owner for purposes incidental to the performance of the Contract, upon request of the Engineer, furnish to the Engineer proper evidence that such additional rights have been properly secured and assurance that no damage to or claim upon the Owner or Engineer will arise there from. Neither the Owner nor the Engineer shall be liable in any way for any expense incurred by the Contractor in securing any such right to use additional property.
- D. The Contractor shall be responsible for and reimburse the Owner and others for any and all losses, damage or expense which the Owner or those others may suffer, either directly or indirectly or through any claims of any person or party, for any trespass outside the spaces and rights of way provided by the Owner to the Contractor or any violation or disregard of the terms and conditions established for the use or occupancy of those rights or for negligence in the exercise of those rights. The Owner may retain or deduct from any sum or sums due or to become due to the Contractor such amount or amounts as may be proper to insure the Owner against loss or expense by reason of the failure of the Contractor to observe the limits and conditions of the rights-of-way, rights-of-access, easements, etc., provided by the Owner

1.6 SITE CONDITIONS

- A. The underground utilities and structures at the site have been located primarily from information furnished by others and the locations as depicted on the Drawings are considered approximate as to size and location. There may be additional underground utilities and structures that are not shown on the Drawings. Locate all existing utilities and structures and protect same from damage or harm. Restore utilities interfered with or damaged, at the expense of the Contractor, and to the satisfaction of its Owner.
- B. Ensure that construction activities do not impact the activities or properties of the Owner and its agents without prior coordination and consent of these entities.

1.7 CALL BEFORE YOU DIG

- A. The Contractor shall be responsible for complying with all applicable Call Before You Dig Rules.
- B. Contact Call Before You Dig at 1-800-922-4455 at least 2 working days prior to the start of construction (excluding weekends and holidays), to mark out the utility locations.

1.8 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of

contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.9 STORAGE AND HANDLING OF MATERIALS

- A. At all times, handle and store materials and equipment to be incorporated in the work in a manner to prevent intrusion of foreign matter, warping, twisting, bending, breaking, and any injury, theft or damage of every description to the material or equipment.
- B. Upon delivery, promptly inspect shipments to assure that products comply with requirements, quantities are correct and products are undamaged. Packages, materials and equipment showing evidence of damage shall be rejected and replaced at no additional cost to the Owner.
- C. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Provide access to products during storage for inspection.
 1. If products are stored for an extended period of time, conduct periodic inspections to assure products are undamaged and are maintained under required conditions.
 2. Keep an inspection log indicating date and time of inspections. Note problems, if any.
- D. For exterior storage of fabricated products, place sloped supports beneath products to keep items from coming in contact with the ground. Cover products subject to deterioration with impervious sheet covering providing ventilation to avoid condensation.
- E. Store loose granular materials on solid surfaces in a well-drained area and prevent from mixing with foreign matter.

- F. Store excavated soils and other construction materials in non-wooded areas near excavations. Store synthetic materials off the ground (or otherwise) to prevent accumulation of dirt or grease, and in a position to prevent accumulation of standing water.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01140 - WORK RESTRICTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 USE OF SITE

- A. Limit use of site to work in areas indicated.
 - 1. Do not disturb portions of site beyond areas in which the Work is indicated.
- B. Do not dump any quantity of oil, chemicals, or other deleterious materials on the ground.
 - 1. Immediately inform the Engineer of any adverse impact or hazard to the environment, including any discharges, spillage, or loss of oil or petroleum or chemical liquids or solids.

1.3 WORK WITHIN WETLANDS AND WATERCOURSES

- A. Identification
 - 1. Wetlands: Area within the wetland lines as depicted on the Drawings.
 - 2. Watercourses: All intermittent streams, ditches, and swales, which are not lined with concrete, are identified as watercourses.
- B. Restrictions
 - 1. Do not store equipment or construction material, or discharge any material including without limitation, fill, construction materials or debris in any wetland or watercourse on or off site except as specifically indicated by these Contract Documents.
 - 2. Do not store any fuel or refuel any equipment within 25 feet of any wetland or watercourse.
 - 3. Separate staging and stockpile areas from wetlands and watercourses by silt fences and/or hay bales.
 - 4. Prevent pollution of wetlands and watercourses by use of the soil erosion and sediment controls shown on the Drawings and specified in Division 1 Section "Erosion and Sedimentation Control"

1.4 ARCHAEOLOGICAL FINDS

- A. Upon encountering any archaeological material, including but not limited to "charcoal", "bone", "shell", "cultural objects (fire cracked stones/stone flaking material)", "middens", or any other artifacts or related items of historical significance, immediately cease work and notify the Engineer and the Owner.

1.5 WORK TIMES

- A. Schedule work activities between 7:00 AM and 5:00 PM, Monday through Friday.
- B. The Owner may authorize work at other times at its sole discretion.
- C. The Owner anticipates issuing the Notice to Proceed after the Pre-Construction conference.
- D. Substantially complete work within 260 calendar days of receiving Notice to Proceed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Contingency allowances.
 - a. North Meadows Construction Area.
 - b. South Meadows Construction Area.
- C. Related Requirements:
 - 1. Division 1 Section "Unit Prices" for procedures for using unit prices.
 - 2. Division 1 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
 - 3. Divisions 2 through 16 Sections for items of Work covered by allowances.

1.3 SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Engineer for Owner's purposes and only as authorized by Change Orders that indicate amounts to be charged to the allowance.
- B. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins unless specified otherwise.
- C. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.6 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Base Bid Payment Item No. 14: Contingency Allowance (North Meadows): Include a contingency allowance of \$100,000.00 for use according to Owner's written instructions.
- B. Base Bid Payment Item No. 15: Contingency Allowance (South Meadows): Include a contingency allowance of \$100,000.00 for use according to Owner's written instructions.

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SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1 – Construction of Stainless Steel Trash Rack at South Meadow.
 - 1. The Work of this item shall be measured by the Contract lump sum price.
 - 2. Work associated with this item will be paid for at the Contract Lump Sum price and includes the following:
 - a. Stainless steel trash racks.
 - b. Stainless steel trash rack support rails.
 - 3. Work not associated with this item include:
 - a. Repairs and other modifications to the concrete channel walls and trash rack fasteners to existing construction.

- B. Alternate No. 2 – Construction of Galvanized Trash Rack at South Meadow.
 - 1. The Work of this item shall be measured by the Contract lump sum price.
 - 2. Work associated with this item will be paid for at the Contract Lump Sum price and includes the following:
 - a. Galvanized trash racks.
 - b. Galvanized trash rack support rails.
 - 3. Work not associated with this item include:
 - a. Repairs and other modifications to the concrete channel walls and trash rack fasteners to existing construction.

- C. Alternate No. 3 – Construction of Stainless Steel Trash Rack at North Meadow.
 - 1. The Work of this item shall be measured by the Contract lump sum price.
 - 2. Work associated with this item will be paid for at the Contract Lump Sum price and includes the following:
 - a. Stainless steel trash racks.
 - b. Stainless steel trash rack support rails.
 - 3. Work not associated with this item include:
 - a. Repairs and other modifications to the concrete channel walls and trash rack fasteners to existing construction.

- D. Alternate No. 4 – Construction of Galvanized Trash Rack at North Meadow.

1. The Work of this item shall be measured by the Contract lump sum price.
2. Work associated with this item will be paid for at the Contract Lump Sum price and includes the following:
 - a. Galvanized trash racks.
 - b. Galvanized trash rack support rails.
3. Work not associated with this item include:
 - a. Repairs and other modifications to the concrete channel walls and trash rack fasteners to existing construction.

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SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Requests for Information (RFIs).
 - 3. Project meetings.
- B. Related Requirements:
 - 1. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 2. Division 1 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and

telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Project closeout activities.

1.6 SUBMITTALS

A. Staff Names: Submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site at the preconstruction conference. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers.

B. Submit at Preconstruction Conference

1. Construction schedule.
2. Erosion and Sedimentation Control Plan.

3. Schedule of Values for Lump Sum pay items.
4. All Plans required by the Specifications (e.g. dewatering plan)

1.7 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.8 PROJECT MEETINGS

- A. General: Engineer will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Engineer will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
 2. Agenda: Engineer will prepare the meeting agenda and distribute the agenda to invited attendees.
 3. Minutes: Engineer will record significant discussions and agreements achieved, and distribute the meeting minutes to concerned parties, including Owner.
- A. Preconstruction Conference: Engineer will schedule a preconstruction conference before start of construction, at a time convenient to Owner, Contractor, and Engineer. Conference will be held at Project site or another convenient location. Meeting will be conducted to review responsibilities and personnel assignments.
 1. Execution of Owner-Contractor Agreement including executed bonds and insurance certificates may be completed immediately prior to pre-construction conference.
 2. Agenda: Perform Contract execution (if not previously completed), and discuss items of significance that could affect progress. Agenda includes the following:
 - a. Submittal of executed bonds and insurance certificates.
 - b. Execution of Owner-Contractor Agreement.
 - c. Tentative construction schedule.
 - d. Critical work sequencing.
 - e. Designation of responsible personnel.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for processing Applications for Payment.
 - h. Distribution of the Contract Documents.
 - i. Submittal procedures.
 - j. Preparation of Record Documents.
 - k. Responsibility for temporary facilities and controls.

- l. Parking availability.
 - m. Road closures and detours.
 - n. Office, work, and storage areas.
 - o. Equipment deliveries and priorities.
 - p. Progress cleaning.
 - q. Working hours.
 - r. Access to work site.
 - s. Erosion and Sedimentation control plan.
- B. Progress Meetings: Engineer will conduct progress meetings at regular intervals
1. Frequency: Meetings will be held weekly unless and until the Owner determines that less frequent meetings will satisfy project management and coordination needs.
 2. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity required to finalize discussions regarding current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

FUSS & O'NEILL
1997279.F54 / JULY 2014

NORTH MEADOW & SOUTH MEADOW PUMP STATIONS
TRASH RACK REPLACEMENT
HARTFORD, CONNECTICUT

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
 - 1. The requirements of this Section are general in nature and apply to all Sections. Additional submissions and requirements are contained in each Section. In each individual Section, no attempt was made to cover or repeat the submissions contained in this Section and, therefore, the total number of submissions required are the combination of those described in this Section plus those specified in the various other Sections.
 - 2. Additional submissions are required by the General and Supplementary Conditions including: Applications for Payment; requests for Change Orders; guarantees; permits; certifications; documents required by Federal, State and Local authorities; and submissions required by utility companies and other persons, firms or organizations.
- B. Related Requirements:
 - 1. Division 1 Section "Closeout Procedures" for submitting warranties and Project Record Documents.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Engineer's responsive action.
- B. Informational Submittals: Written information that does not require Engineer's approval. Submittals may be rejected for not complying with requirements.
- C. Certified Test Report: Reports written by a qualified testing agency or laboratory, on testing agency's standard form, indicating and interpreting results of tests of materials or products for compliance with requirements.
- D. Material or Product Certificate: A document certifying that the materials, components, and equipment furnished conform to the requirements.

- E. Product Data: Standard prepared data for manufactured products.
- F. Shop Drawings: Custom prepared data applicable to the Work.
- G. Samples: Physical examples of the Work.
- H. Addresses: Include mailing address, telephone number, facsimile number, and e-mail address.

1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.
- B. Method of Transmitting Submittals: Electronic transmission of submittals, including facsimile and e-mail, will not be allowed.
- C. Clarity: Provide neat, clean, and legible printed materials that can be easily reproduced by normal photocopying or blueprinting. Illegible submittals will be returned unreviewed.
- D. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- E. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Allow 10 business days for processing each resubmittal.
 - 4. No extension of the Contract Time or claims for delay will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- F. Identification: Place a permanent label or title block on each submittal for identification.

- G. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals. Provide list or narrative of deviations on Submittal Transmittal form.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return submittals, without review received from sources other than Contractor.
1. Transmittal Form: Use sample form at end of Section.
 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
- I. Destination: Send six copies of each submission to the Engineer at:
- Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040-5921
Attn: Keith A. Bowman, P.E.
- J. Distribution of Reviewed Submittals: Engineer will distribute reviewed submittals electronically to the Owner and Contractor, unless hard copies are specifically requested.
- K. Use for Construction: Use only final submittals with mark indicating action taken by Engineer in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. Submittal Schedule:
1. Within 10 business days after the effective date of the Agreement, submit a schedule listing dates for submission and review of shop drawings, project data, and samples needed for each item of Work. Submit in conjunction with Construction Schedule.
- B. Subcontractor List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.

3. Drawing number and detail references, as appropriate, covered by subcontract.

C. Construction Schedule:

1. Within 10 business days after the effective date of the Agreement, submit for Engineer's and Owner's information, a construction schedule showing in detail, the proposed sequence of the Work and the estimated start and end date for each stage of the Work. Prepare the schedule so that the actual progress of the Work can be recorded and compared with the expected progress. Coordinate the construction schedule with the proposed schedules of other contractors, if any, engaged in work at, or adjacent to, the Project site.
2. Prepare a bar chart construction schedule identifying major tasks and the associated time frame within which the task shall be completed for each pond. Tasks include:
 - a. Project start date.
 - b. Demolition of South Meadows trash racks and trash rake.
 - c. Construction of South Meadows concrete repairs.
 - d. Construction of South Meadows trash rake foundations.
 - e. Installation of South Meadows trash racks.
 - f. Installation of South Meadows trash rake.
 - g. Demolition of North Meadows trash rack and trash rake.
 - h. Construction of North Meadows trash rake foundations.
 - i. Installation of North Meadows trash racks.
 - j. Installation of North Meadows trash rake.
 - k. Other site improvements (ex. Guardrails, dumpster pad).
 - l. Site restoration.
 - m. Substantial and final completion dates.
3. Coordinate the Work and make every effort to maintain the construction schedule. In the event actual progress begins to lag the schedule, promptly employ additional means or methods of construction to make up lost time.
4. Keep construction schedule current and revise or confirm the schedule to accurately reflect the conditions of the Work, past progress, and anticipated future progress.

D. Schedule of Values:

1. Within 10 business days after the effective date of the Agreement, submit a Schedule of Values of the various portions of the Work, including quantities aggregating the total Contract Price, and supported by such data to substantiate its correctness as Engineer may require. Use the Schedule of Values only as a basis for Contractor's Periodic Estimate. No payments will be made until such Schedule has been submitted and accepted by Engineer.

2. On "unit price" items, the schedule of values shall contain unit prices for various stages of work, such as restoration of surfaces broken down into paved, unpaved, and other types of areas to be restored.
 3. On "per each" or "lump sum" items, break prices down sufficiently to provide a convenient and realistic means for determining the amount of work done during various stages of progress.
 4. Where prices are not broken down sufficiently to accurately determine the value of Work completed, Engineer will estimate the value of the Work completed and will deduct an amount so as to arrive at a conservative value which will allow Owner to easily complete the Work with the unpaid balance. When the required detail in the Schedule of Values is not provided, the Engineer will make the final determination.
- E. Certified Test Reports:
1. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
 2. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- F. Material or Product Certificates: Prepare written statements certifying that materials or products comply with the requirements.
1. Project to which material is consigned.
 2. Name of contractor receiving material.
 3. Item number and description of material.
 4. Quantity of material represented by the certificate.
 5. Means of identifying consignment including label, marking, or lot number.
 6. Date and method of shipment.
 7. Signature of Supplier's authorized agent.
 8. Notarization of certificate.
- G. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:

- a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Compliance with recognized trade association standards.
 - f. Compliance with recognized testing agency standards.
 - g. Notation of coordination requirements.
- H. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Shopwork manufacturing instructions.
 - e. Templates and patterns.
 - f. Schedules.
 - g. Design calculations.
 - h. Compliance with specified standards.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches.
- I. Samples: Prepare physical units of materials or products, including the following:
1. Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit paired units that show approximate limits of the variations.

2. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

2.2 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of engineers and owners, and other information specified. Submit applicable certificates as follows:
 1. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
 2. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- B. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- C. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- D. Test Results: Whenever tests are required on materials and equipment, such tests shall be performed and two copies of the test results submitted to Engineer. Do not deliver to the Project or incorporate into the Work any materials or equipment for which Engineer has not issued a written acceptance of the required tests and test results.
- E. Construction Photographs: Submit either 8"x10" prints or high resolution digital photographs saved to a compact disk (CD). All photographs should be labeled or submitted with an accompanying index showing date, location, and orientation of each photo. Make available for the Engineer's use at least bi-weekly during construction.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark each copy of each submittal with approval stamp before submitting to Engineer.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents. See attached Submittal Transmittal for sample of statement.

3.2 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
 - 1. Engineer may elect not to review partial or incomplete submittals and will return such submittals with no action taken.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. Furnish as Submitted: Submittal appears to conform to Contract Documents and Contractor may proceed with ordering and installation.
 - 2. Furnish as Noted: Same as "Furnish as Submitted" except that the Contractor must comply with modifications or notes added to the submittal by the Engineer.
 - 3. Rejected: Submittal must be revised and resubmitted.
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION

SUBMITTAL TRANSMITTAL

Date: _____

To: Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040
ATTN: Keith A. Bowman, P.E.

From:

PROJECT: _____ SUBMITTAL NO.: _____

(List Section No., Article No., Paragraph)
(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

MANUFACTURER / SUPPLIER

Name: _____
Address: _____
Telephone No.: _____ Facsimile No.: _____
For Additional Information, Contact _____
E-mail Address: _____

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY: _____
Signature: _____

Title: _____

FOR ENGINEER'S USE

SUBMITTAL PROCEDURES

FUSS & O'NEILL
1997279.F54 / JUNE 2014

NORTH MEADOW & SOUTH MEADOW PUMP STATIONS
TRASH RACK REPLACEMENT
HARTFORD, CONNECTICUT

(Submit on Contractor's letterhead)

-- SAMPLE --

MATERIALS CERTIFICATE

-- SAMPLE --

(Submit on Manufacturer's letterhead)

Date: _____

WE HEREBY CERTIFY THAT

(Description, Kind of Material, Product Name, Model No.)

FURNISHED TO

(Name of Contractor)

(Prime or Subcontractor)

FOR USE ON

(Project Name)

OWNER

(Project Owner)

IDENTIFIED BY:

(Label, Marking, Seal No., Consignment, or Waybill No.)

SHIPPED VIA:

(Method of Shipment, Car No., Truck No.)

SHIPPED ON:

DELIVERED ON: _____

MEETS THE REQUIREMENTS OF THE CONTRACT DOCUMENTS FOR THE SUBJECT PROJECT IN ALL RESPECTS. PROCESSING, PRODUCT TESTING AND INSPECTION CONTROL OF RAW MATERIALS ARE IN CONFORMANCE WITH APPLICABLE SPECIFICATIONS, DRAWINGS AND STANDARDS OF ARTICLES FURNISHED. ARTICLES FURNISHED COMPLY WITH THE FOLLOWING STANDARD SPECIFICATIONS:

All records and documents pertinent to this certificate and not submitted herewith will be maintained available by the undersigned for a period of not less than 3 years from the date of this certificate.

(Name of Manufacturer)

(Authorized Representative's Signature)

(Title)

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 2. Electric power service.
 - 3. Telephone service.
 - 4. Internet service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Project identification and temporary signs.
 - 2. Waste disposal facilities.
 - 3. Contractor and Engineer field offices.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary construction fence.
 - 2. Tree and plant protection.
 - 3. Barricades, warning signs, and lights.
- E. Related Sections include the following:
 - 1. Division 1 Section "Erosion and Sediment Control" for furnishing, placing, and maintaining sedimentation control measures

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Engineer and shall be included in the Work. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Owner.

2. Engineer.
 3. Testing agencies.
 4. Personnel of authorities having jurisdiction.
- B. Sewage Disposal Service: Pay sewage disposal service use charges for sewage disposal from Project site.
- C. Potable Water Service: Pay potable water service use charges, whether metered or otherwise, for water used in construction activities at Project site.
- D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by in construction activities at Project site.
- E. Telephone Service: Pay telephone service use charges, for office telephones at Project site.
- F. Internet Service: Pay internet service use charges, for office at Project site.

1.4 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Engineer. Provide materials suitable for use intended.
- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.
- B. Water: Potable.

2.2 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
1. Provide Project field office.

2. Provide separate room within Project field office for use by Engineer.
- B. Field Offices: Prefabricated mobile units with lockable entrances, operable windows, and serviceable finishes; thermostatically controlled heat and air conditioning.
 1. Heating: Maintain minimum temperature of 68 degrees F.
 2. Cooling: Maintain maximum temperature of 72 degrees F.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material for the exclusive use of the Engineer.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
 1. Provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.
- F. Provide high speed internet service access port, modem capable of providing DSL or cable service.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

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

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.
- B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
- C. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
1. Install power distribution wiring overhead and rise vertically where least exposed to damage.
- D. Telephone Service: Provide temporary telephone service throughout construction period. Install separate telephone lines for telephone and fax service.
1. Provide voice-mail service for Engineer's telephone service.
 2. Provide a portable cellular telephone for Contractor's superintendent use in making and receiving telephone calls when away from field office. Include voice mail with cellular service.
 3. Provide fax machine with supply of paper for duration of project.
- E. Internet Service: Provide DSL or cable access internet connection service for Engineer's service.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access. Obtain Town Planning and Zoning Commission and Inland Wetlands Agency approval for location.
 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion.

- B. Provide sedimentation control measures in accordance with Division 1 Section "Erosion and Sedimentation Control"
- C. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste.
- E. Janitorial Services: Provide janitorial services on a weekly basis for Project office, toilets, wash facilities, and similar areas.
- F. Project Field Office: Provide an insulated, weathertight, air-conditioned field office; include a separate room for use by the Engineer. Keep office clean and orderly. Provide weekly janitorial services.
 - 1. Size: Sufficient to accommodate listed furniture without crowding, but no less than 300 square feet.
 - a. Windows: Three screened, operable windows with locks and curtains.
 - b. Door: Cylinder lock with keys in quantity requested by Engineer.
 - 2. Lighting: Overhead fluorescent lights.
 - 3. Furnish and equip offices as follows:
 - a. Office Desk with Drawers: 3 feet by 5 feet. Enclosed over desk shelving with suitable clearance to stand 3-ring-binders vertically. Built-in desktops may be substituted.
 - 1) Quantity: Two.
 - b. Office Desk Chair: Upholstered, adjustable, executive swivel armchair with casters.
 - 1) Quantity: Two.
 - c. Desk Lighting: Fluorescent under-cabinet lighting for each unit.
 - d. Folding Chairs: Upholstered seats.
 - 1) Quantity: Eight.
 - e. Folding table: 6 feet long
 - f. Broom and dust pan.

- g. Photocopying machine with supply of toner and paper for duration of construction. Provide repair service if needed.
- h. Scanner/ printer that is compatible with the Engineer's computer system.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise.
- B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.
- C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.
- D. Site Enclosure Fence: Before construction operations begin, install chain-link enclosure fence with lockable entrance gates. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.
 - 1. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.
- E. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
- B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor.
2. Remove temporary gravel access roads and temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. Remove temporary gravel access roads.
4. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION

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SECTION 01572 – EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes furnishing, placing, and maintaining sedimentation control measures as shown on the Drawings, as directed by the Engineer, and where necessary to reduce sediment content of runoff. Control measures are to remain in place until after completion of construction. Measures include the following:
 - 1. Silt fence
 - 2. Hay bales
 - 3. Dust control including sweeping of streets
 - 4. Erosion Control Blanket

1.2 SUBMITTALS

- A. Material Certificates:
 - 1. Geotextile.
 - 2. Erosion control bales.
 - 3. Silt fence.
 - 4. Silt sack.
 - 5. Erosion control blanket

1.3 QUALITY ASSURANCE

- A. Standard Specifications: “Form 816, Standard Specifications for Roads, Bridges and Incidental Construction, State of Connecticut, Department of Transportation” and supplements.
- B. Connecticut Guidelines for Soil Erosion and Sediment Control by the Connecticut Council on Soil and Water Conservation.

PART 2 - PRODUCTS

2.1 FILTER FABRIC / SILT FENCE

- A. Synthetic Filter Fabric: Woven geotextile, 36 inches maximum height, conforming to the following:

<u>Properties</u>	<u>Requirement</u>	<u>Unit</u>
Grab Tensile Strength (ASTM D4632):	124	Lbs
Grab Tensile Elongation (ASTM D4632):	15	Percent
Puncture Strength (ASTM D4833):	65	Lbs
Flow Rate (ASTM D4491):	20	Gal/Min/Sq. Ft.
UV Resistance(at 500 hours) (Retained strength) (ASTM D4355):	80	Percent

B. Product and Manufacturer:

1. Harris Silt Fence by Amoco Fabrics and Filters.
2. Mutual MISF 1855 by Mutual Industries, Inc.
3. Or equal.

2.2 POSTS

- A. Hardwood Stakes: 1.5-inch by 1.5-inch by 42-inches, minimum.

2.3 SILT FENCE FASTENERS

- A. Staples, tie wires or hog rings, as recommended by manufacturer.
1. Staples: Heavy-duty wire, 1-inch long minimum.

2.4 EROSION CONTROL BALES

- A. Bales: Hay, weighing 40 to 120 pounds per bale.
- B. Stakes: Wood, 1-inch by 1-inch by 36-inch minimum.

2.5 DUST CONTROL

- A. Calcium Chloride: ASTM D98, Type 1 or Type 2.
- B. Water: Potable.

2.6 EROSION CONTROL BLANKET

- A. Blanket: Minimum width of 6 feet.
1. Mat: Machine-produced of 100 percent straw fiber with colored line or thread along outer edges to indicate material overlap limits.
 - a. Weight: 0.50 lb./sq. yd.

- b. Overlap: Approximately 2 to 5 inches.
 2. Top and Bottom Cover: Light-weight polypropylene netting.
 - a. Mesh Size: 0.625-inch by 0.625 inch.
 - b. Weight: 1.5 lbs/1000 sq.ft.
- B. Sew blanket and covers together on 1.5 inch center at 50 stitches per roll width with UV stable polypropylene thread.

PART 3 - EXECUTION

3.1 GENERAL

- A. Minimize environmental damage during construction. Prevent discharge of fuel, oil, lubricants, and other fluids. Mitigate effects of discharge.
- B. Install erosion and sediment control measures prior to clearing, demolition, or construction.
- C. Construct erosion and sediment control measures in accordance with standards and specifications of the "Guidelines for Soil Erosion and Sediment Control", and City of Hartford requirements.
- D. Implement and maintain the Erosion and Sediment Controls shown on the Drawings.
- E. Install additional control measures, if deemed necessary by the Engineer, Owner, or State at no additional cost.
- F. Control dust and wind erosion. Control dust to prevent a hazard to traffic on adjacent roadways. Dust control includes sprinkling of water and uniform application of calcium chloride on exposed soils and haul roads.

3.2 CONTROL SYSTEMS

- A. Sedimentation Control Bales
 1. Install at locations indicated or where directed by the Engineer. Place hay bales lengthwise with ends tight abutting one another. Install bales with bindings located on the sides.
 2. Entrench bales 4 inches and backfill. Place backfill toward potential silt source.
 3. Secure in place with 2 stakes per bale and insert straw in voids between bales.
- B. Silt Fence

1. Install fencing at location as shown on the Drawings or where directed by the Engineer. Maintain pitch of 2 to 20 degrees, with inclination toward potential silt source.
2. Install bottom 6 inches of fabric by trenching and burying the fabric into the notched ground.
3. Drive posts into ground a minimum of 12 inches.
4. Locate fabric splices at posts only. Provide 6-inch overlap and seal.

C. Erosion Control Blanket

1. Install blankets on slopes greater than 3 to 1, where indicated on the Drawings, and in accordance with manufacturer's recommendation

3.3 DUST CONTROL

- A. Apply water and calcium chloride uniformly over the surface to prevent dust from becoming a nuisance or when directed by the Engineer. Provide shut-off valve in convenient location on water truck, to allow for regulating water flow.
- B. Thoroughly wet building materials immediately prior to demolition

3.4 MAINTENANCE

A. Control System

1. Inspect control system at least once per week, immediately after each rainfall and daily during prolonged rainfall. Make repairs immediately.
2. Remove and dispose of accumulated sediments when sediment reaches approximately one-third the height of the control system, or when directed by the Engineer.
3. Replace control system promptly if fabric decomposes or system becomes ineffective prior to the expected usable life.

- B. Maintain or replace system until no longer necessary for the intended purpose.

3.5 REMOVAL

- A. Remove and dispose of control system after area stabilizes with new growth or as directed by the Engineer.

END OF SECTION

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Progress cleaning.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.
- B. Related Sections:
 - 1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 1 Section "Submittal Procedures" for submitting surveys.
 - 3. Division 1 Section "Selective Demolition" for demolition and removal of selected portions of the structures.
 - 4. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.

- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Engineer. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.
- E. Surface and Substrate Preparation: Comply with manufacturer's recommendations for preparation of substrates to receive subsequent work.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer promptly.
- B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
 - 4. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Owner. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Engineer before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Coordinates

1. Establish X, Y and Z coordinates for benchmarks and survey control points.
 - a. Maximum Permissible Error: 0.10 feet, plus or minus in any coordinate direction.
2. X, Y Coordinates: Refer to coordinate system NAD82.
3. Z Coordinates: Refer to nearest USGS benchmark.
 - a. Accuracy: 0.10 feet, plus or minus NGVD 88.

- E. Certified Survey: On completion of the work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

1. Mapping details shall include, but not be limited to, the listing of items and features provided in the Submittal paragraph of this Section.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- F. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- G. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged areas.
- B. Restore permanent facilities used during construction to their specified condition.

- C. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

END OF SECTION

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 1. Demolition and removal of weakened concrete and reinforcing steel.
 2. Demolition and removal of existing trash racks in their entirety.
 3. Demolition and removal of existing trash rake systems in their entirety.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

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

1.5 SUBMITTALS

- A. Schedule of Selective Demolition Activities: Indicate the following:
 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Means and methods of proposed dust- and noise-control measures.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

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

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.
- C. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 4. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 - 1. Comply with requirements specified in Division 1 Section "Summary."
- B. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
- D. Storage or sale of removed items or materials on-site is not permitted.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.

- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

3.2 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.3 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 4. Maintain adequate ventilation when using cutting torches.
 - 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
8. Dispose of demolished items and materials promptly

3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.5 CLEANING

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

END OF SECTION

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
- B. Related Sections:
 - 1. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
 - 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 3. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 4. Prepare and submit Project Record Documents, operation and maintenance manuals, and similar final record information.
 - 5. Complete startup testing of systems.
 - 6. Submit test/adjust/balance records.
 - 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Engineer will either proceed with inspection or notify Contractor of

unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

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

1.3 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
 1. Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.5 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings.
1. Mark Record Prints to show the actual installation where installation varies from that shown originally.
 - a. Accurately record information in an understandable drawing technique.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
 5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Include identification on cover sheets.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Division 1 Section "Temporary Facilities and Controls."

END OF SECTION

SECTION 01782 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Sections:
 - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Divisions 2 through 16 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Engineer.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Engineer will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Engineer will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Engineer will return copy with comments.
1. Correct or modify each manual to comply with Engineer's comments. Submit copies of each corrected manual within 15 days of receipt of Engineer's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation

used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.

4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.3 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.

- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
- E. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

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SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.

- B. Limits of Work: Minimize disturbance within clearing limits. Perform only as much clearing as required to complete the Work.

- C. Related Sections:

1. Division 1 Section "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities.
2. Division 1 Section "Temporary Erosion and Sediment Control" for temporary control systems including silt fence, hay bales, and construction entrance requirements.
3. Division 1 Section "Execution Requirements" for field engineering and surveying.
4. Division 1 Section "Selective Demolition" for partial demolition of buildings or structures.
5. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

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

1.4 MATERIAL OWNERSHIP

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

1.5 SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or videotape.

1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Protect-In-Place Existing Site Improvements: Support and protect in place existing site improvements. Items include pipes, poles, wires, fences, curbing, property line marker and other items. Restore items promptly; do not leave until end of construction.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.
- E. Restore items and surfaces damaged by construction operations to existing condition or better.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 2 Section "Earthwork."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 EXISTING UTILITIES

- A. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.

3.3 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Use only hand methods for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

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

3.4 SITE IMPROVEMENTS

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

3.5 DISPOSAL

- A. Remove cleared and grubbed material and legally dispose of them off Owner's property.
 1. Tree trunks and branches may be chipped prior to removal with approval of the Engineer.
 2. Under no circumstances will burning be permitted.
- B. Remove obstructions, demolished materials, and waste materials including trash and surface debris, and legally dispose of them off Owner's property.
- C. Dispose of surplus and unsuitable soil, excluding dredge sediment, within the project limits at locations directed by the engineer.

END OF SECTION

SECTION 02243 – POND DRAWDOWN

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Controlling and diverting pond water away from the work area.
 - 2. Maintaining dry conditions throughout the work.
 - 3. Refilling the pond.
- B. Related Sections include the following:
 - 1. Division 1 Section “Erosion and Sediment Control” for erosion and sediment control structures.

1.2 DEFINITIONS

- A. Debris: Pieces of vegetation, rubbish, wire, fish and other materials that may inhibit pumping operations.

1.3 SUBMITTALS

- A. Pond Dewatering Plan: Submit for review and approval prior to initiating drawdown.
 - 1. Identify types of materials, locations, and duration of proposed control and diversion measures.
 - 2. Provide plans and installation details.
 - 3. Provide calculations demonstrating the capacity of proposed temporary conveyance to pass the 2-year peak discharge.
 - 4. Comply with requirements of the Contract Documents and the environmental permits issued for the Project.
- B. Flood Contingency Plan: Submit for review and approval prior to commencing sediment excavation.
 - 1. Indicate the actions to be taken in response to predicted flooding.
 - 2. Provide a list of equipment and labor resources needed to implement the emergency actions
 - 3. Calculate the time needed to complete the emergency actions

1.4 QUALITY ASSURANCE

- A. Notify Owner in writing at least 7 Days prior to beginning pond pumping and drawdown.

1.5 PROJECT CONDITIONS

- A. Potential for flooding during the construction period exists. Be aware of the potential danger and take appropriate measures to prevent injury to personnel and damage to equipment and materials within the Pond.
 - 1. Remove equipment from the pond at the end of each work day.
 - 2. Do not leave equipment within the pond when personnel are not present at the site.
- B. Do not store equipment or fuel within the pond limits.
 - 1. Refueling is prohibited within the pond limits.
- C. Pump station operations are a critical component of the Hartford Flood Control System. In order for the pump stations to function properly, the existing level of protection of the suction and gravity chambers must be maintained. It is the responsibility of the contractor to schedule the work so that this level of protection is maintained (e.g. temporary trash racks, temporary support of the existing trash racks, removal and replacement of trash racks in same work day, etc.)
 - 1. Coordinate scheduling of trash rack work with Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 DRAWDOWN OF POND

- A. Request Owner to close the pump station gravity gates and operate the pump station to drawdown the pond.
 - 1. The maximum pump station drawdown will leave approximately 3-feet of water in suction chambers. Remove residual water from suction chambers as required.
- B. Following initial drawdown of the ponds install temporary cofferdams as required to prevent water from entering the work area. Begin pumping water from the upstream side of the cofferdam.

3.2 DISCHARGE LOCATIONS

- A. North Meadows
 - 1. Pump water into manholes just downstream of the gravity gates.

- B. South Meadows
 - 1. Pump water over the levee and discharge to the existing channel.

3.3 CONTROL AND MAINTENANCE

- A. Install temporary control systems to prevent water from flowing into the work area during construction.
- B. The pump station gravity gates are not completely water tight. When closed, water may still enter the pond through the gravity gates, depending on the water elevation of the river.
- C. Two year peak inflow rates for each pond have been listed below for convenience. The contractor shall determine the size of the dewatering system and what storm events are to be conveyed.

Discharge Location	Approx. Drainage Area (Acres)	2-Year Peak Inflow (cfs)
North Meadows	1,294	724
South Meadows	1,808	989

- D. Clean existing suction chambers of sediment and debris at the conclusion of the pond drawdown.

3.4 FLOOD CONTINGENCY

- A. Flood events may occur that will cause flooding of work areas, and cause the water level in the pond to rise rapidly.
 - 1. Comply with the instructions of City staff if weather forecasts indicated the potential for flooding.
 - a. Remove temporary water diversions/controls immediately to allow unimpeded flow of stormwater.
 - b. Maintain sufficient equipment and staff to implement the flood contingency plan.
 - 2. In the event of flooding, cease operations until water has receded below the work areas.

3.5 REFILLING PROCEDURE

- A. Notify Owner when the work within the pond area has been completed so that a final inspection can be conducted.

1. Maintain water levels so that all the work can be inspected.
- B. Once the work has been inspected and accepted by the Owner, complete the following:
1. Clean the existing suction chamber to a shovel-clean finish.
 2. Remove temporary water diversions/controls.
 3. Remove equipment from the pond.
 4. Notify the Owner in writing that the drawdown is complete. The owner will allow natural stormwater flows to refill the pond until the water elevation has equalized with the Connecticut River, or has reached the pump station pumping criteria (whichever is lower).

END OF SECTION

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Preparing subgrades for pavements.
2. Excavating and backfilling for buildings and structures.
3. Subbase course for concrete pavements.

- B. Related Sections:

1. Division 1 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
2. Division 2 Section "Site Clearing" for protecting existing site features to remain.
3. Division 3 Section "Concrete Rehabilitation" for repair of concrete structures.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

- C. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized

excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

- D. Fill: Soil materials used to raise existing grades.
- E. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- F. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base, bedding, or topsoil materials.
- G. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Material Certification
 - 1. Each type and application of borrow material.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance with the requirements indicated. Prepare separate reports for each type and application of material.
 - 1. Gradation according to ASTM D 422
 - a. One test for every 1,000 cubic yards of borrow material, but not less than one test per year of contract
 - 2. Soil Classification according to ASTM D 2487
 - a. One test for every 1,000 cubic yards of borrow material, but not less than one test per year of contract
 - 3. Modified Proctor according to ASTM 1557
 - a. One test for every 1,000 cubic yards of borrow material, but not less than one test per year of contract.
 - b. One test for every 100 burrows repaired using satisfactory on-site soil.
- C. Field Test Reports: Prepared by a qualified independent geotechnical engineering testing agency indicating compliance with the requirements indicated. Mark each report with date, time, material tested and location (by levee section, station, and off-set from centerline).

1.5 QUALITY ASSURANCE

- A. Form 816: State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges and Incidental Construction, Form 816.

1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify utility owner and Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.
 - 3. Contact utility locator service before excavating. Proceed with excavation only after utility locator service completes marking of utility locations.
- B. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 2 Section "Site Clearing," are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- A. Satisfactory Soils: Free of debris, waste, frozen materials, vegetation, clay, and other deleterious matter; adequately graded for satisfactory compaction.
 - 1. On-Site Material: Native soil additionally free of masses of roots, individual roots more than 18 inches long and 1/2 inch in diameter, subject to approval by the Engineer.
 - 2. Borrow: Free of rock or gravel larger than 3 inches in any dimension; Form 816, Section M.02.01, Grading A.
- A. Backfill and Fill: Satisfactory soil materials.
- B. Processed Aggregate Base: Form 816, Section M.05.01.
- C. Gravel Fill: Naturally or artificially graded mixture of natural or crushed gravel, and broken or crushed stone; Form 816, Section M.02.02 and M.02.05, Grading B.

D. Stone:

1. 2" Stone: Form 816, Section M.01.01, No. 3
2. 1/4" Stone: Form 816, Section M.01.01, No. 4
3. 3/4" Stone: Form 816, Section M.01.01, No. 6
4. 1/2" Stone: Form 816, Section M.01.01, No. 67
5. 3/8" Stone: Form 816, Section M.01.01, No. 8
- 6.

E. Separation Fabric

1. Non-Woven Geotextile Fabric

<u>Properties</u>	<u>Minimum Requirement</u>	<u>Unit</u>
Mass Per Unit Area (ASTM D5261):	8	oz/yd ²
Apparent Opening Size (ASTM D4751):	80	U.S. Sieve
Puncture Strength (ASTM D4833):	100	Lbs

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 SUBGRADE INSPECTION

- A. Notify Engineer when excavations have reached required subgrade.
- B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer.

3.6 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation as directed by Engineer.

3.7 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Prevent windblown dust. Provide erosion control measures.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
 - 2. Stockpile soil materials only in the areas indicated on the Drawings, unless otherwise approved by the Owner.

3.8 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade.
 - 2. Testing and inspecting underground utilities.
 - 3. Removing concrete formwork.
 - 4. Removing trash and debris.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.9 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.10 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.11 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly to required elevations.
- C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.

2. Subgrade: Scarify and re-compact top 8 inches of existing on-site subgrade material to not less than 90 percent of maximum dry density.

3.

3.12 SUBBASE AND BASE COURSES UNDER PAVEMENTS, WALKS, AND CONCRETE PADS

- A. Place base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course under pavements, walks and concrete pads as indicated.
 1. Shape base course to required crown elevations and cross-slope grades.
 2. Place base course 6 inches or less in compacted thickness in a single layer.
 3. Place base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 4. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.13 FIELD QUALITY CONTROL

- A. Laboratory Testing: Perform Modified Proctor Test (ASTM D 1557) for subgrade and gravel materials as necessary to establish field compaction requirements.
- B. Testing Agency: Engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- D. Testing agency will test compaction of soils in place according to ASTM D 2922. Tests will be performed at the following locations and frequencies:
 1. Subgrade: At least one test for every 1,000 square feet of prepared subgrade, as directed by the Engineer.
 2. Base Courses: At least one test for every 1,000 square feet of prepared base material, as directed by the Engineer.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.14 PROTECTION

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

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 02741 – BITUMINOUS CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Bituminous concrete paving and patching.
- B. Related Sections include the following:
 - 1. Division 2 Section "Earthwork" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.2 DEFINITIONS

- A. Bituminous Concrete Base Course: Asphalt-aggregate layer placed over subgrade, aggregate subbase course, or aggregate base course; and beneath bituminous concrete surface course.
- B. Bituminous Concrete Surface Course: The asphalt-aggregate top course of a bituminous concrete pavement, sometimes called a wearing course.
- C. DOT: Department of Transportation.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
- B. Job-Mix Design Certification: For each job mix proposed for the Work, signed by the supplier.
- C. Qualification Data: For bituminous concrete supplier.
- D. Material Certificates: For each paving material, signed by manufacturers.
- E. Material Test Reports: For each paving material.

1.4 QUALITY ASSURANCE

- A. Supplier Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Form 816 of Connecticut Department of Transportation for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

C. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

D. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

C. Transport bituminous concrete mixture in tight body trucks that have been previously cleaned of foreign material.

1. Tightly cover trucks with waterproof canvas or other suitable covers.

D. Deliver mixture within 25 deg F of approved job mix formula temperature.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.

2. Bituminous Concrete Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.

3. Bituminous Concrete Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 50 deg F and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 BITUMINOUS CONCRETE

A. Materials: Section M.04 and M.05.02 of Form 816.

- B. Tack Coat: AASHTO M 140 Grade SS-1 or SS-1H, emulsified asphalt or AASHTO M 208 Grade CSS-1 or CSS-1H, cationic emulsified asphalt, slow setting, diluted in half with water.

2.2 MIXES

- A. Bituminous Concrete: Dense, hot-laid, bituminous concrete plant mixes approved by authorities having jurisdiction and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Course Depth and Class: As indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. General: Immediately before placing bituminous concrete, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 - 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
- B. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd.. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.

2. Protect primed substrate from damage until ready to receive paving.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..
1. Allow tack coat to cure undisturbed before applying bituminous concrete paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 BITUMINOUS CONCRETE PLACING

- A. Machine place hot bituminous concrete on prepared surface, spread uniformly, and strike off. Place by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
1. Place bituminous concrete base course in number of lifts and thicknesses indicated.
 2. Spread mix at minimum temperature of 250 deg F.
 3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in bituminous concrete paving mat.
 5. In areas inaccessible to pavers, use staked forms to maintain indicated line and grade. Prevent segregation of mix when placing mix by hand.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of bituminous concrete base course before placing bituminous concrete surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot bituminous concrete to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of bituminous concrete course.
1. Clean contact surfaces and apply tack coat to joints.
 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 3. Offset transverse joints, in successive courses, a minimum of 24 inches.

4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as bituminous concrete will bear roller weight without excessive displacement.
6. Compact material at joints to a density within 2 percent of specified course density.

3.5 COMPACTION

- A. General: Begin compaction as soon as placed paving material will bear roller weight without excessive displacement. Compact material with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while bituminous concrete is still hot enough to achieve specified density. Continue rolling until course has been uniformly compacted to the following density:
 1. Average Density: 95 percent of reference maximum theoretical density according to AASHTO T 209, but not less than 92 percent nor greater than 97 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while bituminous concrete is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while material is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh material. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 1. Base Course: Plus or minus 1/2 inch.

2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 1. Base Course: 1/4 inch.
 2. Surface Course: 1/8 inch.
 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.
- C. Variation from Design Elevation: 1/4 inch.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Thickness: In-place compacted thickness of bituminous concrete courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each bituminous concrete course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T 168.
 1. Reference maximum theoretical density will be determined by averaging results from four samples of bituminous concrete mixture delivered daily to site, prepared according to AASHTO T 209, and compacted according to job-mix specifications.
 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Replace and compact hot-mix asphalt where core tests were taken.

- G. Remove and replace or install additional bituminous concrete where test results or measurements indicate that it does not comply with specified requirements.

3.8 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an approved landfill.
 - 1. Do not allow excavated materials to accumulate on-site.

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SECTION 02751 - CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes exterior cement concrete pavement for the following applications:
 - 1. Miscellaneous utility equipment and site service pads including dumpster pads.
- B. Related Sections:
 - 1. Division 3 Section "Miscellaneous Cast-in-Place Concrete" for general building applications of concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Admixtures.
 - 4. Curing compounds.
 - 5. Bonding agent or epoxy adhesive.
 - 6. Joint fillers.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- D. ACI Publications: Comply with ACI 301 unless otherwise indicated.

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- D. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

- E. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, white portland cement Type I/II. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

2.5 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 - 1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): As indicated on the Drawings
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use high-range, water-reducing and retarding admixture or plasticizing and retarding admixture in concrete as required for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- F. Cementitious Materials: Limit percentage by weight of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals as follows:
 1. Fly Ash or Pozzolan: 25 percent.
 2. Ground Granulated Blast-Furnace Slag: 50 percent.
 3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.

2. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Division 2 Section "Earthwork."

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 2. Provide tie bars at sides of paving strips where indicated.
 3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 4. Doweled Joints: Install dowel bars and support assemblies at joints. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
1. Elevation: 3/4 inch.
 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/2 inch.
 4. Lateral Alignment and Spacing of Dowels: 1 inch.
 5. Vertical Alignment of Dowels: 1/4 inch.
 6. Joint Spacing: 3 inches.
 7. Contraction Joint Depth: Plus 1/4 inch, no minus.
 8. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 5000 sq. ft. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from

at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
- F. Concrete paving will be considered defective if it does not pass tests and inspections.
- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- H. Prepare test and inspection reports.

3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.
- B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 02821 - CHAIN-LINK FENCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Permanent chain-link fences.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design chain-link fences and gates, including comprehensive engineering analysis by a qualified professional engineer.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.
 - 1. Fence and gate posts, rails, and fittings.
 - 2. Chain-link fabric, reinforcements, and attachments.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.
- C. Samples for Initial Selection: For components with factory-applied color finishes.
- D. Samples for Verification: Prepared on Samples of size indicated below:
 - 1. Polymer-Coated Components: In 6-inch lengths for components and on full-sized units for accessories.
- E. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Product Certificates: For each type of chain-link fence from manufacturer.
- G. Product Test Reports: For framing strength according to ASTM F 1043.

1.5 QUALITY ASSURANCE

- A. Where "Form 816" is used, it shall mean "State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816" and issued supplements.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials for this Work shall conform to the requirements of Form 816, Article M.10.05, and shall be black vinyl coated steel fabric, posts, rails and hardware.

2.2 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading is completed unless otherwise permitted by Engineer.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

3.4 CHAIN-LINK FENCE INSTALLATION

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
- C. Terminal Posts: Locate terminal end and corner posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
- D. Line Posts: Space line posts uniformly at 10 feet o.c.
- E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end posts and at both sides of corner and pull posts.
 - 1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
 - 1. As indicated.

- G. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- H. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, and pull posts with tension bands spaced not more than 15 inches o.c.
- I. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
 - 1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
- J. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

END OF SECTION

SECTION 02849 – PARKING BOLLARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 1. Metal vehicle guard posts filled with concrete.
 2. Painted finish for vehicle guards.

1.3 SUBMITTALS

- A. Material Certificates: Signed by manufacturer certifying that product complies with requirements.

1.4 QUALITY ASSURANCE

- A. Form 816: State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction.

PART 2 - PRODUCTS

2.1 STATIONARY STEEL POSTS

- A. Posts: ASTM F 1083, Schedule 80, standard weight steel pipe.

2.2 PAINT

- A. Enamel Paint: Form 816, Article M.18.08. Color as selected by Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install vehicle guards as indicated. Set posts plumb. Fill with concrete. Rod concrete to remove air pockets.
- B. Remove spilled concrete from adjacent surfaces and clean surface.

3.2 PAINTING

- A. Paint vehicle guards with one coat of primer and two finish coats.

END OF SECTION

SECTION 02920 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Providing and grading topsoil.
 - 2. Seeding or hydroseeding.
 - 3. Establishing vegetation
 - 4. Mowing all existing grass areas during the construction period.
- B. Owner considers surface restoration of grassed areas to be critically important to the proper close-out of this project. Owner requires the grassed areas to be in a mowable condition upon completion. Provide repeated plantings or hydroseeding of exposed areas until such time as a full turf has been established.
- C. Related Sections include the following:
 - 1. Division 2 Section "Site Clearing" for topsoil stripping and stockpiling.
 - 2. Division 2 Section "Earthwork" for excavation, filling and rough grading.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Planting Soil: Native or imported topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- C. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 SUBMITTALS

- A. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture, identifying source, including name and telephone number of supplier.
- B. Product Certificates: For soil amendments, fertilizers and mulch, signed by product manufacturer.
- C. Topsoil Analysis Test Reports: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of soil.
 1. Obtain one composite sample for every 5,000 cubic yards of existing stockpiled surface soil and imported topsoil.
 2. Report suitability of soil for growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory soil.
- D. Topsoil Chemical Analysis Report: Obtain and analyze one composite soil sample from each source prior to bringing such soil on-site.
 1. Analysis shall be performed by an independent qualified environmental laboratory for the following:
 - a. Volatile organic compounds (VOCs) by EPA SW-846 Method 8021.
 - b. Semi-volatile organic compounds (SVOCs) by EPA SW-846 Method 8270.
 - c. Total RCRA 8 Metals by EPA SW-846 6000/7000 series.
 - d. Pesticides by EPA SW-846 Method 8081.
 - e. Chlorinated Herbicides by EPA SW-846 Method 8151.
 2. Obtain one composite sample for every 5,000 cubic yards of imported topsoil.

1.5 SOURCE QUALITY CONTROL

- A. Chemical Analysis:

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment and establishment of plants.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed, Lime, and Fertilizer: Deliver in original sealed, labeled, and undamaged containers.

1.8 NEW TURF MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
 - 1. Seeded Areas: Through Substantial Completion.
 - a. When full maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
- B. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch as many times as necessary to achieve a continuous improvement to the turf and grass root system and produce a uniformly smooth turf.
 - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.
- C. Watering: Provide and maintain temporary piping, hoses, and watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 6 inches.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water turf at a minimum rate of 1 inch per week.
- D. Mow seeded areas during maintenance period.
 - 1. First mowing shall be either when grass reaches a height of 6 inches or at the end of the growing season, whichever occurs first.
 - 2. Second mowing shall be either the second time the grass reaches a height of 6 inches or at the end of the next growing season, whichever occurs first.
 - 3. Mowing work will conform to the following requirements.
 - a. Mow grass to 4 inches high.
 - b. Remove no more than 40 percent of grass-leaf growth.
 - c. Do not delay mowing until grass blades bend over and become matted.
 - d. Do not mow when grass is wet.
- E. Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
 - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.
- F. Install stakes, tape, and pedestrian fencing during the entire maintenance period to avoid pedestrian damage to newly planted areas.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Mixes

	<u>Proportion by Weight (Percent)</u>	<u>Minimum Purity (Percent)</u>	<u>Minimum Germination (Percent)</u>
Orchard Grass	30	85	75
Creeping Red Fescue	10	98	85
K.31 Tall Fescue	50	98	85
Domestic Ryegrass	10	98	90

2.2 TOPSOIL

- A. Topsoil: Form 816, Article M.13.01-1.
1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 6 inches deep; do not obtain from agricultural land, bogs, or marshes. Topsoil must be free of toxic substances.

2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: Form 816, Article M.13.02.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.
1. Organic Matter Content: 50 to 60 percent of dry weight.

- a. State of Connecticut, Department of Environmental Protection approved when derived from food and agricultural residues, animal manures, and sewage sludge.
 2. Approved Products: AllGro, 4 Liberty Lane West, Hampron, NH 03842 (1-800-662-2440), or equal.
- B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
- 2.5 FERTILIZER
- A. Fertilizer: Form 816, Article M.13.03.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive turf for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
1. Protect adjacent and adjoining areas from hydroseeding overspray.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 VEGETATION AREA PREPARATION

- A. Limit preparation to areas to be planted.
- B. Prepare surface soil where existing lawn is disturbed by the Contractor's operations as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen existing topsoil to a depth of at least of 6 inches. If existing topsoil is less than 6 inches thick, supplement with imported topsoil. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.

3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- D. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
1. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Sow seed at the following rates:
1. 100 lbs./acre
 - 2.
- C. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes exceeding 1:3 with erosion-control blankets installed and stapled according to manufacturer's written instructions.
- E. Protect seeded areas with slopes not exceeding 1:3 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

3.5 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
1. Mix slurry with nonasphaltic tackifier.
 2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate.

3.6 TURF RENOVATION

- A. Renovate existing turf where indicated and where damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 - 1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
- B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
- C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new.
- D. Mow, dethatch, and rake existing turf.
- E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- H. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 6 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades.
- I. Apply seed and protect with straw mulch as required for new turf.
- J. Water newly planted areas and keep moist until new turf is established.

3.7 SATISFACTORY TURF

- A. Satisfactory Seeded Areas: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
- B. Reestablish turf that do not comply with requirements and continue maintenance until turf is satisfactory.

3.8 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after turf is established.

- C. Remove erosion-control measures after grass establishment period.

END OF SECTION

SECTION 03301 – MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mix design, placement procedures, and finishes for the following:
 - 1. Suction Chamber Retaining Wall Repairs.
- B. Related Sections
 - 1. Division 2 Section "Cement Concrete Pavement" for miscellaneous utility equipment and site service pads including dumpster pads.
 - 2. Division 3 Section "Concrete Rehabilitation" for drilling holes and chemical anchors.

1.3 SUBMITTALS

- A. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1. Cementitious materials and aggregates.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Admixtures.
 - 4. Curing compounds.
 - 5. Bonding Agent or epoxy adhesive.
 - 6. Joint fillers.
- B. Product Certificate: Signed by producer or supplier certifying that each of the following items complies with requirements:
 - 1. Design mix.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

- B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.
 - 1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.
 - 2. Formwork and form accessories.
 - 3. Steel reinforcement and supports.
 - 4. Concrete mixtures.
 - 5. Handling, placing, and constructing concrete.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Furnish formwork and form accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Types I or II or Type I/II.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source.
 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94.

2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Do not use admixtures containing calcium chloride.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

2.6 RELATED MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 CONCRETE MIXES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
- C. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): As indicated on the Drawings.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45
 - 3. Slump: 4 inches, plus or minus 1 inch.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use high-range, water-reducing and retarding admixture or plasticizing and retarding admixture in concrete as required for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with ASTM C 94.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.9 WATERSTOPS

- A. Self-Expanding Strip Waterstop: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophilic material for adhesive bonding to concrete.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Chamfer exterior corners and edges of permanently exposed concrete.
- F. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- H. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- I. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Engineer.

3.6 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.

3.7 CONCRETE PLACEMENT

- A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment.
- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

- E. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
1. Apply to concrete surfaces not exposed to public view.

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Completely remove fins and other projections.
 - 1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
 - 2. Apply the following rubbed finish, defined in ACI 301, to smooth-formed finished concrete.
 - a. Smooth-rubbed finish.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.
 - 1. Do not further disturb surfaces before starting finishing operations.
- C. Float Finish: Apply float finish to conduit invert surfaces.
- D. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

3.10 TOLERANCES

- A. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3.11 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection, and follow recommendations in ACI 305R for hot-weather protection during curing.
- B. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

- C. Curing Methods: Cure formed and unformed concrete for at least seven days by moisture curing, moisture-retaining-cover curing, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture.
 - a. When frequency of testing will provide fewer than five samples for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used for the project.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.13 REPAIRS

- A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION

SECTION 03930 - CONCRETE REHABILITATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Removal of deteriorated concrete and reinforcement and subsequent replacement and patching.
 - 2. Replacing deteriorated steel structural reinforcement.
 - 3. Corrosion-inhibiting treatment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, chemical composition, physical properties, test data, and mixing, preparation, and application instructions.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers and manufacturers.
- B. Product Test Reports: For each manufactured bonding agent cementitious patching mortar, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Field quality-control reports.
- D. Maintenance Program: Submit before work begins.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Each manufacturer shall employ factory-trained technical representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer to apply specified products.

- C. Maintenance Program: Prepare a written plan for maintenance of cast-in-place concrete, including each phase or process, protection of surrounding materials during operations, and control of debris and runoff during the Work. Describe in detail materials, methods, equipment, and sequence of operations to be used for each phase of the Work.
- D. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.
- B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.
- C. Store cementitious materials off the ground, under cover, and in a dry location.
- D. Store aggregates covered and in a dry location; maintain grading and other required characteristics and prevent contamination.

1.7 FIELD CONDITIONS

- A. Environmental Limitations for Epoxies: Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. During hot weather, cool epoxy components before mixing, store mixed products in shade, and cool unused mixed products to retard setting. Do not apply to wet substrates unless approved by manufacturer.
 - 1. Use only Class A epoxies when substrate temperatures are below or are expected to go below 40 deg F within 8 hours.
 - 2. Use only Class A or B epoxies when substrate temperatures are below or are expected to go below 60 deg F within 8 hours.
 - 3. Use only Class C epoxies when substrate temperatures are above and are expected to stay above 60 deg F for 8 hours.
- B. Cold-Weather Requirements for Cementitious Materials: Comply with the following procedures:
 - 1. When air temperature is below 40 deg F, heat patching-material ingredients and existing concrete to produce temperatures between 40 and 90 deg F.

2. When mean daily air temperature is between 25 and 40 deg F, cover completed Work with weather-resistant insulating blankets for 48 hours after repair or provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after repair.
 3. When mean daily air temperature is below 25 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after repair.
- C. Hot-Weather Requirements for Cementitious Materials: Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks, and use cooled materials as required. Do not apply to substrates with temperatures of 90 deg F and above.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain each color, grade, finish, type, and variety of product from single source with resources to provide products of consistent quality in appearance and physical properties.
- B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

2.2 BONDING AGENTS

- A. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Manufactured product that consists of water-insensitive epoxy adhesive, portland cement, and water-based solution of corrosion-inhibiting chemicals that forms a protective film on steel reinforcement.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sika Corporation, Construction Product Division; Armatec 110 EpoCem.
 - b. Euclid Chemical Company (The), an RPM company; Duralprep A.C.
 - c. Or approved equal.

2.3 PATCHING MORTAR

- A. Patching Mortar, General:
 1. Only use patching mortars that are recommended by manufacturer for each applicable horizontal, vertical, or overhead use orientation.
 2. Color and Aggregate Texture: Provide patching mortar and aggregates of colors and sizes necessary to produce patching mortar that matches existing, adjacent, exposed concrete. Blend several aggregates if necessary to achieve suitable matches.

3. Coarse Aggregate for Patching Mortar: ASTM C 33, washed aggregate, Size No. 8, Class 5S. Add to patching-mortar mix only as permitted by patching-mortar manufacturer.
- B. Polymer-Modified, Silica-Fume-Enhanced, Cementitious Patching Mortar: Packaged, dry mix for repair of concrete and that contains silica fume complying with ASTM C 1240 and a latex additive as either a dry powder or a separate liquid that is added during mixing.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Euclid Chemical Company (The); an RPM company.
 - b. Kaufman Products, Inc.
 - c. Sika Corporation; Construction Product Division.
 - d. Or approved equal.
 2. Compressive Strength: Not less than 4000 psi 28 days when tested according to ASTM C 109/C 109M.

2.4 CHEMICAL ANCHORS

- A. Epoxy Anchors: ASTM C881, high-strength, two-part adhesive epoxy system, conforming to the following:
 1. Type: IV.
 2. Grade: 3.
 3. Class: A, B or C.
 4. Compressive Strength: 10,000 psi.
 5. Tensile Strength: 7,000 psi.

2.5 MIXES

- A. General: Mix products, in clean containers, according to manufacturer's written instructions.
 1. Do not add water, thinners, or additives unless recommended by manufacturer.
 2. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
 3. Do not mix more materials than can be used within time limits recommended by manufacturer. Discard materials that have begun to set.
- B. Mortar Scrub Coat: Mix dry ingredients with enough water to provide consistency of thick cream.

- C. Concrete: Comply with Division 3 Section "Miscellaneous Cast-in-Place Concrete."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Notify Engineer seven days in advance of dates when areas of deteriorated or delaminated concrete and deteriorated reinforcing bars will be located.
- B. Locate areas of deteriorated or delaminated concrete using hammer or chain-drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries. At columns and walls make boundaries level and plumb unless otherwise indicated.
- C. Pachometer Testing: Locate at least three reinforcing bars using a pachometer, and drill test holes to determine depth of cover. Calibrate pachometer using depth of cover measurements, and verify depth of cover in removal areas using pachometer.
- D. Perform surveys as the Work progresses to detect hazards resulting from concrete-maintenance work.

3.2 PREPARATION

- A. Ensure that supervisory personnel are on-site and on duty when concrete maintenance work begins and during its progress.
- B. Preparation for Removal of Deteriorated Concrete: Examine construction to be repaired to determine best methods to safely and effectively perform concrete maintenance work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed in the course of repair.
 - 1. Inventory and record the condition of items to be removed for reinstallation or salvage.
 - 2. Provide and maintain shoring, bracing, and temporary structural supports as required to preserve stability and prevent unexpected or uncontrolled movement, settlement, or collapse of construction being demolished and construction and finishes to remain.
- C. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from concrete maintenance work.
 - 1. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

2. Use only proven protection methods appropriate to each area and surface being protected.
 3. Provide barricades, barriers, and temporary directional signage to exclude public from areas where concrete maintenance work is being performed.
 4. Contain dust and debris generated by concrete maintenance work and prevent it from reaching the public or adjacent surfaces.
 5. Use water-mist sprinkling and other wet methods to control dust only with adequate, approved procedures and equipment that ensure that such water will not create a hazard or adversely affect other building areas or materials.
 6. Protect adjacent surfaces and equipment by covering them with heavy polyethylene film and waterproof masking tape. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
 7. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 8. Dispose of debris and runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- D. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Engineer immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is in working order.
1. Prevent solids such as aggregate or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from concrete maintenance work.
 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- E. Concrete Removal:
1. Provide shoring, bracing, and supports as necessary. Strengthen or add new supports when required during progress of removal work. Do not overload structural elements with debris.
 2. Saw-cut perimeter of areas indicated for removal to a depth of at least 1-inch. Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcement.
 - a. Provide a 5 degree undercut towards sound concrete.
 3. Remove deteriorated and delaminated concrete by breaking up and dislodging from reinforcement.
 4. Remove additional concrete if necessary to provide a depth of removal of at least 1/2 inch over entire removal area.
 5. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded,

- remove concrete from entire perimeter of bar and to provide at least a 1-inch clearance around bar.
6. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound and disbonded concrete is completely removed.
 - a. Notify the Engineer of any areas where the depth to sound concrete exceeds 4 inches.
 7. Provide surfaces with a fractured profile of at least 1/8 inch that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level unless otherwise directed.
 8. Thoroughly clean removal areas of loose concrete, dust, and debris.
- F. Reinforcing-Bar Preparation: Remove loose and flaking rust from reinforcing bars by until only tightly adhered light rust remains.
1. Where section loss of reinforcing bar is more than 25 percent, or 20 percent in two or more adjacent bars, cut bars and remove and replace as directed by Engineer. Remove additional concrete as necessary to provide at least 3/4-inch clearance at existing and replacement bars. Splice replacement bars to existing bars according to ACI 318 by lapping, welding, or using mechanical couplings.

3.3 DRILLING HOLES

- A. Drill hole to indicated depth and diameter.
 1. Immediately inform the Engineer if reinforcement or other obstructions are encountered during drilling of dowel hole in concrete.
- B. Clean hole of drillings, debris and freestanding water.

3.4 CHEMICAL ANCHORS

- A. Install anchors in accordance with manufacturer's written procedure.

3.5 APPLICATION

- A. General: Comply with manufacturer's written instructions and recommendations for application of products, including surface preparation.
- B. Do not exceed the maximum patch material thickness specified by the manufacturer.
- C. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Apply to reinforcing bars and concrete by stiff brush or hopper spray according to manufacturer's written instructions. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar or concrete.

- D. Placing Patching Mortar: Place as follows unless otherwise recommended in writing by manufacturer:
1. Provide forms where necessary to confine patch to required shape.
 2. Wet substrate and forms thoroughly and then remove standing water.
 3. General Placement: Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch. At fully exposed reinforcing bars, force patching mortar to fill space behind bars by compacting with trowel from sides of bars.
 4. Vertical Patching: Place material in lifts of not more than 1-1/2 inches nor less than 1/8 inch. Do not feather edge.
 5. Overhead Patching: Place material in lifts of not more than 1 inch nor less than 1/8 inch. Do not feather edge.
 6. Consolidation: After each lift is placed, consolidate material and screed surface.
 7. Multiple Lifts: Where multiple lifts are used, score surface of lifts to provide a rough surface for placing subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.
 8. Finishing: Allow surfaces of lifts that are to remain exposed to become firm and then finish to a surface matching adjacent concrete.
 9. Curing: Wet-cure cementitious patching materials, including polymer-modified cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.
- E. Dry-Pack Mortar: Use for deep cavities. Place as follows unless otherwise recommended in writing by manufacturer:
1. Provide forms where necessary to confine patch to required shape.
 2. Wet substrate and forms thoroughly and then remove standing water.
 3. Pretreatment: Apply specified bonding agent.
 4. Place dry-pack mortar into cavity by hand, and compact tightly into place. Do not place more material at a time than can be properly compacted. Continue placing and compacting until patch is approximately level with surrounding surface.
 5. After cavity is filled and patch is compacted, trowel surface to match profile and finish of surrounding concrete. A thin coat of patching mortar may be troweled into the surface of patch to help obtain required finish.
 6. Wet-cure patch for not less than seven days by water-fog spray or water-saturated absorptive cover.
- F. Concrete: Place according to Division 3 Section "Miscellaneous Cast-in-Place Concrete" and as follows:

1. Standard Placement:
 - a. Dampen exposed concrete surfaces with potable water immediately prior to placement.
 - b. Use vibrators to consolidate concrete as it is placed.
 - c. At unformed surfaces, screed concrete to produce a surface that when finished with patching mortar will match required profile and surrounding concrete.
2. Form-and-Pump Placement: Place concrete where indicated by form and pump method.
 - a. Design and construct forms to resist pumping pressure in addition to weight of wet concrete. Seal joints and seams in forms and where forms abut existing concrete.
 - b. Pump concrete into place from bottom to top, releasing air from forms as concrete is introduced. When formed space is full, close air vents and pressurize to 14 psi.
3. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
4. Fill placement cavities with dry-pack mortar and repair voids with patching mortar. Finish to match surrounding concrete.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 1. Packaged, Cementitious Patching Mortar: 1 sample for each 50 square feet randomly selected sets of samples for each type of mortar required, tested according to ASTM C 928.
 2. Concrete: As specified in Division 3 Section "Miscellaneous Cast-in-Place Concrete."
- C. Product will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Arrange for a patch material manufacturer's representative to be on site for one day during the initial patch placement operations for each different type of patch material used.

END OF SECTION

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SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 2. Trash Racks and support framing.
- B. Products furnished, but not installed, under this Section:
 - 1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Sections:
 - 1. Division 5 Section "Pipe and Tube Railings."

1.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
- C. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening stainless steel.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

E. Post-Installed Anchors: chemical anchors.

1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

- F. Form exposed connections with hairline joints, flush and smooth, using concealed welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

2.7 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.8 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.9 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 05521 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Aluminum pipe railings.

1.3 PERFORMANCE REQUIREMENTS

- A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
- B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Railing brackets.
 - 3. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- D. Welding certificates.
- E. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Aluminum Pipe and Tube Railings:
 - a. ATR Technologies, Inc.
 - b. Superior Aluminum Products, Inc.
 - c. Tubular Specialties Manufacturing, Inc.
 - d. Wagner, R & B, Inc.; a division of the Wagner Companies.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Structural Pipe: ASTM B 429/B 429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.
- C. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.4 FASTENERS

- A. General: Provide the following:
 - 1. Aluminum Railings: Type 316 stainless-steel fasteners.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.

- D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

- C. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.

- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- D. Form work true to line and level with accurate angles and surfaces.

- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- J. Close exposed ends of railing members with prefabricated end fittings.
- K. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- L. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.
- M. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable

variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.8 ALUMINUM FINISHES

- A. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending

2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

3.4 ADJUSTING AND CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.

3.5 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

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SECTION 11332 – TRASH RAKE ASSEMBLY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Monorail Traveling Gripper Rakes Assembly.
- B. Related Sections
 - 1. Division 5 Section "Metal Fabrications" for bar rack.
 - 2. Division 3 Section "Concrete Rehabilitation" for drilling holes and chemical anchors.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Equipment furnished under this section shall be suitable for automatic (or manual) operation in raw water and shall be a single piece of equipment designed and arranged to remove trash, plastic bags, branches, tires and other debris from bar screens, transport it to and discharge into the appropriate discharge area.
- B. Functional:
 - 1. The Grab Rake System shall primarily consist on an overhead rail type track, a traversing carriage and a raking unit. The carriage shall travel along an overhead track until the desired section of the bar rack has been reached. The rake shall then be lowered to engage and penetrate the bar rack for debris removal to just above invert elevation. The rake shall then be closed, raised and debris transported to the appropriate dumping site.
 - 2. The overhead track shall be fabricated from two I-beams. One beam shall provide the track for the traversing drive and support wheels fitted to the top of the trolley, and the second beam shall support the festoon system and act as a counterbalance for the rake. The track shall be supported by steel support columns located where shown on plan.
 - 3. The rake carriage unit shall contain the traversing trolleys with motors, hoisting gear motor and a hydraulic power unit. The carriage shall be traversed by trolleys mounted on top of the carriage that include wheels, fitted directly to the gearbox output shaft designed to run on the I-beams. The hoisting system shall consist of spirally grooved rope drums mounted on a common shaft within the carriage to raise

and lower the rake. The hoist shaft shall be driven by a geared motor unit with brake. Electrical power to the carriage shall be supplied by a festooning system.

4. The rake grab shall be supported by wire ropes and shall consist of a series of teeth designed to engage with the bar rack, and shall be opened and closed by hydraulic cylinders. The rake head shall be prevented from excessive lateral swaying when traversing motion stops by a swing restrictor.

1.4 OPERATING CONDITIONS

A. South Meadow Pump Station

1. Site Data
 - a. Liquid Being Screened Water
 - b. Number of Channels: 3
 - c. Channel Width: 7'-3.25"
 - d. Channel Depth: 15.75 ft.
2. Technical Data – Screen Cleaner
 - a. Rake Width: 7'- 0"
 - b. Grab Opening: 1'- 8"
 - c. Grab Penetration: 1.5"
 - d. Grab Open/Close Time: 6 sec
 - e. Debris Lift Capacity: 1,500 lbs
 - f. Volume Capacity: 11 ft³/trip
 - g. Raking Speed (Up/Down): 60 ft/min
 - h. Traversing Speed (Left/Right): 100 ft/min
 - i. Hoist Motor Size (min.): 7.5 HP
 - j. Traversing Motor Size (min.): 2 x 0.5 HP
 - k. Hydraulic Motor Size (min.): 2.0 HP
 - l. Motor Speeds (nominal max): 1800 RPM
 - m. Motor Enclosure: TEFC
 - n. Motor Insulation: Class "F"
 - o. Motor Supply: 480 V/3 PH/60 Hz
 - p. Hydraulic Operating Pressure (max.): 1,500 PSI
3. Site Data – Bar Rack
 - a. Deck Level: 10 ft.
 - b. Top of Bar rack Opening: 10 ft.

- c. Invert Level: 5.75 ft.
- B. North Meadow Pump Station
 - 1. Site Data
 - a. Liquid Being Screened: Water
 - b. Number of Channels: 2
 - c. Channel Width: 16'-0"
 - d. Channel Depths: 15.0 ft., 8.0 ft.
 - 2. Technical Data – Screen Cleaner
 - a. Rake Width: 7'- 0"
 - b. Grab Opening: 1'- 8"
 - c. Grab Penetration: 1.5"
 - d. Grab Open/Close Time: 6 sec
 - e. Debris Lift Capacity: 1,500 lbs
 - f. Volume Capacity: 11 ft³/trip
 - g. Raking Speed (Up/Down): 60 ft/min
 - h. Traversing Speed (Left/Right): 100 ft/min
 - i. Hoist Motor Size (min.): 7.5 HP
 - j. Traversing Motor Size (min.): 2 x 0.5 HP
 - k. Hydraulic Motor Size (min.): 2.0 HP
 - l. Motor Speeds (nominal max): 1800 RPM
 - m. Motor Enclosure: TEFC
 - n. Motor Insulation: Class "F"
 - o. Motor Supply: 480 V/3 PH/60 Hz
 - p. Hydraulic Operating Pressure (max.): 1,500 PSI
 - 3. Site Data – Bar Rack
 - a. Deck Level: 10 ft.
 - b. Top of Bar rack Opening: 10 ft.
 - c. Invert Level: -5.0 ft., 2.0 ft.

1.5 DESIGN REQUIREMENTS

- A. The Bar Screen cleaning Machines shall be designed for operation under the conditions specified in Paragraph 11332-1.4.

1. Equipment Guards: The equipment shall operate on an overhead monorail and shall include access enclosures and guards.
2. Maintenance Access: Design of the screen cleaner shall ensure that all routine maintenance of the trolley components can be accomplished above the operating floor level. The gripper rake shall be maintainable by lowering to the deck level for direct access.
3. Local Electrical Control Panels and Control Pendant Stations: Local electrical control panels shall be designed by the manufacturer and shall be provided with NEMA 4X 316 stainless steel enclosures including an Allen Bradley PLC.

1.6 QUALITY ASSURANCE

- A. The equipment shall be designed, fabricated, and assembled in accordance to standard sizes and gages so that repair parts, furnished at any time, can be installed in the field. It shall not have been in service at any time prior to delivery except as required to test and verify proper operations and performance.
- B. This section contains references to the following documents. They are part of this section as specified and modified. In case of conflict between the requirements of this section and those of other specification sections, the requirements of the more stringent section shall prevail.
 1. ABMA American Bearing Manufacturers Association
 2. AGMA American Gear Manufacturers Association
 3. AISC American Institute of Steel Construction
 4. AISI American Iron and Steel Institute
 5. ANSI American National Standards Institute
 6. ASME American Society of Mechanical Engineers
 7. ASTM American Society for Testing and Materials
 - a. ASTM A-36 Carbon Steel
 - b. ASTM A-276 Stainless Steel Bars and Shapes
 - c. ASTM A-123 Zinc
 8. AWS American Welding Society
 - a. AWS D1.1 Structural Welding
 9. AWWA American Water Works Association
 10. IEEE Institute of Electrical and Electronics Engineers
 11. NEC National Electrical Code
 12. NEMA National Electrical Manufacturers' Association
 13. OSHA Occupational Safety and Health Act

- 14. SSPC Steel Structures Painting Council (SSPC)
- 15. UL Underwriters Laboratories
- 16. UBC Uniform Building Codes

1.7 SUBMITTALS

- A. The following information shall be provided:
 - 1. General arrangement drawings.
 - 2. Electrical elementary diagrams, internal connection diagrams and external interconnection diagrams.
 - 3. Local control panel layout drawings.
 - 4. Catalog data on major mechanical and electrical components.
 - 5. Installation details and instructions.
 - 6. Operating and maintenance information.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with trash rake assemblies by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Evoqua Water Technologies, LLC.
 - 2. Ovivo U.S., LLC
 - 3. Or approved equal

2.2 MATERIALS

A. Materials of Construction

Component	Standard	Optional
Support Structure	Epoxy Painted Carbon Steel	Galvanized
Rake Carriage	Epoxy Painted Carbon Steel	Galvanized, 304 or 316 Stainless Steel
Rake Grab	Epoxy Painted Carbon Steel	Galvanized, 304 or 316 Stainless Steel
Teeth	Epoxy Painted Carbon Steel	Galvanized, 304 or 316 Stainless Steel
Hoisting Cables	304 Stainless Steel	316 Stainless Steel
Fasteners	18-8 Stainless Steel	316 Stainless Steel
Anchor Bolts	18-8 Stainless Steel	316 Stainless Steel
Bar Rack	Epoxy Painted Carbon Steel	Galvanized, 304 or 316 Stainless Steel

B. Equipment List:

1. Grab Rake Unit - 2
2. Support Columns – As Indicated
3. Overhead Rails - 4
4. Control Panels - 6
5. Wireless Remote Controls - 4
6. Ultra-Sonic Differential Transducers - As Required
7. Cable Festooning System - 2
8. Anchor Bolts (complete set) – 1

C. Protection: Carbon steel structural parts shall be coated with a high solids epoxy paint or galvanized. Purchased finished items such as motors, gearboxes, switches, etc. shall be supplied with the manufacturer's standard finish, suitable for the application.

D. Carbon Welding: All welding on the bar racks shall conform to AWS D1.1. Welding on items designated for galvanized shall be per recommended standards for galvanized structural fabrication.

2.3 EQUIPMENT

A. Grab

1. The rake grab shall be manufactured from heavy plate and shapes with teeth spaced to match the openings in the bar rack. The rake shall operate by traversing over the required section of the bar rack during a cleaning cycle. The rake shall be in the open position when being lowered.

2. The rake teeth shall normally engage with the bar rack above the maximum high water level. Teeth shall automatically engage and self-center between the bars during the descent.
3. The grab shall have non-metallic, non-lubricated wheels which will ride on the bar rack while ascending and descending. The wheels will also align the grab with the bars to allow smooth operation.
4. The rake teeth shall be capable of passing 1-1/2" into the bar rack without interference from the bar rack horizontal supports. The rake shall continue to descend until it reaches the invert elevation (or an immobile object).
5. The rake grab shall automatically close via hydraulic cylinders when the invert (or blockage) has been reached (or at anytime under manual control).
6. When closing, the upstream portion of the grab shall be rotated towards the teeth to capture and lift objects or debris within the lifting capacity of the hoist, without forcing material into the bar rack.

B. Rake Carriage

1. The carriage shall contain all the necessary traversing and hoisting equipment. This includes the traversing drive and wheels, hydraulic power unit, hoisting drive, hoist drums, hoist cable, hydraulic hoses with spring tensioned hose reel, slack cable tension roller with limit switches, hoist raising and lowering limit sensors, over-travel limit switches and RFID position sensor for automatic operation.
2. The trolley shall be enclosed with fiberglass housings.
3. The TEFC traverse motors shall be adequately sized to allow for continuous operation including loads from the trolley and grab fully loaded. Traverse drive assembly shall include a brake and be controlled via VFD to allow ramping of speed and overload protection. The traverse drive assembly units shall be mounted on pivots to follow the curvature of the track, if applicable.
4. The hoist motor shall be adequately sized to allow for continuous operation including loads from the rake fully loaded. The hoist drive assembly shall include a brake and be controlled via VFD to allow ramping of speed and overload protection. The hoist drive unit shall be mounted directly onto the hoist drum shaft. The hoist drums shall be designed to properly wind the wire ropes during raising or lowering operations. The hoist drums shall be cast iron with hubs keyed to the hoist shaft. Each trolley unit shall include two (2) hoist drums keyed to the head shaft, which rides in ball bearings. The hydraulic hose reel shall be spring tensioned to prevent slack from developing in the hoses. The hoist shaft shall also include two (2) slack rope rollers that shall maintain a constant tension on the hoist cables and sense slack in the hoisting wire rope.
5. The carriage shall be equipped with an adjusting roller device that will allow the grab to be properly aligned with the bar rack during start-up without adjustment of the support structure, to accommodate minor misalignment.

6. The hydraulic pump unit shall provide fluid to open and close the hydraulic cylinders mounted on the grab. The unit shall be capable of continuous operation and shall be sized to develop up to 1500 PSI. The unit shall include all the necessary components for adequate operation including the TEFC motor, pump, coupling, oil return filter, oil reservoir, sight glass, pressure gauge, pressure relief valve, level switch, solenoid operated hydraulic valve, check valve and required hydraulic hoses and fittings. The unit shall trip "OFF" and signal "Hydraulic Failure" if the required level is not maintained.
7. All motors, motor brakes and reducers shall be designed for outdoor service, suitable to the environment.

C. Overhead Track

1. The track shall be manufactured from two open I-beams. Designs utilizing two welded channels shall not be allowed. The track shall be of sufficient size and strength to withstand the forces from the trolley, fully loaded rake, required support span and other conditions as specified in the site data and in accordance with AISC practices. The track shall include bumpers at each end to prevent over travel.

D. Support Structure Assembly

1. The track support columns shall be manufactured from carbon steel plates and shapes. The columns shall be adequately sized to support the track, spaced as indicated on the drawings and sized to withstand the conditions indicated under site data. The columns shall be "U" shaped or "L" shaped as shown on the drawings with heavy flanged feet for fixing to the deck level or other location. The feet shall be anchored via properly sized anchor bolts supplied by grab rake supplier and grouted in place by the contractor.

E. Cables and Festooning

1. Electrical power shall be supplied to the trolley unit via electrical cables supported by a festooning system. Cables shall be shielded as required for proper operation.

2.4 ELECTRICAL CONTROLS

- A. General: Local electrical control panels shall be designed by the manufacturer and shall be provided with NEMA 4X enclosures.

B. Local Control Panel

1. The controls shall include the necessary components to allow for proper operation of the equipment and shall basically consist of the following:
 - a. One (1) main switch panel, internally pre-wired, to house the necessary differential controllers, PLC, contactors, terminal blocks, control transformer, fuses, relays, indicator lamps, operator interface terminal (OIT), power pushbutton with indicator and E-stop. The panel shall be located adjacent to the screening facility. This shall be the main operating panel for controlling the grab rake system.
 - b. One (1) high voltage disconnect panel with E-stop.

- c. One (1) Carriage panel with VFD's, wireless receiver, PLC input module and necessary contactors.
 - d. Two (2) wireless remote controls for manually opening and closing the grab, raising and lowering the grab and traversing the carriage left and right.
2. Access into the panels shall be through a door complete with a mechanically interlocked isolating switch that renders the internal circuits safe, unless they are covered with insulated shrouds or of "safe" low voltage levels.
 3. The control panel shall be fitted with a thermostatically controlled anti-condensation heater.
 4. Air conditioners shall be provided if required by site conditions.
- C. Safety Features: The following safety features shall be incorporated into the system:
1. Motor Overloads
 2. RFID sensors indicating unique carriage position
 3. Over-travel limit switches
 4. Slack cable limit switch
 5. Hydraulic failure indicators

2.5 OPERATION

A. Safety Features

1. If a large quantity of debris or other obstruction prevents the rake from descending to the invert elevation, a slack cable limit switch shall actuate ceasing the lowering motion. The grab will then close and raise, and the debris transported to the dump area. In automatic mode, the rake will then try to clean the same location two more times. If slack cable is still indicated at the end of the third cycle, an alarm will indicate on the panel and the rake will continue to the next cleaning station.
2. If the debris collected is too heavy as indicated by the hoist motor amperage draw, the system will stop and an alarm will sound.
3. Limit switches shall be fitted to each side of the trolley with corresponding flags on the track to prevent inadvertent over-travel. If over-travel is indicated, the rake will stop and an alarm will sound. Motion will only be permitted in the opposite direction until the over-travel is cleared.
4. If hydraulic level or temperature is not maintained, a "Hydraulic Failure" will be indicated at the main panel and an alarm will sound.
5. RFID cards along the travel path indicate cleaning stations for the rake, and flags actuating limit switches on the carriage indicate the exact descending location. This dual indication system will allow the rake to accurately and repeatedly descend at the same position, and also indicate a unique position to prevent the rake from

becoming "lost". If a flag or RFID tag is missing, the PLC will detect the error, stop the cycle and sound an alarm.

6. All errors will be indicated on the OIT for easy troubleshooting and repair.

B. Automatic Operation

1. General automatic mode information:

- a. The normal mode of operation is intended to be full automatic. Both the Differential Cleaning Mode and the Timer Cleaning Mode are to be enabled for normal operation.
- b. Prior to any automatic cycle start, the alarm will sound for a few seconds and the amber light on the carriage will flash during the entire cycle.
- c. Automatic mode settings are accessible through the OIT panel.
- d. Regardless of initiation mode, the full automatic cycle shall operate as follows:
 - 1) Upon initiation, the alarm will sound for a few seconds.
 - 2) The carriage will traverse to the first cleaning station. The RFID tag will indicate the approach to the station and slow the carriage via the VFD. When the carriage reaches the station flag (as indicated by a limit switch on the carriage), the carriage will stop at the exact cleaning position.
 - 3) The grab will open via the hydraulic cylinders.
 - 4) The grab will descend the bar rack until it reaches the well invert as indicated by the hoist count sensor. Debris will be collected in the grab as it descends.
 - 5) The grab will close, capturing the debris.
 - 6) The grab will ascend the bar rack with the debris, until it reaches the carriage.
 - 7) The carriage will traverse to the dump station and the grab will open, releasing the debris.
 - 8) The grab will close, and the carriage will traverse to the next cleaning station and repeat the cycle until all stations are cleaned.
 - 9) When complete, the carriage will return to the home position, ready for the next cycle.

2. The automatic modes of operation are as follows:

- a. Operator initiated full cleaning cycle
 - 1) This mode is initiated via a selection on the OIT screen by the operator.
 - 2) After operator initiates, the rake will clean each station consecutively as described above, until the entire intake is complete.
- b. Operator initiated semi-automatic cycle

- 1) This mode is initiated via a selection on the OIT screen by the operator.
- 2) The operator selects Semi-Automatic mode, then selects a station to be cleaned.
- 3) The rake cleans only that station as described above, then returns to the home position.
- c. Timer initiated cleaning cycle
 - 1) Timer Cleaning Mode must be enabled via the OIT Auto-Start Settings
 - 2) The timer delay (one to 24 hours) is set via the OIT Auto-Start Settings as required for site conditions.
 - 3) In this mode, the rake will initiate a complete cleaning cycle at the duration specified by the timer settings, then re-set the timer for the next cycle.
 - 4) When initiated via the timer, the rake will clean each station consecutively as described above, until the entire intake is complete.
- d. Differential initiated cleaning cycle
 - 1) Differential Cleaning Mode must be enabled via the OIT Auto-Start Settings
 - 2) The Differential Start Level and Differential Alarm Level shall be entered in the Auto-Start Settings based on site requirements.
 - 3) The rake shall be supplied with two (or more, as required by the intake layout) ultrasonic level sensors. These will be mounted as one upstream and one downstream of the bar rack.
 - 4) The levels as detected by the sensors will be relayed to the PLC, and the actual differential across the screen will be calculated.
 - 5) When the actual differential level meets or exceeds the entered Differential Start Level, a complete cleaning cycle will be initiated and the rake will clean all stations as described above. If the actual differential has not dropped below the start set-point when the cycle is complete, another cleaning cycle will be immediately started.
 - 6) After a complete cycle is complete, and the differential has dropped below the start set-point, the rake will return to the home position.
 - 7) If, at any time, the actual differential meets or exceeds the entered Differential Alarm Level, an alarm will sound, and the condition will be displayed on the OIT. The rake will continue to operate during this alarm condition.
3. Output signals for alarms and rake status can be provided to the client's SCADA system. Input signals from the client's SCADA system to initiate an automatic

cleaning cycle can be accepted. All interface signals must be coordinated prior to shipment to ensure compatibility.

4. The panel shall include any additional controls, indications or alarms considered necessary for safe operation and protection of the equipment.

C. Manual Operation

1. General manual mode information:
 - a. Manual operation allows the grab to be opened, closed, hoisted, lowered and traversed in both directions within safe operating parameters.
 - b. All safety features are active in manual operation, and the rake will not operate outside of these parameters
 - c. The operator shall be able to select high or low speed via the OIT panel. This shall control both traversing and hoisting speeds.
 - d. There will be a green light on the OIT and the rake carriage that will serve as a visual indicator that the screen is correctly positioned above a cleaning or dump station. In manual mode, the rake will not automatically stop at any cleaning or dump stations.
 - e. Manual mode shall only be used when there is direct line of site from the operator to the rake.
2. The manual modes of operation are:
 - a. Manual control via the OIT panel
 - 1) When the rake is set to Manual Mode in the OIT panel, the control buttons will appear:
 - a) Grab
 - b) Hoist
 - c) Trolley
 - d) Extend
 - e) Retract
 - 2) Motion is activated by selecting a function (grab, hoist or trolley) and an action (extend or retract). Motion will continue as long as the action button is pressed, or until a safety is reached (over-travel, slack cable, etc.)
 - b. Manual control via the wireless remote
 - 1) The wireless remote is activated via the OIT panel
 - 2) The remote controls the same manual functions described above
 - 3) Motion is activated by pressing and holding the function button and the action button. Both buttons must be held to continue motion.

D. Maintenance Mode

1. Maintenance mode is intended only for commissioning or emergency use.
 - a. During commissioning it may be used to verify operation and set-up prior to PLC testing.
 - b. For emergencies, such as problems with operation where the rake is located at an inaccessible area for maintenance, it may be used to return the rake to a maintenance area.
2. In maintenance mode the hoist counter is not active; therefore care must be used during operation. Traversing over-travel, slack cable and hoist-up over travel are still active.
3. During maintenance mode, the PLC is bypassed, and the rake is controlled via contactors directly to the VFD's.
4. The wireless remote is used for operation during maintenance mode. The operations are the same as described above for the manual mode.
5. Maintenance mode is accessed via a locking selector switch on the main control panel.
6. Maintenance mode shall only be used when there is direct line of site from the operator to the rake

2.6 EQUIPMENT GUARDS

- A. The trolley shall be enclosed by fiberglass guard panels.
- B. The area of operation is to have appropriate railing and warnings to prevent personnel from entering. The rake is an automated piece of equipment, and may start at any time.

2.7 SPARE PARTS

- A. The following spare parts shall be provided:
 1. Control Valve 1 each
 2. Slack Cable Roller 2 each
 3. Limit Switch 2 each
 4. Rake Wheels and Spacers 1 set
 5. Hydraulic Hoses 1 set
 6. Hydraulic cylinder 1 each
 7. Counterbalance Roller 1 each
 8. Slack Cable and Counterbalance Bearings 4 each
 9. The spare parts shall be tagged and stored by the contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation and assembly of the equipment shall be in accordance with the drawings and with the manufacturer's installation instruction manual. The contractor shall furnish all bolts, shims, tools and other devices necessary for installing the bar rack, support structure and monorail system. The manufacturer's representative familiar with the equipment shall advise on the handling, installation, start-up and testing of the equipment.

3.2 CLEANUP PRIOR TO START

- A. After the system is installed and prior to start-up, complete clean up of the screen area of any accumulated construction debris shall be done. Any damage to the bar rack or related equipment during initial start-up due to foreign objects left in the sump areas shall be corrected at the contractor's expense.

3.3 RAKE FIELD TESTS

A. Field Testing

- 1. Field testing shall be conducted by the contractor in conjunction with the manufacturer's representative and will be witnessed by the owner. Before initially energizing the motors, the contractor shall have successfully tested all the control, monitoring, and protective circuits. This thorough electrical checkout procedure shall have followed a detailed step-by-step approved test plan. The motor units undergoing tests should also be checked at this time.

B. Dry Test

- 1. All pieces of the equipment shall be tested in the dry condition in accordance with the manufacturer's instructions to determine whether it has been properly installed. Such test shall be made when, and as, directed by the owner. Should test reveal a design or installation deficiency or a manufacturing error in the components, the problem shall be promptly corrected by and at the expense of the contractor.

C. Wet Test

- 1. The system shall be given an operating test under load for a period of at least one hour or as directed by the owner. The tests shall be conducted by the contractor and will be witnessed by the owner.

D. Operation Testing

- 1. Operation testing shall include all manual and automatic operations and cycles. All operations shall be tested a minimum of 5 times and until continuous error-free operation is assumed.

3.4 OPERATOR TRAINING

- A. The equipment manufacturer shall provide an instruction/training session for the equipment. The training sessions shall include preventative maintenance requirements, parts replacement, troubleshooting instructions and normal operating practices.

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SECTION 16010 - SUMMARY OF WORK - ELECTRICAL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The work provided under Division 16 shall be as specified in Division 16 sections listed in the table of contents and as indicated on the drawings. In summary and without limiting the generality thereof, the work shall consist of the following:
1. Basic Materials and Methods
 2. Demolition
 3. Power Distribution
 4. Final connection to equipment provided under other divisions.
- B. Electrical Contractor shall provide all temporary power and lighting as required for construction activities.

1.2 RELATED WORK

- A. The following work shall be performed under other Divisions. Coordinate related work with the following:
1. Trash Rack Demolition
 2. Sitework for trash rack
 3. Installation of new trash rack

1.3 QUALITY ASSURANCES

- A. Only the best of workmanship in accordance with present standards and generally accepted construction practices will be acceptable. Any work installed which the workmanship is judged by the Engineer to be below the present standards or generally accepted construction practices shall be taken out and replaced with properly done work at the Contractor's expense.

1.4 SITE CONDITIONS

- A. The Drawings shall be taken in a sense as diagrammatic. Locations of mechanical and electrical equipment are not intended to show every offset and fitting, nor every structural difficulty that may be encountered during the installation of the work. Where necessary and after approval from the Engineer, the alignment of work and equipment shall be varied from that shown on Drawings without extra expense to the Owner.
- B. Install work as close as possible to layouts shown on Contract Drawings. Modify work as necessary to:
1. Provide maximum possible headroom and space clearances.
 2. Provide ready access to all parts of the work, for inspection, operation, safe maintenance and repair, and code conformance.
 3. Coordinate and arrange work to avoid conflicts with work of other trades. Satisfactory space conditions shall be shown on coordination drawing submittals.

4. Where space appears inadequate, consult Engineer before proceeding with installation.

C. Finished work shall present a neat coordinated appearance.

1.5 PROJECT CONTROL

- A. The Contractor shall ensure no debris from demolition or construction remains at the close of each workday and that work areas adjacent to the work area are maintained in a safe and useable condition.

1.6 DEFINITIONS

A. The following terms are used in this Division and are defined as follows:

1. "Provide": To furnish and install, ready for safe and regular operation the item, material or service under discussion.
2. "Furnish": To purchase, acquire and deliver to the site, complete with related accessories.
3. "Install": To erect, mount and connect completely, by acceptable methods.
4. "Work": Labor, materials, equipment, apparatus, controls and accessories required for proper and complete installation.
5. "Concealed": Embedded in masonry or other construction; or installed in furred spaces, trenches or crawl spaces; or installed within double partitions or hung ceilings; or in enclosures.
6. "Exposed": Visible to building occupants, excluding mechanical room and utility tunnel locations.
7. "Equal": Of weight, size, design, capacity and efficiency to meet requirements specified and shown, and of acceptable manufacture, as determined in the opinion of the Engineer.
8. "Acceptable": Acceptable, as determined in the opinion of the Engineer.
9. "Contractor": General Contractor.
10. "Named" Product: Manufacturer's name for product, as recorded in published documents of latest issue as of date of Contract Documents. Obtain Engineer's permission before using products of later or earlier model.

B. Standards, specifications and tests of following technical societies, organizations and governmental bodies, as referenced in Contract Documents, are hereby made part of Contract Documents.

1. IES: Illuminating Engineering Society.
2. NEC: National Electrical Code.
3. ANSI: American National Standards Institute.
4. ASTM: American Society for Testing and Materials.
5. EPA: Environmental Protection Agency.
6. FS: Federal Specification.
7. IEEE: Institute of Electrical and Electronics Engineers.
8. NEMA: National Electrical Manufacturers Association.
9. NFPA: National Fire Protection Association.
10. OSHA: Occupational Safety and Health Administration.
11. UL: Underwriters Laboratories.

12. CODE: Codes and regulations of the Federal, State and local governments and of utility companies having jurisdiction, as appropriate.

C. Use of a singular or plural reference in these Specifications shall not be construed to limit number of units required. These specifications are intended to define quality and performance characteristics; quantity of units supplied shall be as needed to meet requirements as specified and as shown on Contract Documents.

PART 2 - PRODUCTS

A. Products provided under Division 16 shall be as specified in the following Sections of Division 16 and as indicated on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation requirements for the work provided under Division 16 shall be as specified in the following Sections of Division 16 and as indicated on the Drawings.

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SECTION 16050 - BASIC MATERIAL AND METHODS - ELECTRICAL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Unless otherwise indicated, provide Basic Material and Methods including raceway, wire and cable, pull and junction boxes, outlet boxes, wiring devices, motor starters, disconnect switches, overcurrent protective devices, electrical equipment not furnished as an integral part of manufactured equipment, and all incidental devices and accessories necessary for the complete installation of electrical systems indicated on the Drawings and specified in other Sections of Division 16.

1.2 PERMITS AND FEES

- A. The Contractor shall give all necessary notices, obtain all permits, file all required plans, obtain all necessary approvals of governmental departments and utilities having jurisdiction over the electrical work and obtain all required certificates and inspections. If requested in writing or specified in other Division 16 Sections provide Engineer with copies of notification letters, permits, certificates, and inspection reports. The Contractor shall pay permit fees.

1.3 CODES, REGULATIONS AND STANDARDS

- A. All materials, equipment, apparatus and work shall be in accordance with the latest edition of the National Electrical Code which has been adopted by the State of Connecticut, State and Local codes, and the requirements of the local utility companies.
- B. All equipment and material provided under Division 16 shall be approved by the Underwriters' Laboratories, Inc. or other national, well known testing laboratory as evidenced by listing or labeling. All equipment items or parts thereof shall bear the manufacturer's nameplate, which shall give all pertinent information for the particular item. Distributor's or contractor's nameplates will not be acceptable.
- C. Contract Documents shall govern whenever they are more stringent than Code requirements.
- D. Where discrepancies occur between the Specifications and the Drawings, the more stringent rule shall govern. The Contractor shall bring all discrepancies to the Engineer's attention.

1.4 SUBMITTALS

- A. Prepare shop drawing according to paragraphs 1.04 G and 1.04 H and submit through the Contractor to the Engineer for review.
- B. The selection and intention to use a product specified by name shall NOT excuse the need for timely submission of shop drawings for that product.

- C. Immediately after award of contract and prior to submitting shop drawings, Contractor shall submit for review a preliminary list of intended or proposed manufacturers for all items for which shop drawings are required.
 - D. Submission of shop drawings of unnamed manufacture or shop drawings at variance with the Contract Documents is NOT a proper request for substitution.
 - E. Samples that are submitted in lieu of shop drawings shall be clearly identified and shall be submitted in duplicate. Only one sample will be returned and the accepted sample shall be kept available at the job site office. The accepted sample retained by the Engineer will be kept available at Engineer's home office.
 - F. Upon completion of shop drawing review, shop drawings will be returned, marked with one of following notations: Furnish as submitted, Furnish as corrected, Revise and Resubmit, Rejected, or Submit Specified Item. Only products whose shop drawings are marked "Furnish as submitted" or "Furnish as corrected" shall be used on the project.
 - G. Submittals shall clearly indicate the following information:
 - 1. Specification Section and Paragraph under which equipment is specified. (Failure to comply will result in submittal rejection.)
 - 2. Equipment or fixture identification corresponding to that used in Contract Documents. (Failure to comply will result in submittal rejection.)
 - 3. Descriptive data necessary to verify compliance with Contract Documents. (Failure to comply will result in submittal rejection.)
 - 4. Manufacturer's specifications including materials of construction, metal gauge, thickness and finish.
 - 5. Certified dimensional drawings including clearances required for maintenance or access.
 - 6. Performance data, ratings, operating characteristics and operating limits.
 - 7. Electrical ratings and characteristics.
 - 8. Wiring and control diagrams, where applicable.
 - 9. Certifications requested, including UL label or listing.
 - H. In addition, submittals shall include the following:
 - 1. Accessories and special/non-standard features and materials which are being furnished.
 - 2. List of accessories which are required for a proper installation but are NOT being provided by the product manufacturer or are NOT being furnished under this Section. In the latter case, identify the Section(s) under which the accessories are being furnished.
- 1.5 PRODUCT SELECTION
- A. Contractor's options for selecting products are limited by Contract Document requirements and governing regulations and are NOT controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are NOT necessarily limited to, following various methods of specifying:

1. "Or Equal": Where named products are accompanied by the term "or equal" or words of similar effect, provide one of named products or propose substitute product according to paragraph 1.06, SUBSTITUTIONS.
 2. Standards, Codes and Regulations: Where specification requires only compliance with a standard, code or regulation, Contractor may select any product which complies with requirements of that standard, code or regulation.
 3. Performance Requirements: Provide products which comply with specific performances indicated and which are recommended by manufacturer (in published product literature or by individual certification) for application intended. Overall performance of product is implied where product is specified with only certain specific performance requirements.
- B. Inclusion by name, of more than one manufacturer or fabricator, does NOT necessarily imply acceptability of standard products of those named. All manufacturers, named or proposed, shall conform, with modification as necessary, to criteria established by Contract Documents for performance, efficiency, materials and special accessories.

1.6 SUBSTITUTIONS

- A. Substitution requests from vendors, suppliers and manufacturers may be submitted only during bid period. Requests for substitution will NOT be considered unless requests are received by the Engineer at least 7 days prior to Bid Due date AND all supporting data is provided such that an adequate review can be performed. If substitution is acceptable, an Addendum will be issued.
- B. Substitution request from Contractors may be submitted only after the award of Contract. Requests shall be in writing on Contractor's letterhead and shall include:
1. Contractor's statement to the effect that proposed substitution will result in overall work equal to or better than, work originally intended.
 2. Contractor's detailed comparison of significant qualities between specified item and proposed substitution.
 3. Statement of effect on construction time, coordination with other affected work, and cost information or proposal.
- C. Substitution requests from contractors will only be considered if:
1. Extensive revisions to Contract Documents are NOT required;
 2. Changes are in keeping with general intent of Contract Documents;
 3. Requests are submitted in a timely and proper manner, fully documented; and
 4. One or more of following conditions is satisfied; all as judged by Engineer:
 - a. Where request is directly related to the "or equal" clause or words of similar effect in Contract Documents.
 - b. Where specified product, material or method can NOT be provided within Contract Time; but NOT as a result of Contractor's failure to pursue the work promptly to coordinate various activities properly.
 - c. Where specified product, material or method can NOT be provided in manner which is compatible with other materials of the work and where Contractor certifies that proposed substitution is compatible.

- d. Where specified product, material or method can NOT be properly coordinated with other materials of the work and where Contractor certifies that proposed substitution can be properly coordinated.
 - e. Where specified product, material or method can NOT be warranted as required and where Contractor certifies that proposed substitution can be so warranted.
 - f. Where specified product, material or method can NOT be used without adversely affecting Owner's insurance coverage on completed work and where Contractor certifies that proposed substitution can be so used.
 - g. Where specified product, material or method will encounter other substantial non-compliances which are NOT possible to otherwise overcome except by using proposed substitution.
 - h. Where specified product, material or method can NOT receive required approval by governing authority and proposed substitution can be so approved.
 - i. Where a substantial advantage is offered to the Owner; in terms of cost, time, energy conservation or other valuable considerations; after deducting offsetting responsibilities that this Contractor may be required to bear, including additional compensation to Engineer for any redesign or evaluation services, increased cost of other work by other contractors, and similar considerations.
- D. The burden is upon the Contractor, supplier and manufacturer to satisfy to the Engineer that:
- 1. The proposed substitute is equal to, or superior to, the item specified.
 - 2. The intent of the Contract Documents, including required performance, capacity, efficiency, quality, durability, safety, function, appearance, space clearances and delivery date, will be equaled or bettered.
- E. Changes in work of other trades, such as structural supports, which are required as a result of substitution and the associated costs for such changes, shall be the complete responsibility of the Contractor proposing the substitution. There shall be NO additional expense to the Owner.

1.7 SAMPLES

- A. Submit samples as requested by Engineer/Owner.

1.8 RECORD DRAWINGS

- A. Contractor shall maintain and keep on the job at all times, one complete and separate set of blackline prints of the Electrical work. As work progresses, all changes, revisions and additions to Electrical work shall be recorded clearly, neatly, accurately and promptly.
- B. Contractor shall indicate daily progress on these prints by coloring in the various lines, fixtures, apparatus and associated appurtenances as they are erected.
- C. Approval of requisition for payment of work installed will NOT be given unless supported by the record prints as required above.
- D. At the conclusion of work, Contractor will deliver all record drawings to Owner as required by GENERAL CONDITIONS and SUPPLEMENTARY GENERAL CONDITIONS.

1.9 OPERATING AND MAINTENANCE MANUALS

- A. Contractor shall submit for review, Operating and Maintenance manuals for each system or piece of equipment, at least 4 weeks prior to request for acceptance of same. Upon acceptance, Contractor will furnish 4 copies of each manual to Engineer for transmittal to Owner. Operating and Maintenance manuals shall be arranged in the following format:
1. Description of Electrical System and Component Parts, including function, normal operating characteristics and limiting conditions, performance curves, engineering data and tests, and complete nomenclature and manufacturer's number for replaceable parts. (Tab A)
 2. Operating Procedures, including start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shutdown and emergency instructions; summer and winter operating instructions; and any special operating instructions. (Tab B)
 3. Sequence of Operation and Control Diagrams, corrected to show as-built conditions. (Tab C)
 4. Copies of approved shop drawings, charts and diagrams. (Tab D)
 5. Maintenance Procedures, including routine operations, guide to trouble-shooting; disassembly, repair and reassembly; alignment, adjusting and checking; servicing and lubrication schedule, and list of lubricants; manufacturer's installation and maintenance bulletins and related information. (Tab E)
 6. Parts List, including illustrations, assembly drawings and diagrams required for maintenance, predicted life of parts subject to wear, and recommendations for stocking spare parts. (Tab F)
 7. Names, addresses and telephone numbers of manufacturer's representative and Service Company. (Tab G)
 8. Other data, if required under pertinent Sections of these Specifications. (Tab H)

1.10 GUARANTEE

- A. Furnish standard manufacturers' guarantees for all work under this Division. Such guarantees shall be in addition to, and NOT in lieu of, other liabilities under the law or by other provisions of the Contract Documents.
- B. Materials, equipment and workmanship shall carry the standard warranty against defects in material and workmanship. Failure which may develop due to defective or improper material, equipment, workmanship or design shall be made good, forthwith, by and at the expense of the Contractor, including damage done to areas, materials and other systems resulting from this failure.
- C. Guarantee that all elements of the systems are of sufficient capacity to meet the specified performance requirements as set forth in Contract Documents.
- D. Upon receipt of notice from Owner of a failure of system(s) or component(s) during the guarantee period, replace affected components within reasonable time period at no additional cost.

- E. Guarantee period shall extend minimum of one year from Date of Acceptance of project by Owner.
- F. Before final request for payment, Contractor shall furnish written guarantee covering the above requirements.

1.11 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- A. Before submitting prices or beginning work, Contractor must thoroughly examine the site and the Contract Documents.
- B. No claim for extra compensation will be recognized if difficulties are encountered which would have been revealed by examination of site conditions and all Contract Documents prior to executing Contract.
- C. Where discrepancies occur within Contract Documents, notify Engineer in writing, of discrepancy and request a clarification. Until notified of Engineer's decision, include item or arrangement of better quality, greater quantity or higher cost in Contract price.
- D. Notify Engineer, in writing, of all materials and apparatus believed to be omitted, inadequate or unsuitable, or in violation of laws, ordinances, rules or regulations of authorities having jurisdiction. In absence of such written notice, it is mutually agreed that bid price for work performed under each Section has included the cost of any and all items required for acceptable and satisfactory functioning of the entire system.

1.12 GUARANTEE AND WARRANTY

- A. All materials, equipment and labor provided under Division 16 shall be guaranteed against defects for a period of one year or as specified in Division 1. Any defects that appear during the guarantee period shall be corrected at no cost to the Owner. The Electrical contractor shall provide free maintenance and emergency service including labor and materials during the guarantee period.
- B. Any item provided under Division 16 that requires excessive servicing during the guarantee period will be considered defective and shall be replaced at no cost to the Owner.
- C. A letter of guarantee along with any extended equipment warranty shall be delivered to the Owner before final payment is made.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Basic Materials as specified in Section 16110 through 16199.
- B. Materials for systems are specified in Section 16200 through 16999.
- C. Materials for work are also specified on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The wiring method shall be copper conductors with 600 volt THWN insulation installed in conduit as shown on the Drawings:
- B. All connections shall be made with an approved type of solderless connector, shall be protected from mechanical injury and shall be rigidly supported. All contact surfaces shall be thoroughly cleaned and bright before connection is made so as to insure a good metal-to-metal contact. All ground connections shall be accessible for inspection at all times.
- C. All other installation of electrical equipment shall be in accordance with that prescribed in the individual sections of Division 16 and the National Electrical Code.
- D. Conduit and electrical distribution equipment shall be installed to resist the earthquake effects determined in accordance with the requirements of the Connecticut Basic Building Code.

3.2 FIELD QUALITY CONTROL

- A. Upon completion of all work and tests, the Contractor shall instruct the Owner or his representative fully in the operation, adjustment, and maintenance of all electrical equipment provided under Division 16. The procedures of any instructions pertaining to the operation and/or programming of equipment shall be video taped and two copies turned over to the owner.
- B. The contractor shall obtain services of manufacturer's representatives of major equipment during erection or construction of their respective equipment to insure proper installation of same. Failure to have such checks made by manufacturers shall place full responsibility for proper installation on contractor who shall make any corrections or remedy all defects at no additional cost to Owner. If required by the Engineer, a letter shall be provided from each manufacturer certifying that manufacturer's requirements are met.
- C. Each contractor shall test and adjust the systems and equipment for which he is responsible during the progress of the work, as required by the Engineer, and shall thoroughly test the same under working conditions at the completion of the work.
- D. The Contractor shall coordinate all activities related to the electrical work.

3.3 UNINSPECTED WORK

- A. Uninspected work shall not be covered up or enclosed until it has been inspected, tested, and approved by the Owner's representative and by the authorities with the appropriate jurisdiction.

- B. Should any work be covered or enclosed before it has been completely inspected, tested and approved, the Contractor shall uncover such work as requested. After the work has been completely inspected, tested, and approved, the Contractor shall provide all materials and labor necessary and make all repairs necessary to restore the work to its original and proper condition at no additional cost to the Owner.

END OF SECTION

SECTION 16112 - CONDUIT

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all material and labor for the complete installation of conduit as specified in other Sections of this Specification or indicated on the Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Intermediate Metal Conduit: IMC shall be hot-dip galvanized steel with threads that have been galvanized after cutting. IMC shall conform to Federal Specification WWC-581 (latest revision), UL 1242, and Article 345 "Intermediate Metal Conduit" of the NEC.
- B. Liquidtight Flexible Conduit: LT shall be galvanized steel strip, spiral wound into interlocked flexible steel conduit with an outer liquidtight nonmetallic sunlight resistant jacket. The interior shall be formed into smooth surface for easy wire pulling. LT shall conform to Article 351 "Liquidtight Flexible Conduit" of the NEC. A separate internal grounding conductor shall be installed.
- C. Conduit Fittings: Fittings for metallic conduit shall be corrosion-resistant plated steel or die cast and UL listed as indicated below. Regal, Appleton, Atlas and Bridgeport are also acceptable manufacturers.

Conduit Type	UL File No.
IMC	E-1275, 504G, 651B, 886C, 964L
LT	583C

PART 3 - EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

- A. Arrange conduit to maintain headroom and present a neat appearance.
- B. Exposed conduit and conduit above accessible ceilings shall be run parallel with or at right angles to the walls of the building and adjacent piping only in locations as approved by the Architect or Engineer or as indicated on the Drawings.
- C. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- D. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. All conduits shall be supported by approved hangers, clamps or clips fastened to the building

structure. Do not fasten to other systems. Spacing of supports for conduits and raceways shall be in accordance with the National Electric Code.

- E. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- F. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
- G. Support conduit per NEC.

3.2 INSTALLATION

- A. Conduit for power, lighting circuits and low voltage control circuits shall be a minimum of 3/4".
- B. All metal conduit, enclosures and raceways for conductors shall be mechanically joined together to form a continuous electrical continuity and bond. Provide grounding bushings on all conduits 1-1/4 inches and larger.
- C. Conduits shall be in full lengths wherever possible and all ends shall be cut square, reamed and burred.
- D. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- E. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
- F. Install no more than the equivalent of four 90 degree bends in between boxes.
- G. Use conduit bodies to make sharp changes in direction.
- H. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inches in size.
- I. IMC conduit shall be assembled with threaded connections, double lock nuts and bushings at conduit terminations, standard radius bends. When conduit is exposed, "L" fittings may be used.
- J. Follow connector manufacturers' instructions and NEC requirements when connecting FLX, and LT conduit to junction and outlet boxes. A separate internal grounding conductor shall be installed.
- K. Where conduit extends through concrete floor in wet locations furnish and install galvanized steel pipe sleeves. Seal the opening between the conduit and the sleeve with fire rated flexible sealer.
- L. The use of wooden plugs inserted in concrete or masonry units as base for fastenings conduits, tubing, boxes, cabinets, or other equipment shall be prohibited.
- M. The installation of conduit or tubing which has been crushed or deformed shall be prohibited.

- N. All conduits shall be plugged with approved discs during construction and be dry and clean before pulling wires.
- O. Install conduit to prevent low spots which might accumulate water during or after installation. Where unavoidable, provide junction box with drain fitting at conduit low point.
- P. Install expansion joints where conduit crosses building expansion or seismic joints.
- Q. Where conduit penetrates fire-rated walls and floors, provide pipe sleeve two sizes larger than conduit; pack void around conduit with fire rated flexible sealer and fill ends of sleeve with fire-resistive compound.
- R. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket.

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SECTION 16120 - WIRE AND CABLE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all material and labor for the complete installation of wire and cable required for electrical work specified in other Sections of this Specification or as indicated on the Drawings.

1.2 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Conductor sizes are based on copper.
- C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required meeting Project Conditions.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All wire sizes indicated on Drawings and this Specification are based on copper conductors. All conductors provided shall be copper.
- B. Provide copper conductors installed in conduit for power and lighting. (NEC Type THWN) Conductors shall be 98% conductivity solid or class B concentric strand copper with 600 volt thermoplastic insulation manufactured in accordance with UL 83.
- C. Minimum size of conductor shall be No. 12. Conductors of size greater than No. 8 shall be stranded.
- D. Provide type MC cable only as indicated on drawings or in paragraph 3.03 S of this section. Conductors shall be 98% conductivity solid conductors with 600 volt type THWN thermoplastic insulation. Provide full size insulated copper grounding conductor. MC cable shall meet UL Standard 1564.
- E. Copper conductor installed in conduit for low voltage control. (NEC Class 2 cable) Minimum size of conductor shall be No. 16.
- F. Conductor shall be marked in accordance with the requirements of the NEC Article 310-11. Conductors shall be identified in accordance with the requirements of the NEC Article 310-12 and as indicated below:
 - 1. Circuit with:

- a. two conductors White, Black
- b. three conductors White, Black, Red
- c. four conductors White, Black, Red, Blue
- d. five conductors White, Black, Red, Blue, Yellow

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that mechanical work likely to damage wire has been completed.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Install all wire in accordance with Section 16050, manufacturer's instructions and the NEC requirements.
- B. All connections and pigtail splices for wires #14-#10 shall be made with insulated type "Y", "R", or "B" spring connectors or compression splices. Conductor sizes #8 and larger shall be made with compression connectors.
- C. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- D. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- E. Use conductor not smaller than 12 AWG for power and lighting circuits.
- F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- G. Use solid conductors for feeders and branch circuits 10 AWG and smaller.
- H. Use stranded conductors not smaller than 14 AWG for control circuits.
- I. There shall be no splices in any conductors except where circuits are branched and located in accessible junction or outlet box.
- J. Unless otherwise noted, each conduit raceway shall contain only those conductors constituting a single feeder circuit.
- K. Branch circuit home runs shall not share a common neutral. Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
- L. Pull all conductors into raceway at same time.

- M. Protect cable from damage.
- N. Clean conductor surfaces before installing lugs and connectors.
- O. Neatly train and lace wiring inside boxes, equipment and panelboards.
- P. Run conductors of same circuit in same conduit. Run conductors of different voltage systems in separate conduits.
- Q. All feeder and branch circuits shall have a full size separate grounding conductor installed in the conduit.
- R. Final connections to equipment shall be made with copper insulated conductors installed in liquid tight flexible raceway. Minimum size $\frac{3}{4}$ ".

3.4 INTERFACE WITH OTHER PRODUCTS

- A. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.5 FIELD QUALITY CONTROL

- A. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
- B. Do not use heavy mechanical means for pulling conductors.
- C. Only UL approved wire pulling lubricant shall be used.
- D. Insulation integrity shall be tested before energizing any circuits.
- E. Verify continuity of each branch circuit conductor.
- F. Inspect wire for physical damage and proper connection.
- G. Perform field inspection and testing under provisions of Division 1.

END OF SECTION

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SECTION 16132 - OUTLET BOXES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all material and labor for the complete installation of outlet boxes for electrical work specified in other Sections of this Specification or indicated on the Drawings.

1.2 QUALITY ASSURANCES

- A. Where discrepancies occur between the Electrical Plans and the Architectural Plans and details or a doubt exists as to the exact location of an outlet or fixture, or mounting heights, the Architect and Engineer shall be notified and a decision obtained before proceeding with the work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Outlet boxes for concealed wiring shall be galvanized sheet steel and shall have plaster rings as required for the depth of the wall or ceiling finish and for the wiring device mounted thereon.
- B. Provide metal supports and other accessories for installation of each box.
- C. When required, provide fixture studs for ceiling and other fixture boxes.
- D. Provide extensions as required to bring box flush with finish surface.
- E. Outlet boxes for exposed wiring shall be cast metal.
- F. Outlet boxes for hazardous locations shall be explosive-proof and be of proper design for the area in which they will be installed.
- G. Outlet boxes for plastic conduit shall be plastic of proper design for conduit.
- H. Outlet boxes shall be of size and type to accommodate: the structural conditions; size and number of raceways and conductors or cables entering; and device or fixture for which required.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before roughing-in outlet boxes, the Electrical Contractor shall coordinate the locations of all outlets with other trades and the Architectural Plans and interior room elevations so that wall boxes do not fall behind work tables, counters, mechanical equipment, cabinets, etc.

3.2 INSTALLATION

- A. Boxes shall be rigidly and securely fastened to the structure.
- B. Suitable fittings shall be used for the cable or raceway connection to the outlet box.
- C. Locate boxes so outlets are not obstructed by pipes, ducts, or other items.
- D. Seal all unused openings.

END OF SECTION

SECTION 16133 - PULL AND JUNCTION BOXES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide material and labor for the complete installation of pull and junction boxes for electrical work specified in other Section of this Specification and as indicated on the Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Boxes shall be hot dipped galvanized #14 gauge steel, with angle iron supports and braces.
- B. Access shall be by means of removable screw covers.
- C. Pull and junction boxes shall be of size as required by the National Electric Code, the size and number of conduits and/or cables entering.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Pull and junction boxes shall be installed where shown on drawings and where more than three 90 degree bends are required between conduit terminations and also where required to facilitate cable pulling although not indicated on plans.
- B. Support boxes securely from building members, not from raceways, or other system. Install boxes so they are accessible for wire pulling after building is completed. Seal all unused openings.
- C. Pull boxes are not permitted in finished areas, corrosive areas, stair towers or hazardous areas. All locations shall be approved by Engineer and Architect.

END OF SECTION

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SECTION 3

GENERAL INFORMATION FOR PREPARATION AND DELIVERY OF A RESPONSE

Rev. 06/04/12

Definitions:

Request for Response (RFR) refers to any form of solicitation the City may use, such as a Request for Bids (RFB), Request for Proposal (RFP), Request for Information (RFI) or Request for Quotation (RFQ).

Candidate or Respondent refers to an individual or company who is considering or has submitted a response to a solicitation. This is also commonly referred to as “bidder.”

City refers to the City of Hartford, the Hartford Public Schools and any other governmental entity participating in the RFR process and/or resulting award(s).

Provider refers to the Candidate or Candidates who receive an award and who enter into a contract with the City.

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3.1 HOW TO RESPOND: Supply the required information on and along with the response forms. An officer or explicit agent of your organization must sign the response form and any supplementary proposal document.

If this request has a "Specification Offered" column opposite the specifications, complete as follows and return these pages with your pricing sheet(s):

In the "specification offered" column type in:

- a) "As specified"
- b) "Exceeds specifications" - Identify what exceeds the specification and why
- c) "Exception to specifications" - Identify the substitute and define its effect

Failure to follow these guidelines may be just cause for rejection of the response.

3.2 QUESTIONS & ADDENDA: Questions related to this project must be received in writing 72 hours in advance of the response submittal deadline. Written questions must be sent via email to the buyer whose name appears on the invitation to respond. Responses shall be in writing and posted in the form of an addendum. Candidates are responsible for obtaining all addenda related to this RFR and thus advised to check for any addenda a minimum of twenty-four hours in advance of the response deadline.

The bids submitted for the work must be based upon the text of this document including the Standard instructions, Special Instructions, Specifications, all Addenda, and any referenced plans, and no oral or informal statement or representation by any representative or employee of the City of Hartford or the Architect shall be considered an amendment to or waiver of any statements in or requirement of such bidding or proposed contract documents and no claim or right of action shall accrue in favor of any respondent as a result of or founded on such oral or informal statements or representations. The City or its agents shall not be responsible for any oral instructions or interpretations given to a Candidate.

Note: All communications related to this project are to be directed to buyer noted on the invitation to respond. Candidates found to be communicating with City or School staff outside of the Procurement Services Unit will have their response rejected.

3.3 QUALIFICATIONS OF CANDIDATES OFFERING A RESPONSE: The City may make such investigations as deemed necessary to determine the ability of the Candidate to perform the work and the degree to which any Candidate meets the criteria for award listed herein. Each Candidate agrees to furnish the City any additional information requested.

3.4 OBLIGATIONS OF THE CANDIDATE: At the time of the opening of proposals, each Candidate will be presumed to be thoroughly familiar with the City's requirements, and the objectives for each element of the project, item or service. A plea of mistake in the accepted response shall not be available to the Candidate for the recovery of the bid surety or as a defense to any action based upon an accepted response.

3.5 NON-DISCRIMINATION: The candidate agrees and warrants that in the performance of the contract such candidate will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, mental or physical disability, in any manner prohibited by the laws of the United States or of the State of Connecticut.

3.6 AFFIRMATIVE ACTION REQUIREMENTS:

3.6.1 No Contract or Purchase Order, regardless of how procured, shall be awarded to any Person or Candidate that is not an equal opportunity employer. The successful respondent, as a condition of being awarded this contract shall agree to comply with all contractual Equal Employment Opportunity/Affirmative Action performance requirements as outlined herein.

3.6.2 The successful respondent, as a requirement of final contract execution will additionally agree to comply with the following provisions:

- a. Submit a report of current company employment statistics on the EEO Certification Form and a copy of the company Affirmative Action / Equal Employment Opportunity Policy Statement, properly signed by Company official on company letterhead, in accordance with paragraph 3.6.3 below.
- b. Sign and submit the document entitled "Hartford Affirmative Action Plan / Equal Employment Opportunity Agreement and Affidavit". (*Construction/Infrastructure projects only*)

3.6.3 Candidate's EEO Report: As a condition of doing business with the City the selected respondent must be certified by the City as an Equal Employment Opportunity Employer. Certifications must be renewed annually. Submit completed EEO Certification forms and EEO Policy Statement with your response. To check the current status of your EEO certification contact Aileen Ortiz at 860.757.9784, fax 860.722.6607 or email: ORTIA005@hartford.gov.

3.6.4 The candidate agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated, when employed, without regard to race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, mental or physical disability. The advertisement of employment opportunities shall be carried out in such manner as not to restrict such employment.

3.6.5 The successful respondent shall agree that neither he/she nor any subcontractors will discharge, expel or otherwise discriminate against any person because he/she has opposed any unfair employment practice or because he/she has filed a complaint or testified or assisted in any proceeding under Section 31-127 of the Connecticut General State Statutes.

3.6.6 (*Construction/Infrastructure projects only*) During the Performance of this contract, the contractor agrees to permit authorized City of Hartford staff to perform on-site project monitoring related to the contractual equal employment opportunity/affirmative action performance requirements. The prime contractor additionally agrees on behalf of his/her company and all subcontractors to submit the following compliance reports, available at <http://procurement.hartford.gov>, while performing under this contract:

- a. Payroll Certification Form within 10 working days of end of reporting month
- b. Minority/Women Business Enterprise (MWBE) Monthly Payment Status Reports
- c. Minority/Women Business Enterprise (MWBE) Final Payment Status Reports
- d. Monthly Employment Utilization Report
 1. Minimum of 15% of the total project hours by trade shall be allocated to minority workers.
 2. Hartford resident employment goal of 30% by trade.
- e. Status reports as to special training and/or employment residency requirements

3.6.7 The successful respondent further agrees that the requirements as noted in paragraphs 3.5 and 3.6 shall likewise apply to all construction sub-contractors.

3.7 RESPONSE DEVELOPMENT: Candidates are responsible for all costs and expenses incurred in the preparation of a response and for any subsequent work on the response that is required by the City of Hartford. Any submittal is the property of the City of Hartford and will not be returned.

3.8 TIME PROVISIONS: The content of any response submitted is to remain valid and available to the City for ninety (90) days from the day proposals are due.

3.9 CORRECTION OR WITHDRAWAL OF RESPONSES, CANCELLATION OF AWARDS. Correction or withdrawal of inadvertently erroneous bids, including corrections to pricing must be submitted to the Procurement Agent prior to the bid response deadline. Corrections before or after award, or cancellation of awards of Contracts or Purchase Orders based on such mistakes, may also be permitted with the approval, in writing, of the Procurement Agent, otherwise withdrawal of bid by respondent shall be cause for forfeiture of bid surety to the City.

3.10 QUANTITIES AND/OR USAGES: Quantities and/or usages are estimates only and in no way represent a commitment and/or intent to purchase the estimated amount. Actual quantities and delivery locations may vary. The City reserves the right to order all quantities that may be needed, at the contract price, during the contract term regardless of the estimates provided in this RFR.

3.11 ACCEPTABLE BRANDS: The RFR specifications are not intended to limit consideration to the particular service organization or manufacturer from which they were developed. References to brand names or numbers are to be interpreted as establishing a standard of quality, unless specifically limited by the term "no substitute", otherwise brand names used within these specifications shall be presumed to be followed by the words "or approved equal". Burden of proving a product and/or material as equal to a specific product and/or material by brand name is the responsibility of the Provider. Final determination as to what is an "or equal" product will be made by the Procurement Agent in conjunction with other City staff. The City will award on the basis of the criteria stated herein, and reserves the right to waive or require compliance with any element of the specifications.

3.12 SAMPLES: Samples are furnished free of charge and may be held for comparison with deliveries. Candidate must arrange for their return if desired. Samples are assumed to meet, at a minimum, City specifications for quality. All deliveries shall have at least the same quality as the accepted proposal sample. Latent deficiencies will be remedied by the contractor at no additional cost, or loss of service, to the City.

3.13 SITE INSPECTION: Information contained in these documents is provided in good faith only that all Candidates may have access to the same information utilized by the City, and is not intended as a substitute for personal investigations, interpretations and judgment of the Candidate. As information may be approximated or incomplete, Candidates should conduct a thorough inspection, review of existing conditions/equipment, examination of the site and compare it to the specifications and drawings. Any discrepancies or needs for clarifications must be brought to the attention of the department managing the RFR prior to the bid opening.

Pre-bid / Response conferences are noted on the invitation to respond. Submission of a bid shall be evidence that respondent has examined the site, compared it with the drawings and specifications and satisfied itself of the conditions existing at the site, the storage and handling of materials, and all other

matters incidental to the work under this contract. No additional compensation will be allowed for difficulties which the respondent could have discovered or reasonably anticipated prior to bidding.

3.14 CONTRACTING: The City reserves the right to require the successful Candidate to execute a contract in a format supplied by the City. The terms and conditions of the contract to be signed upon the award of the RFR will supersede any inconsistent provision of the RFR documents.

The award of any contract is subject to the following conditions and contingencies:

- (1) The approval of such governmental agencies as may be required by law.
- (2) The appropriation of adequate funds by the proper agencies.
- (3) Compliance with all applicable laws, regulations, ordinances and codes of the United States, the State of Connecticut and the City of Hartford.
- (4) The selected Candidate must be current in all tax or any other monetary obligation owed to the City of Hartford.
- (5) The selected Candidate must have a current EEO certification on file with the City.

Unless otherwise indicated the duration of the Contract will be one (1) year. Further, Contract terms may be negotiated on award anniversaries. City Ordinance Sec 2-588 (C) allows for a maximum of three Contract extensions provided that the funds are available, approved by the City for this purpose and that the Provider has established a satisfactory performance record.

Notwithstanding the failure of City to exercise any option to renew this contract for an additional year, the Managing Authority reserves the right to unilaterally extend this contract on a month to month basis for a period not to exceed three (3) months under the same terms and conditions applicable to the preceding contract period.

3.15 CONTRACT DOCUMENTS: The Contract documents consist of the Agreement between Owner and Contractor (hereinafter the Agreement), this Request for Response (RFR) and its referenced documents, General and Supplementary Conditions, drawings, any Addenda issued, the Contractor's response to the RFR, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a Minor change in the Work issued by the Design Professional on behalf of the City; the Contract Documents do include other documents such as bidding requirements.

3.16 RETAINAGE (*Construction/Infrastructure projects only*): When progress payments are being made for items being built or designed, the City may withhold at least 5% of the total project cost, or as otherwise specified in the contract for this project.

3.17 INSURANCE: Refer to the exhibit noted on the Invitation to Respond for specific insurance requirements. List the name and address of the respondent's insurance agent on the response form. The successful candidate shall be required to furnish a Certificate of Insurance (Accord Form), acceptable to the City, within ten (10) days from notice of award and must name the City as an additional insured on the face of the document. The insurance certificate and coverage requested must be updated and kept current throughout the life of the contract, including any extensions. If at any time during the term of the contract or any extension thereof, any required policies of insurance should renew, expire, or be cancelled, it will be the responsibility of the Provider to furnish to the City a Certificate of Insurance indicating renewal or an acceptable replacement of the expiring policy prior to

the expiration or cancellation, so that there will be no lapse in any coverage. The candidate shall obtain and maintain such required insurance at its own cost and expense.

3.18 BID BONDS: A Bid bond, cashiers or certified check may be required with your response. The City of Hartford provides contractors with the option of submitting an electronic Bid Bond through the Surety2000 website. Surety 2000 is an Internet-based surety processing, verification and security system, developed in cooperation with the surety industry. You may contact Surety 2000 at 1-800-660-3263 or www.surety2000.com, for more information.

Certified checks will be returned to all unsuccessful Candidates upon the awarding of the contract. If your response is not accompanied by a bond, certified check or proof that a valid bond has been obtained at the RFR opening it may be rejected.

If you manage a **small business** and have difficulty obtaining bonds help is available from the Small Business Administration (SBA) through "The Surety Bond Guarantee Program. For more information go to www.sba.gov, choose "Services." Then select "Financial Assistance" and click on "Surety Bond."

3.19 PERFORMANCE BOND AND PAYMENT BOND: If requested, the successful contractor will be required to submit a Performance Bond and Payment (Labor & Material) Bond in the amount of 100% of contract award within 10 days of award if the contract value exceeds \$50,000. Said bonds shall be issued by an insurance company and said surety companies must be listed on the current Federal Register, licensed in the State of Connecticut with an underwriting limitation exceeding the value of the project with no more than 5% of capital in surplus tied to any one risk. Banks must have a branch office in Connecticut with insurance provided by the FDIC. The bonds must be signed by an officer of the company and of the surety company above their official titles and their corporate seals must be affixed over the signatures.

Indicate the cost for these bonds, to be added to the contract sum, on the response form.

3.20 PREVAILING WAGES (*Construction/Infrastructure projects only*): Pursuant to Section 2-559 (B), Required Provisions. Each Agreement for the construction, remodeling or repair of any Infrastructure Facilities shall contain both of the following provisions:

(1) "The wages paid to any mechanic, laborer or workman employed upon the work herein contracted to be done shall be at a rate equal to the prevailing wage rate in the State of Connecticut and or federal government, whichever is applicable, for the same work in the same trade or occupation."

(2) "Each contractor and subcontractor, or an authorized officer or employee, responsible for supervision of the payment of wages shall submit, on a weekly basis within seven (7) days after the regular payment date of the payroll period, to the Procurement Services Unit, a "Weekly Certified Statement of Compliance." Due and timely compliance with this provision shall be a condition precedent to the approval and transmittal of the next and succeeding payments by the city or its authorized officers or agents to the contractor under the terms of this agreement."

3.21 SUBCONTRACTORS: The respondent shall not subcontract any portion of the project to be performed unless the prior consent of the City is given for both the work to be subcontracted and the subcontractor to perform the same. The terms and conditions of the underlying contract between the City and Contractor will become part and parcel of the terms and conditions of each subcontract. Respondents are required to provide subcontractor information in the space provided in 1.4 "Subcontractor Utilization" of the response forms. Complete a separate form for the Base Bid and each Alternate. MWBE's must certified with the City of Hartford at the time of response submission.

3.22 MINORITY BUSINESS UTILIZATION (*Construction/Infrastructure projects only*): Respondents are required to set-aside for Minority Businesses 15% of the construction work. Respondents are encouraged to exceed the set-aside requirement specified. The City's Minority Business listing as further described in paragraph 3.23.3 shall be used by respondents in selecting minority business contractors.

The sum of all minority business subcontracts shall be equal to or greater than 15% regardless of how the bid is awarded (base only or base plus one or more alternates). Failure to comply with the required percentage of minority business utilization will be cause for rejection of bid.

3.22.1 City Certification Required

Respondents shall utilize Minority subcontractors who hold a current MWBE certificate with the City of Hartford at the time of response submission. Certifications by any other government entity shall not be sufficient to qualify the subcontractor to participate in the City of Hartford's minority business utilization preference program. In selecting its minority subcontractors, respondent is cautioned to seek documented proof that its subcontractors hold valid certification by the City. Failure to identify City certified Minority Business subcontractors will be cause for rejection of bid.

3.22.2 Percentage of Work to be Performed

Designated MWBE's shall perform at least 70% of the work with their own forces and as part of their own operations excluding the manufacture or purchase of proprietary products.

3.22.3 Minority Business Listing

A listing of Minority Businesses holding certification by the City of Hartford is available at <http://purchasing.hartford.gov> or in the Procurement Services Unit, Room 100, 550 Main Street, Hartford, CT 06103. The City's listing of minority businesses is comprised of companies whereby at least 51% of the company is owned and operated by one or more of the following group persons: Black Americans, Hispanic Americans, Women, Asian Pacific Americans, Pacific Islanders, American Indians and descendants from the Iberian Peninsula. It should be understood that such listings are made available to assist respondents in satisfying bid requirements; however, respondent's selection of a subcontractor is its sole responsibility and all work performed under the contract shall be respondent's sole responsibility. The City does not sponsor or recommend the selection of any one vendor. Certification by the City of Hartford as a minority business does not imply that the business is qualified to perform the work specified in this bid. The City reserves the right to request alternate minority subcontractors for whatever reason.

3.22.4 Proof of Minority Business Utilization Required

Prior to execution of contract, the successful respondent shall be required to file with the City Engineer the actual form of subcontract with subcontractor(s) named in at least the minimum dollar value as stated in the "Subcontractor Utilization" form. The subcontract shall state the percentage of work which will be performed by the MWBE with its own forces and as part of its operation. Failure to comply with proof of subcontract within 10 days of notification may result in the rejection of bid and may be cause for forfeiture of respondents' bid surety. Further, the City reserves the right to monitor the performance and payment of such subcontracts; therefore, upon request by the City, the successful respondent shall be required to furnish proof of payment to its subcontractors. Failure to comply with such monitoring requirements within ten days of written request will result in withholding of payment to respondent.

3.22.5 Changes in Subcontractors after Award

The successful respondent may not change subcontractor(s) after the contract has been let unless and

until it has received written approval from the City of Hartford. Any such approval shall be based upon a written request by the Contractor or City, which details performance and/or other issues related to the subcontractor(s).

3.23 SET-ASIDE PROGRAM: If this RFR is set-aside for award to a small, minority or women owned business enterprise you must receive a City of Hartford SC/MWBE certification prior to submission of bid response. This program is described in Sec. 2-660 of the Hartford Municipal Code.

3.24 CITY-BASED SMALL CONTRACTOR PREFERENCE: Any City-based SC/MWBE Certified Small Business which has submitted a bid not more than fifteen (15) percent higher than the low bid, provided such respondent agrees to accept the award at the amount of the low bid, shall be selected as the lowest responsible candidate. If more than one City-based SC/MWBE Certified Small Business has submitted bids not more than fifteen (15) percent higher than the low bid, the City shall select the lowest Responsible candidate among such respondents which submitted the lowest bid.

3.25 CRITERIA FOR AWARD: This Request for Response does not necessarily contemplate an award based solely on price. Rather, the City reserves its rights to accept or reject any or all responses or any portion thereof that it may determine to be in its own best interests, for whatever reason.

3.26 NOTICE OF AWARD: The selected vendor will be provided with a written Notice of Award which shall be contingent upon the submission by the respondent of all documents required of the successful candidate, including, but not limited to, proper insurance certificates, performance and payment bonds, verification of MWBE percentage contribution to the work and execution of contract within 10 days of the notice of award.

3.27 PERFORMANCE EVALUATION: The Contractor understands that during the course of and at the conclusion of the project that the City will evaluate his/her overall performance. Based on information gathered from the City's project management team, the Procurement Agent will assess factors including, but not limited to, quality of work or service, completion record, job supervision, working relationship with other providers, bills for extras, organization, cooperation, worksite cleanliness and compliance with City MBE requirements. This evaluation will be considered in the issuance of future awards. The contractor further understands and agrees that this record will be available for public scrutiny for a minimum of two years.

END OF SECTION

Project: North Meadow And South Meadows Pump Stations Trash Rack Replacements

**Minimum Rates and Classifications
for Heavy/Highway Construction**

**Connecticut Department of Labor
Wage and Workplace Standards Division**

ID#: H 19347

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: DPW14-42

Project Town: Hartford

FAP Number:

State Number:

Project: North Meadow And South Meadows Pump Stations Trash Rack Replacements

CLASSIFICATION	Hourly Rate	Benefits
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01) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters. **See Laborers Group 5 and 7**

1) Boilermaker	33.79	34% + 8.96
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1a) Bricklayer, Cement Masons, Cement Finishers, Plasterers, Stone Masons	32.50	27.06
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2) Carpenters, Piledrivermen	31.00	22.50
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As of:

Friday, June 06, 2014

Project: North Meadow And South Meadows Pump Stations Trash Rack Replacements

2a) Diver Tenders	31.00	22.50
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3) Divers	39.46	22.50
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4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	44.25	17.75
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4a) Painters: Brush and Roller	30.62	17.75
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4b) Painters: Spray Only	33.62	17.75
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4c) Painters: Steel Only	32.62	17.75
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4d) Painters: Blast and Spray	33.62	17.75
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Project: North Meadow And South Meadows Pump Stations Trash Rack Replacements

4e) Painters: Tanks, Tower and Swing 32.62 17.75

5) Electrician (Trade License required: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9) 37.60 22.22+3% of gross wage

6) Ironworkers: Ornamental, Reinforcing, Structural, and Precast Concrete Erection 33.50 28.98

7) Plumbers (Trade License required: (P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2) and Pipefitters (Including HVAC Work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4 G-1, G-2, G-8, G-9) 39.31 26.27

---LABORERS----

8) Group 1: Laborer (Unskilled), Common or General, acetylene burner, concrete specialist 27.05 17.80

9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen, air tool operator 27.30 17.80

As of:

Friday, June 06, 2014

Project: North Meadow And South Meadows Pump Stations Trash Rack Replacements

10) Group 3: Pipelayers 27.55 17.80

11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders 27.55 17.80
(cement/concrete), catch basin builders, asphalt rakers, air track operators, block
pavers and curb setters

12) Group 5: Toxic waste removal (non-mechanical systems) 29.05 17.80

13) Group 6: Blasters 28.80 17.80

Group 7: Asbestos Removal, non-mechanical systems (does not include 28.05 17.80
leaded joint pipe)

Group 8: Traffic control signalmen 16.00 17.80

---LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and
Liner Plate Tunnels in Free Air.----

As of:

Friday, June 06, 2014

Project: North Meadow And South Meadows Pump Stations Trash Rack Replacements

13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	31.28	17.80 + a
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13b) Brakemen, Trackmen	30.37	17.80 + a
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14) Concrete Workers, Form Movers, and Strippers	30.37	17.80 + a
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15) Form Erectors	30.68	17.80 + a
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---ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL
IN FREE AIR:----

16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers	30.37	17.80 + a
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17) Laborers Topside, Cage Tenders, Bellman	30.26	17.80 + a
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18) Miners	31.28	17.80 + a
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---TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED
AIR: ----

18a) Blaster	37.41	17.80 + a
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19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	37.22	17.80 + a
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20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	35.35	17.80 + a
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21) Mucking Machine Operator	37.97	17.80 + a
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---TRUCK DRIVERS----(*see note below)

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Two axle trucks	28.33	19.14 + a
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Three axle trucks; two axle ready mix	28.43	19.14 + a
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Three axle ready mix	28.48	19.14 + a
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Four axle trucks, heavy duty trailer (up to 40 tons)	28.53	19.14 + a
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Four axle ready-mix	28.58	19.14 + a
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Heavy duty trailer (40 tons and over)	28.78	19.14 + a
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Specialized earth moving equipment other than conventional type on-the road trucks and semi-trailer (including Euclids)	28.58	19.14 + a
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---POWER EQUIPMENT OPERATORS---

Group 1: Crane handling or erecting structural steel or stone, hoisting engineer (2 drums or over), front end loader (7 cubic yards or over), Work Boat 26 ft. & Over. (Trade License Required)	36.80	22.30 + a
Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver (\$3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	36.48	22.30 + a
Group 3: Excavator/Backhoe under 2 cubic yards; Cranes (under 100 ton rated capacity), Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.). (Trade License Required)	35.74	22.30 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper)	35.35	22.30 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Spreader; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell)	34.76	22.30 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	34.76	22.30 + a

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Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer). 34.45 22.30 + a

Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and Under Mandrel). 34.11 22.30 + a

Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine. 33.71 22.30 + a

Group 9: Front End Loader (under 3 cubic yards), Skid Steer Loader regardless of attachments (Bobcat or Similar); Fork Lift, Power Chipper; Landscape Equipment (including hydroseeder). 33.28 22.30 + a

Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc. 31.24 22.30 + a

Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment. 31.24 22.30 + a

Group 12: Wellpoint Operator. 31.18 22.30 + a

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Group 13: Compressor Battery Operator. 30.60 22.30 + a

Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain). 29.46 22.30 + a

Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator. 29.05 22.30 + a

Group 16: Maintenance Engineer/Oiler 28.40 22.30 + a

Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator. 32.71 22.30 + a

Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license). 30.29 22.30 + a

**NOTE: SEE BELOW

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---LINE CONSTRUCTION---(Railroad Construction and Maintenance)---

20) Lineman, Cable Splicer, Technician	44.30	6.5%+17.70
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21) Heavy Equipment Operator	39.87	6.5%+15.83
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22) Equipment Operator, Tractor Trailer Driver, Material Men	37.66	6.5%+15.40
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23) Driver Groundmen	24.37	6.5%+10.04
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23a) Truck Driver	33.23	6.5%+14.28
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---LINE CONSTRUCTION---

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24) Driver Groundmen	30.92	6.5% + 9.70
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25) Groundmen	22.67	6.5% + 6.20
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26) Heavy Equipment Operators	37.10	6.5% + 10.70
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27) Linemen, Cable Splicers, Dynamite Men	41.22	6.5% + 12.20
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28) Material Men, Tractor Trailer Drivers, Equipment Operators	35.04	6.5% + 10.45
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Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.*

***Note: Hazardous waste premium \$3.00 per hour over classified rate*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra \$1.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - \$1.50 extra

Crane with 200 ft. boom (including jib) - \$2.50 extra

Crane with 250 ft. boom (including jib) - \$5.00 extra

Crane with 300 ft. boom (including jib) - \$7.00 extra

Crane with 400 ft. boom (including jib) - \$10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of each apprentice in a specific trade.

~~Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work ~~

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

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Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

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