# **BID NO. 2204**

PREQUAL BID #B2006468 ACTUAL BID #B6006469

# 2020

City of Philadelphia Water Department

### WORK NO. 63096

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BIDDING REQUIREMENTS, CONTRACT FORMS and SPECIAL SPECIFICATIONS for PRETREATMENT BUILDING RESTORATION at QUEEN LANE WATER TREATMENT PLANT 3257 FOX STREET PHILADELPHIA, PA 19129

\_\_\_\_\_

Quotes are to be submitted until ten thirty a.m. EST on **WWW.PHLCONTRACTS.PHILA.GOV** An opening of quotes received will be held in Room 170A, MSB, 1401 JFK Blvd., 1st Fl., at ten thirty a.m., prevailing time, on

# Thursday, September 12, 2019

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NOTICE:

No quote will be accepted unless the prequalification questionnaire, with all questions fully answered, is submitted within the prequalification solicitation on **WWW.PHLCONTRACTS.PHILA.GOV**, on or before **Thursday**, **August 29**, **2019**.

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#### ATTACHED:

Standard Contract Requirements for Public Works ContractsHazardous Material Testing Reports

# Bid 2204 - 63096

Contractor	:						
PWD ID	Description	UOM	Quantity	Unit Price		Total	
GC-1	General Work: For providing all labor, materials, and equipment necessary to complete all work in accordance with the Contract Documents. The price bid shall include all work and materials required in these Contract Documents and not included in other bid items, at Lump Sum.	Lump Sum	1.0			\$	-
GC-2	Demolition Work: For providing all labor, materials, and equipment necessary to complete all demolition work in accordance with the Contract Documents, exclusive of Items GC-1 and GC-3 through GC-5. The bid item also includes all demolition costs associated with proper disposal of all materials (see drawing A01 - Hazardous Materials Notes), at Lump Sum.	Lump Sum	1.0			\$	-
GC-3	Storage Container: Contractor shall procure, furnish, and place on site one (1) modular storage container in accordance with the Contract Documents (see drawing A01 – General Notes), at Lump Sum.	Lump Sum	1.0	1		\$	-
GC-4	General Allowance: For all work required as part of this contract and not accounted for in Items GC- 1 and GC-5, to be performed as directed by the Engineer.	Allowance	1.0	\$	100,000.00	\$	100,000.00
GC-5	Additional Maintenance and Janitorial Services: The Allowance amount shall include labor, equipment, materials, and appurtenant work necessary to produce complete facilities as specified in Section 01500.	Allowance	1.0	\$	20,000.00	\$	20,000.00
AGGREG	ATE AMOUNT BID					\$	-

## Public Works LBE Language

In accordance with Chapter 17-109 of The Philadelphia Code relating to Local Bidding Preferences and the Regulation promulgated thereto, this bid may be subject to a local bid preference<sup>1</sup>. In order to determine eligibility to receive the preference, if applicable, Seller must be certified as a Local Business Entity ("LBE") at the time of the bid opening.

Further, through submission of quote, Seller makes the following certification in connection with the grant of any local bidding preference which certification is incorporated into any contract resulting from this quote:

"Throughout the entirety of the contract, my company or my LBE certified subcontractor(s)<sup>2</sup> will perform the majority of any work on the subject contract within the geographic limits of the City of Philadelphia and my company or my LBE certified subcontractor(s) will maintain within the City a majority of the inventory or equipment that will be used on the contract or the amount of inventory that is customary for that industry."

If the Procurement Commissioner determines that the awarded Seller fails to comply with its certification at any time during the term of its contract, the awarded Seller's LBE certification will be revoked and the awarded Seller shall be deemed in substantial breach of such contract, shall be required to pay liquidated damages of 10% of the awarded contract amount, and may be debarred by the Procurement Commissioner in accordance with the Procurement Department Debarment Regulation for a period up to three years.

NOTE: If you wish to apply for Local Business Entity (LBE) certification,

go to www.phila.gov/bids. Please provide sufficient time prior to bidding

for processing of the LBE application. The Procurement Commissioner reserves the right to request any additional or clarifying information at any time prior to award of the contract, and during the performance of the contract.

<sup>&</sup>lt;sup>1</sup> For quotes of One Million Dollars or less, the preference is ten percent (10%); for all other quotes the preference is five percent (5%).

<sup>&</sup>lt;sup>2</sup> If the Seller relies upon LBE subcontractor(s) to perform the majority of the work and maintain the majority of the inventory or equipment within the City, the subcontractor(s)' LBE Certification Number and most recent annual affidavit of continuing eligibility must be submitted to the Procurement Department.

#### BID BOND

FOR CITY OF PHILADELPHIA BID NUMBER: \_\_\_\_\_

(Please fill in)

KNOW ALL MEN BY THESE PRESENTS, that we \_\_\_\_\_

\_\_\_\_\_, as

Principal (hereinafter called the "Principal Obligor"), and

\_\_\_\_\_, Surety, are jointly and severally held firmly bound unto the City of

Philadelphia, in the sum of

TEN PERCENT (10%) of the GROSS AMOUNT OF THE BID

lawful money of the United States of America, to be paid to the said City of Philadelphia, its successors and assigns, to which payment well and truly to be made, we do bind ourselves and each of us, our and each of our successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals and dated the \_\_\_\_\_\_ day of

A.D. 20\_\_\_\_

WHEREAS, the above bounded Principal obligor, submitted a bid pursuant to the above referenced Bid Number to perform certain work for the City of Philadelphia.

NOW, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the City of Philadelphia shall accept the bid of the Principal Obligor and the Principal obligor shall enter into a contract with the City in accordance with the terms of such bid, and furnish such bond or bonds as are specified in the bid documents with good and sufficient surety, for the faithful performance of the contract and for the prompt payment of labor and material furnished in the prosecution thereof; or in the event of the failure or refusal of the Principal obligor to enter such contract and give such bond or bonds, if the Principal Obligor shall pay to the City the difference between the amount specified in said bid and such larger amount for which the City may legally contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

And we do for ourselves and each of us, our and each of our. successors and assigns, hereby heirs, executors, administrators, authorize and empower the City solicitor of Philadelphia or any other attorney of any court of record in Pennsylvania or elsewhere by him or her deputized for the purpose, upon the filing of this instrument or a copy thereof, duly attested as correct by the City Solicitor of Philadelphia, to appear for us or either of us, our or either of our heirs, executors, administrators, successors or assigns, and confess a judgment against us or either of us, our or either of our heirs, executors, administrators, successors or assigns, and confess a signs, in favor of the City of Philadelphia for the sum named in this bond, without defalcation, with costs of suit, release of errors, and with five percent added for collection fees; hereby waiving the benefit of all exemption laws and the holding of inquisition on any real estate that may be levied upon by virtue of such judgment, voluntarily condemning such real estate and authorizing the entry of such condemnation upon any writ of fieri facias and agreeing that said real estate may be sold under the same; and further waiving all errors, defects and imperfections whatsoever in the entering of the said judgment or any process thereon, and hereby agreeing that no writ of error or objection or motion or rule to open or strike off judgment or to stay execution or appeal, shall be made or taken thereto.

And for the doing of these acts, this instrument or a copy thereof attested as aforesaid shall be full warrant and authority.

CORPORATE SEAL:

PRINCIPAL OBLIGOR:

(SEAL)

President or Vice President

(SEAL) Secretary or Treasurer (or either of their assistants)

SURETY:

\_(SEAL)

Attorney-In-Fact

Note: (1) <u>All sellers must utilize this Bid Bond form when submitting a bid to the city.</u>

(2) If Principal obligor is an individual or partnership, Bid Bond should be signed by owner or authorized general partner. Please identify on the Bid Bond the type of business (e.g. individual proprietorship or partnership) and title of party executing the Bid Bond.

(3) Bid Bond must be executed by a surety c authorized and licensed to act as surety by the Pennsylvania Insurance Commissioner pursuant to the Commonwealth of Pennsylvania.



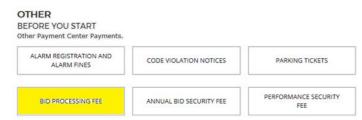
Your gateway to better business

# **BID PROCESSING FEES**

Quotes shall be accompanied by a non-refundable processing fee and must be received by the City of Philadelphia no later than the time and date of the bid closing. Payments must be in the exact amount that is specified in paragraph 11 of the Standard Contract Requirements or the Seller Quote Checklist within the bid solicitation.

# **Electronic Payment Submission**

Electronic payment submission of Bid Processing fees can be made at: https://secure.phila.gov/PaymentCenter/AccountLookup/



Bid number must be referenced on the payment

\*\*\*\*Please note: Electronic payments made by credit card will have an additional service charge.

# **Alternate Payment Submission**

Mail/hand-deliver the processing fees to the Procurement Department before the closing of the bid to: MSB, 1401 JFK Blvd, Phila PA 19102 - Suite 170, Attn: Public Works Supervisor Check payable to City of Philadelphia, RE: Bid Number



Procurement

CITY OF PHILADELPHIA

1401 John F. Kennedy Blvd #120 Philadelphia, PA 19102-1685 CONTACT US: Email **PHLContracts@phila.gov** Call **215-686-4755** or **215-686-4720** 

# www.PHLContracts.phila.gov

And \_\_\_\_\_\_\_\_ hereby agrees to provide acceptable surety, both for the proper completion of the work and upon the penal bond, and to complete the whole of the work within (365) CALENDAR days from the date of the Notice to Proceed from the Chief Engineer to commence the work.

# PERFORMANCE OF WORK BY CONTRACTOR

I, the undersigned Contracting Seller, am required to perform, on the site and with my own work force, work with a value of at least twenty percent (20%) of the original total contract price, exclusive of profit, overhead and the costs of procuring insurance and bonds. I, the undersigned Contracting Seller shall submit with my Quote a complete description of the work that will be performed (e.g., earthwork, paving, brickwork, roofing, etc.), the percentage of the total work this represents, and the estimated dollar value thereof.

I shall perform the following work:

Percentage of the total contract to be performed by Contracting Seller

Estimated cost of work to be performed by Contracting Seller:

#### City of Philadelphia - Business, Corporate and Slavery Era Insurance Disclosure

In accordance with Section 17-104 of The Philadelphia Code, the Bidder, after execution of this Contract, will complete an affidavit certifying and representing that the Bidder (including any parent company, subsidiary, exclusive distributor or company affiliated with Bidder) has searched any and all records of the Bidder or any predecessor business entity regarding records of investments or profits from slavery or slaveholder insurance policies during the slavery era. The names of any slaves or slaveholders described in those records must be disclosed in the affidavit.

The Bidder expressly understands and agrees that any false certification or representation in connection with this Paragraph and/or any failure to comply with the provisions of this Paragraph shall constitute a substantial breach of this Contract entitling the City to all rights and remedies provided in this Contract or otherwise available in law (including, but not limited to, Section 17-104 of The Philadelphia Code) or equity and the contract will be deemed voidable. In addition, it is understood that false certification or representation is subject to prosecution under Title 18 Pa.C.S.A. Section 4904.

#### DISCLOSURE OF MINORITIES AND WOMEN AS BOARD MEMBERS AND EXECUTIVE STAFF

**Instructions**: As required by Section 17-104 of The Philadelphia Code entitled "Prerequisites to the Execution of City Contracts," Section 17-104(3) requires seller to complete and submit this form with its quote. If seller believes that these requirements do not apply (e.g., seller is a single-member Limited Liability Company), please check the first field below and attach an explanation. This form should be submitted at the time of electronic submission of the quote, but the City reserves the right to allow seller to submit this information at any time prior to award of a contract.

Seller's Name:	Bid Number:
Please check here if the requirements do not apply to seller and explanation:	attach
Disclosure of Minorities <sup>1</sup> and Women as Board Members and	l Executive Staff
Pursuant to Section 17-104(3) (a) (i) of The Philadelphia Code, p	lease provide the following information:
	(M)
1. Current percentage of minority and female executive officers	in seller's company:

- 2. Current percentage of minorities and women on the executive board of the seller's company:
- 3. Current percentage of minorities and women on the full board of the seller's company:

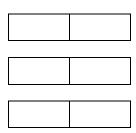
# Aspirational Goals for Minorities and Women as Board Members and Executive Staff

Pursuant to Section 17-104(3) (a) (ii) of The Philadelphia Code, please provide the following information:

- 1. Percentage goal for minority and female executive officers in seller's company:
- 2. Percentage goal for minorities and women on the executive board of the seller's company:
- 3. Percentage goal of minorities and women on the full board of the seller's company:

# Identify Below Seller's Intended Efforts to Achieve the Aforementioned Aspirational Goals:

(M)	(W)



<sup>&</sup>lt;sup>1</sup> Section 17-1608 of the Philadelphia Code defines minority to include African Americans, Hispanic Americans, Asian Americans and Native Americans Revised 7.1.14

### City of Philadelphia Economic Opportunity Plan [ BID 2204 ]

I. Introduction, Definitions and Goals

A. Chapter 17-1600 of The Philadelphia Code requires the development and implementation of "Economic Opportunity Plan(s)" for certain classes of contracts and covered projects as defined in Section 17-1601. The Economic Opportunity Plan ("Plan") memorializes the successful Seller's best and good faith efforts to provide meaningful and representative opportunities for Minority Business Enterprises ("MBEs"), Woman Business Enterprises ("WBEs") and Disabled Business Enterprises ("DSBEs"), Disadvantaged Business Enterprises<sup>1</sup> ("DBEs") (collectively, "M/W/DSBEs") and an appropriately diverse building trades workforce in connection with the contract or covered project.

This Invitation and Bid and any resulting contract are subject to the Plan requirements as described in Section 17-1603 (2). Accordingly, by submission of its Quote, a responsive and responsible Seller makes a legally binding commitment to abide by the provisions of this Plan which include Seller's commitment to exercise its best and good faith efforts throughout the contract term to provide meaningful and representative contracting opportunities for M/W/DSBEs and to employ an appropriately diverse workforce of tradespeople including minority and female persons in all phases of any contract awarded under this Bid.

Seller hereby verifies that all information submitted to the City including without limitation, the Plan and all forms and attachments thereto, are true and correct and is notified that the submission of false information by Seller is subject to the penalties of 18 Pa.C.S. Section 4904 relating to unsworn falsification to authorities. Seller also acknowledges that if it is awarded a contract resulting from this Invitation and Bid, it is a felony in the third degree under 18 Pa.C.S. Section 4107.2 (a)(4) if, in the course of this contract, it fraudulently obtains public moneys reserved for or allocated or available to minority business enterprises or women's business enterprises.

B. For the purposes of this Plan, MBE, WBE, DBE and DSBE shall refer to certified businesses so recognized by the City of Philadelphia through its Office of Economic Opportunity ("OEO"). Only the work or supply effort of firms that are certified as M/W/DSBEs by an OEO approved certifying agency<sup>2</sup> at the time of bid opening will be eligible to receive credit as a Best and Good Faith Effort. In order to be counted, certified firms must successfully complete and submit to the OEO an application to be included in the OEO Registry which is a list of registered M/W/DSBEs maintained by the OEO and available online at www.phila.gov/oeo/directory. If seller or seller's subcontractor(s) is certified by an approved certifying agency, a copy of that certification should be furnished with the quote.

C. For this Plan, the term "Best and Good Faith Efforts," the sufficiency of which shall be in the sole determination of the City, means: a Seller's efforts, the scope, intensity and

<sup>&</sup>lt;sup>1</sup>Disadvantaged Business Enterprises ("DBEs") are those socially or economically disadvantaged minority and woman owned businesses certified under 49 C.F.R. Part 26. If Bidder makes solicitation(s) and commitment(s) with a DBE, Seller shall indicate which category, MBE or WBE, is submitted for credit.

<sup>&</sup>lt;sup>2</sup>A list of "OEO approved certifying agencies" can be found at www.phila.gov/oeo

appropriateness of which are designed and performed to foster meaningful and representative opportunities for participation by M/W/DSBEs and an appropriately diverse workforce and to achieve the objectives of Chapter 17-1600. Best and Good Faith Efforts are rebuttably presumed met, when a Seller makes commitments within the M/W/DSBE Participation Ranges established for this Bid and commits to employ a diverse workforce as enumerated herein.

# D. Goals

1. M/W/DSBE Participation Ranges

As a benchmark for the Seller's expression of its Best and Good Faith Efforts to provide meaningful and representative opportunities for M/W/DSBEs in the contract, the following participation ranges have been developed. These participation ranges represent, in the absence of discrimination in the solicitation and selection of M/W/DSBEs, the percentage of MBE, WBE and DSBE participation that is reasonably attainable on this contract through the exercise of Seller's Best and Good Faith Efforts. In order to maximize opportunities for as many businesses as possible, a firm that is certified in two or more categories (e.g. MBE and WBE and DSBE or WBE and DSBE) will only be credited toward one participation range as either an MBE or WBE or DSBE. The firm will not be credited toward more than one category. These ranges are based upon an analysis of factors such as the size and scope of the contract and the availability of MBEs, WBEs and DSBEs to perform various elements of the contract:

BID	MBE		WBE	DSBE
2204	17% - 20%	and	10% - 12%	0

# 2. Workforce Diversity Goals

Seller agrees to exhaust its Best and Good Faith Efforts to employ minority persons, by race and ethnicity, and females in its workforce of apprentices and journeypersons at the following levels<sup>3</sup>:

African American Journeypersons – 22% of all journey hours worked across all trades Asian Journeypersons – 3% of all journey hours worked across all trades Hispanic Journeypersons – 15% of all journey hours worked across all trades Female Journeypersons – 5% of all journey hours worked across all trades

Minority Apprentices – 50% of all hours worked by all apprentices Female Apprentices – 5% of all hours worked by all apprentices

The successful Seller will be required to submit to the City, no later than seven (7) days before the starting date of work on any such contract, a Workforce Diversity Goal Plan which shall include specific availability and utilization strategies for meeting the Workforce Diversity goals. The City's Labor Standards Unit shall have the responsibility of administering oversight of these Workforce Diversity Goals including evaluating the sufficiency of the Workforce Diversity Goal Plan, and monitoring the successful Seller's Best and Good Faith Efforts towards realization of the goals throughout the duration of the contract.

<sup>&</sup>lt;sup>3</sup> These goals have been informed by the City of Philadelphia Fiscal Year 2015 Annual Disparity Study, Economic Opportunity Plan Employment Composition Analysis.

II. Seller Responsiveness and Responsibility

A. Seller shall identify all its M/W/DSBE commitments and evidence its agreement to employ minority persons and females at the levels stated herein on the form entitled, "M/W/DSBE Participation and Workforce Commitments." The Seller's identified commitment to use an M/W/DSBE on this form constitutes a representation by Seller, that the M/W/DSBE is capable of completing the subcontract with its own workforce, and that the Seller has made a legally binding commitment with the firm. The listing of the M/W/DSBE firm by Seller further represents that if Seller is awarded the contract. Seller will subcontract with the listed firm(s) for the work or supply effort described and the dollar/percentage amount(s) set forth on the form. In calculating the percentage of M/W/DSBE participation, Seller shall apply the standard mathematical rules in rounding off numbers. In the event of inconsistency between the dollar and percentage amounts listed on the form, the percentage will govern. Seller is to maintain the M/W/DSBE percentage commitments throughout the term of the contract which shall apply to the total amount of the contract and any additional increases. In the event the Successful Seller's contract is increased by change order and/or modification, or amendment, it shall be the responsibility of the Successful Seller to apply its Best and Good Faith Efforts to the amended amount in order to maintain any participation ranges committed to on the total dollar amount of the contract at the time of contract completion.

# 1. Commercially Acceptable Function

A Seller that enters into a subcontract with an M/W/DSBE shall be considered to have made a Best and Good Faith Effort in that regard only if its M/W/DSBE subcontractor performs a commercially acceptable function ("CAF"). An M/W/DSBE is considered to perform a CAF when it engages in meaningful work or supply effort that provides for a distinct element of the subcontract (as required by the work to be performed in accordance with Bid specifications), where the distinct element is worthy of the dollar amount of the subcontract and where the M/W/DSBE carries out its responsibilities by actually performing, managing and supervising the work involved; M/W/DSBE subcontractors must perform at least twenty percent (20%) of the cost of the subcontract (not including the cost of materials, equipment or supplies incident to the performance of the subcontract) with their own employees.

The City may evaluate the amount of work subcontracted, industry practices and any other relevant factors in determining whether the M/W/DSBE is performing a CAF and in determining the amount of credit the Seller receives towards the participation ranges. For example, a Seller using an M/W/DSBE non-stocking supplier (i.e., a firm that does not manufacture or warehouse the materials or equipment of the general character described by the Bid specifications and required under the contract) to furnish equipment or materials will only receive credit towards the participation ranges for the fees or commissions charged, not the entire value of the equipment or materials furnished.

B. Upon award, letters of intent, quotations, and any other accompanying documents regarding commitments with M/W/DSBEs, including the M/W/DSBE Participation and Workforce Commitments Form, become part of the contract. M/W/DSBE commitments are to be memorialized in a written subcontract agreement and are to be maintained throughout the term of the contract and shall apply to the total contract value (including approved change orders and amendments). Any change in commitment, including but not limited to termination of the subcontract, reduction in the scope of committed work, substitutions for the listed firms, changes

or reductions in the listed dollar/percentage amounts, must be pre-approved in writing by OEO. Throughout the term of the contract, Seller is required to continue its Best and Good Faith Efforts.

C. In the event Seller does not identify on the M/W/DSBE Participation and Workforce Commitments Form that it has made M/W/DSBE commitments within the participation ranges established for this Bid and/or does not agree to the employment goals described herein, Seller must complete and submit a *Documentation of Best and Good Faith Efforts Form* ("BGFE Form"), documenting its solicitations and any commitments with M/W/DSBEs, and detailing any efforts made to include M/W/DSBEs in the contract and to employ a diverse workforce. The submission of the BGFE Form is an element of bid responsiveness and failure to include this form may result in the rejection of the Quote. The BGFE Form must include at a minimum, certification and documentary evidence that the following actions were taken:

1. Solicitation directed to both qualified M/W/DSBEs registered with OEO and qualified M/W/DSBEs certified by agencies approved by OEO. Seller must provide a list of all certification directories used for soliciting participation for this Bid. Seller must determine with reasonable certainty if the M/W/DSBEs are interested by taking appropriate steps to follow up on initial solicitations; one time contact, without follow up, is not acceptable; and

2. Seller provided interested M/W/DSBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation; and

3. Seller negotiated in good faith with interested M/W/DSBEs. A Seller using good business judgment would consider a number of factors in negotiating with subcontractors, including M/W/DSBE subcontractors, and would take a firm's price and capabilities as well as the objectives of the Plan into consideration; and

4. Documentation of the following:

i. Any commitments to use M/W/DSBEs in its quote for subcontracted services and materials supply even when Seller would otherwise prefer to self-perform/supply these items; and

ii. Correspondence between the Seller and any M/W/DSBE(s) related

to this Bid; and

iii. Attendance logs and/or records of any scheduled pre-bid meeting;

and

5. Certification and evidence that the following actions were taken or documentation of the following, or an explanation why these actions were not taken or why documentation does not exist:

i. Any arms length business assistance provided to interested M/W/DSBEs which may include access/introduction to major manufacturer/suppliers, lines of credit and union halls; and

ii. Solicitation through job fairs, newspapers, periodicals, advertisements and other organizations or media that are owned by M/W/DSBEs and/or focus on M/W/DSBEs; and

iii. Telephone logs of communications related to this Bid; and

iv. Notification of and access to bid documents at the Seller's office or other office locations for open and timely review; and

v. Seller sought assistance from jobs training and employment referral agencies such as the Urban Affairs Coalition, PA CareerLink Philadelphia, Philadelphia OIC and Philadelphia Works to identify candidates for employment and to perform employment outreach; and

vi. Seller published its policy of nondiscrimination in the hiring, retention and promotion of employees; and

vii. Any agreement with an apprenticeship or training program that targets the employment of minority persons, disabled persons and women.

#### III. Evaluation of Responsiveness and Responsibility

A. Evaluation and Determination

1. The City, acting through its OEO, will evaluate the responsiveness of the Seller's Plan to these requirements. OEO reserves the right to request further documentation and/or clarifying information at any time prior to the award of the contract which may result in Seller's amendment of its M/W/DSBE Participation and Workforce Commitments Form or BGFE Form.

B. Administrative Reconsideration

1. If the OEO determines that the apparent low Seller has not made sufficient Best and Good Faith Efforts, the Seller will be notified and may file a written appeal with OEO within forty-eight (48) hours of the date of notification. The decision of OEO may be appealed in writing within forty-eight (48) hours of the date of OEO's decision to Chief Operating Officer of the Commerce Department or his designee whose decision shall be final. If it is determined that the apparent low Seller did not make sufficient Best and Good Faith Efforts, its Quote will be rejected.

2. Notwithstanding compliance with the requirements set forth herein, the City reserves the right to reject any or all quotes as deemed in the best interest of the City.

#### IV. Compliance and Monitoring of Best and Good Faith Efforts

A. A copy of the Successful Seller's Plan, as certified below by OEO, will be filed with the Chief Clerk of Council by the Procurement Department on behalf of the Successful Seller, within fifteen (15) days of the Procurement Department's issuance of the notice of award.

The Successful Seller agrees to cooperate with OEO and the Labor Standards Unit ("LSU") in their compliance monitoring efforts, and to submit, within the time limits prescribed, all documentation which may be requested by OEO and LSU relative to the

awarded contract, including the items described below. The Successful Seller must provide as required and maintain the following contract documentation for a period of three (3) years following acceptance of final payment under the contract:

- Copies of signed contracts and purchase orders with M/W/DSBE subcontractors;
- Evidence of payments (cancelled checks, invoices, etc.) to subcontractors and suppliers to verify participation;
- Telephone logs and correspondence relating to M/W/DSBE commitments.
- Certified Payroll records for all on-site contractors.

B. The Successful Seller is required to use the City's electronic systems for payment verification, B2GNOW Contract Compliance Reporting System and certified payrolls, LCP Tracker.

- C. Prompt Payment of M/W/DSBEs
  - The Successful Seller shall within five (5) business days after receipt of a payment from the City for work performed under the contract, deliver to its M/W/DSBE subcontractors their proportionate share of such payment for work performed (including the supply of materials). In connection with payment of its M/W/DSBE subcontractors, the Successful Seller agrees to fully comply with the City's payment reporting process which may include the use of electronic payment verification systems.
  - 2. Each month of the contract term and at the conclusion of the contract, the Successful Seller shall provide to the OEO documentation reconciling actual dollar amounts paid to M/W/DSBE subcontractors to M/W/DSBE commitments presented in the Plan.
- D. Oversight Committee
  - For this project, the City, in its sole discretion, may establish a Project Oversight Committee consisting of representatives from the Seller's company, representatives of the building trades, the construction manager, and the City which may include the Project site's District Councilperson, OEO, and appropriate community organizations ("Committee"). The Committee will meet regularly to provide advice for the purpose of facilitating compliance with the Plan.
  - 2. If a Project Oversight Committee is established, the City will convene meetings of the Committee no later than one (1) month after issuance of the Notice To Proceed.

V. Remedies and Penalties for Non-Compliance

A. The Successful Seller agrees that its compliance with the requirements of the Plan is material to the contract. Any failure to comply with these requirements may constitute a substantial breach of the contract. It is further agreed and understood that in the event the City determines that the Successful Seller hereunder has failed to comply with these requirements the City may, in addition to remedies reserved under Section 17-1605 of The Philadelphia Code, any other rights and remedies the City may have under the contract, or any bond filed in connection therewith or at law or in equity, exercise one or more of the remedies below, which shall be deemed cumulative and concurrent:

- a. Withhold payment(s) or any part thereof until corrective action is taken.
- b. Terminate the contract, in whole or in part.
- c. Suspend/Debar the successful seller from bidding on and/or participating in any future City contracts for a period of up to three (3) years.
- d. Recover as liquidated damages, one percent of the total dollar amount of the contract for each one percent (or fraction thereof) of the commitment shortfall. (<u>NOTE</u>: The "total dollar amount of the contract" shall include approved change orders, amendments and for requirements contracts shall be based on actual quantities ordered by the City.)

The remedies enumerated above are for the sole benefit of the City and City's failure to enforce any provision or the City's indulgence of any non-compliance with any provision hereunder, shall not operate as a waiver of any of the City's rights in connection with any contract resulting from this Invitation and Bid nor shall it give rise to actions by any third parties including identified M/W/DSBE subcontractors. No privity of contract exists between the City and the M/W/DSBE subcontractor identified in any contract resulting from this Invitation and Bid. The City does not intend to give or confer upon any such M/W/DSBE subcontractor(s) any legal rights or remedies in connection with subcontracted services under any law or Executive Order or by any reason of any contract resulting from the Invitation and Bid except

such rights or remedies that the M/W/DSBE subcontractor may seek as a private cause of action under any legally binding contract to which it may be a party.

SIGNATURE OF SELLER AND TITLE <sup>4</sup>	DATE
PRINT NAME OF SELLER	DATE
IOLA HARPER, Executive Director, Office of Economic Opportunity <sup>5</sup>	DATE

[See Forms on following pages; these Forms, as completed by Seller, must be submitted with the Quote as a matter of Responsiveness and Responsibility]

<sup>&</sup>lt;sup>4</sup>Seller is required to sign and date, but the City reserves the right to obtain the Successful Seller's signature thereon at any time prior to Plan certification. The Successful Seller will receive from the City a certified copy of its Plan which will be filed by the Procurement Department with the Chief Clerk of City Council within fifteen (15) days of the Procurement Department's issuance of a notice of award and published by OEO, in a downloadable format, on the OEO website.

<sup>&</sup>lt;sup>5</sup> Pursuant to Section 17-1603 (2) of The Philadelphia Code, the representative of the City of Philadelphia's Office of Economic Opportunity, the "certifying agency", certifies that the contents of this Plan are in compliance with Chapter 17-1600.

	OEO Official Use Only	
M/W/DSBE Commitments		Percent/Dollar Amount
	[MBE]	
	_	
	_	
	_	
	_[WBE]	
	_	
	_	
	_	
	_[DSBE]	
	-	

#### M/W/DSBE Participation and Workforce Commitments EOPs FOR BIDS ESTIMATED AT MORE THAN \$100,000

	Minority (MBE) Woman (	WBE), Disabled (DSBE) and D	DMIC OPPORTUNIT		usiness Enternri	coc <sup>1</sup>
BID NUMBER/PROJECT TIT		NAME OF BIDDER -			BID OPENIA	
			Commercially Accer	ntable Functio		- Photocopy this form as necessary
	SBE M-DBE <sup>2</sup> W-DBE <sup>2</sup>	Subcontractor	Supplier		uote Received	Amount Committed To
Company Name						Dollar Amount
		Work or Supply Effor	t to be Performed	YES <sup>3</sup>	NO	\$
Address						-T
Contact Person						
elephone Number	Fax #					Percent of Total Drangoal
	1 0. 7					Percent of Total Proposal
-mail Address						70
DEO Registry #	Certifying Agency					
	SBE M-DBE <sup>2</sup> W-DBE <sup>2</sup>	Subcontractor	Supplier	Qı	ote Received	Amount Committed To
Company Name						Dollar Amount
ddress		Work or Supply Effor	t to be Performed	YES <sup>3</sup>	NO	_\$
dd1000						
Contact Person						
Celephone Number	Fax #					Percent of Total Proposal
E-mail Address	· · · · · · · · · · · · · · · · · · ·					%
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DEO Registry #	Certifying Agency					
internet in the second s	Serinying Agency					
MBE WBE D	SBE M-DBE <sup>2</sup> W-DBE <sup>2</sup>	Subcontractor	Supplier	Qı	uote Received	Amount Committed To
Company Name					Ī	Dollar Amount
		Work or Supply Effor	t to be Performed	YES <sup>3</sup>	NO	\$
ddress						1
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Contact Person						
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,	, was in					%
-mail Address	······································					~
EO Registry #	Certifying Agency		1			
	<sup>1</sup> MBE/W	BE/DSBEs Listed above must	be certified prior to bid	submission da	te.	
2007-1-1 · · ·	<sup>2</sup> If Bidder makes o	commitments with DBEs, Bidd	er shall indicate which	class type M-DE	BE or W-DBE is s	ubmitted for credit.
<sup>a</sup> Bidder should a	attach quotation with this form, but the Ci	ty reserves the right to request	this information which	i shall be submi	itted by bidder wi	thin 48 hours of the City's Request.

#### DEPARTMENT OF COMMERCE OFFICE OF ECONOMIC OPPORTUNITY (OEO)

Bidder, by submission of this M/W/DSBE Participation and Workforce Commitments Form, certifies that it will use, for the duration of the project, its Best and Good Faith Efforts, as that term is defined in Chapter 17-1600 of The Philadelphia Code, to employ a diverse workforce for this project and achieve the following goals:

African American Journeypersons – 22% of all journey hours worked across all trades Asian Journeypersons – 3% of all journey hours worked across all trades Hispanic Journeypersons – 15% of all journey hours worked across all trades Female Journeypersons – 5% of all journey hours worked across all trades Minority Apprentices - 50% of all hours worked by all apprentices Female Apprentices – 5% of all hours worked by all apprentices List any and all collective bargaining agreements that Bidder is a signatory to:

REV 07/2016

#### DOCUMENTATION OF BEST AND GOOD FAITH EFFORTS FORM

	DEPARTMEN OFFICE OF ECONO			OEO)			
Minority (MBE), Woman (WBE), Disabled (DSBE) and Disa	advantaged (DBE) Business Enterprises	1					
BID TITLE -	NAME OF BIDDER -				BID SUBMISSION	I DATE -	
List below ALL MBE/WBE/DSBE/DBEs <sup>3</sup> to MBE WBE DSBE M-DBE <sup>3</sup> W-DBE <sup>3</sup>	Please Specify Work to be Performed						r <i>m as necessary.</i> nent Made
	and/or		Date	Solici	-		
Company Name	Type of Supply Effort	By Phone	By Mail		By Advertisement	(If Yes, give date solicited)	(If No, provide reasons on Page 2)
Address		1				(n red, give date senoned)	(ii No, provide reasons on rage 2)
Contact Person							
			Date	Solici		Dollar Amount	
Telephone Number Fax #		YES			NO	\$	
Subcontractor Supplier							
OEO CERTIFICATION #						Percent of Total Proposal %	
				l			
			Date	Solici			nent Made
Company Name	and/or	By Phone	By Mail		By Advertisement	YES	NO
Address	Type of Supply Effort					(If Yes, give date solicited)	(If No, provide reasons on Page 2 )
Contact Person			Date	Solici	ited	Dollar Amount	
Telephone Number Fax #		YES			NO	\$	
Subcontractor Supplier						Devecut of Total Drop cool	
OEO CERTIFICATION #						Percent of Total Proposal %	
MBE WBE DSBE M-DBE W-DBE	Please Specify Work to be Performed		Date	Solici	ited	Commitr	nent Made
Company Name	and/or	By Phone	By Mail		By Advertisement	YES	NO
	Type of Supply Effort					(If Yes, give date solicited)	(If No, provide reasons on Page 2)
Address							
Contact Person							
			Date	Solici		Dollar Amount	
Telephone Number Fax #		YES			NO	\$	
Subcontractor Supplier						Percent of Total Proposal	
OEO CERTIFICATION #						%	

<sup>1</sup>MBE/WBE/DSBE/DBEs Listed above must be certified prior to bid submission date.

<sup>2</sup>Bidder should attach quotation with this form, but the City reserves the right to request this information which shall be submitted by bidder within 48 hours of the City's request.

<sup>3</sup>If Bidder makes solicitation(s) and commitments with a DBE, Bidder shall indicate which class type, M-DBE or W-DBE, is submitted for credit.

#### DOCUMENTATION OF BEST AND GOOD FAITH EFFORTS FORM

		OF COMMERCE	
		C OPPORTUNITY (OEO)	
BID NUMBER & TITLE -	NAME OF BIDDER -	BID SUBMISSION	DATE -
		BID SOBMISSION	DATE -
Photocopy this form as r	ecessary; you must respond for each solicited M/W/DSBE	for which there is no commitment. Failure to do so	may result in rejection of your bid.
Name of M/W/DSBE solicited for which no comm	nitment was made:		
No commitment resulted from your solicitation of	f the above identified M/W/DSBE; please explain why:		
No communent resulted from your solicitation o	the above identified w/w/DSDL, please explain wry.		
Did you attempt, in good faith, to negotiate price	and scope (please be specific, attaching any dated price q	uotations and correspondence):	
Did you offer this M/W/DSBE any arms length bus	siness assistance (e.g., introduction to manufacturer, help	ed provide access to line of credit, access to union	hall, etc.):
Did you provide this M/W/DSBE with timely inform	nation about the scope of work required; be specific and a	tach dated documentary evidence of the foregoing	:
	· · · · ·		-

#### DOCUMENTATION OF BEST AND GOOD FAITH EFFORTS FORM

	DEPARTMENT OF OFFICE OF ECONOMIC O		
BID TITLE -	NAME OF BIDDER -	BID SUBMISSION DATE -	
	Photocopy this form		
Do you operate or provide funding to any on-		se describe and provide the number of trainees and breakout of mi	inority, female and/or
disabled participants:			
		trial Center and the Philadelphia Workforce Development Corporat nunity based organizaitons that your firm uses for employment place	
	· · · · · · · · · · · · · · · · · · ·		
Describe any specific outreach activities thro	ugh job fairs, newspapers, periodicals, advertisements	and other organizations or media that are owned by M/W/DSBEs a	nd/or focus on
M/W/DSBEs:	<u></u>		
		tices, or involvement in Commonwealth approved apprenticeship r	programs that specifically
encourage the training and employment of mi	nority, women and/or disabled persons:		
List all directories of certified M/W/DSBEs (e.	I., OEO Registry, Pennsylvania Unified Certification Pro	ogram, Department of General Services) that you consulted in prepa	aring your bid:
Attach your company's Equal Employment O	portunity Statement and any published nondiscriminat	tion policies.	



# WORKFORCE DIVERSITY PLAN

BID#:	CONTRACT#:	DATE SUBMITTED:
PROJECT NAME:		
COMPANY NAME:	CONTACT	PERSON:
TELEPHONE#:	EMAIL:	

As identified in the City of Philadelphia's Annual Disparity Assessment of Workforce Diversity, the current employment hourly goals for Journeymen is 40% minority (22% African American, 15% Hispanic, and 3% Asian) and 5% female. Apprentice is 50% minority and 5% female. You must utilize Best and Good Faith Efforts to remain in compliance with the Workforce Diversity Goals outlined above. Overall employment goals are to be achieved by the completion of the contract.

**PLEASE NOTE:** Best and Good Faith Efforts are defined as efforts, the scope, intensity and appropriateness of which are designed and performed to foster meaningful and representative opportunities for an appropriately diverse workforce. Pro forma efforts are not Best and Good Faith Efforts. You are expected to make appropriate outreach to labor sources (e.g. union hiring hall, job training organizations, etc.) to satisfy the goals. Failure to demonstrate Best and Good Faith Efforts may result in the Labor Standards Unit ("LSU") imposing remedies and penalties for non-compliance.

Quarter	Total Workers	Journeymer	Journeymen				Apprentice		
		African American %	Hispanic %	Asian %	Female %	Minority%	Female%		
Quarter 1*									
Quarter 2									
Quarter 3									
Quarter 4									

#### Please provide an estimate of your quarterly employment utilization for each category.

<sup>\*17-1605(4)(</sup>c) of The Philadelphia Code requires the Labor Standards Unit ("LSU") to determine, after completion of this quarter, whether you are on track to meet the Workforce Diversity Goals. If you are not achieving your committed percentages at this stage, LSU will take appropriate enforcement action including issuance of fines of \$300. for each violation, stop payment on your contract and any other available remedies.



Please answer the following questions concerning your efforts to achieve the diversity goals on this project. If you need more space, please attach an additional sheet of paper.

- 1. What are the estimated Total Project Hours for this project?
- 2. If your estimated quarterly employment utilization for each category of minority and female workers falls below the identified Workforce Diversity goals established by the Annual Disparity Assessment (referenced above), please provide a brief explanation for each category in which you anticipate a shortfall.

- 3. How do you plan to achieve the diversity goals on this project (Journeymen and Apprentices)?
- 4. Please identify the Labor Organization(s), if any, with whom you have a collective bargaining agreement.

Please provide a copy of your request as well as a copy of any responses received. Attached? 

Yes

No

6. What resources will you utilize to recruit minority and female workers for this project?
□ Urban Affairs Coalition
□ CareerLink Philadelphia
□ Opportunity Industrial Center
□ Philadelphia works
□ Finishing Trades Institute
□ JEVS Orleans Technical Institute
□ Philadelphia Housing Authority
□ Other:



7. If you have <u>not</u> identified any minority or female apprentices for this project, please provide your plan to meet the established Workforce Diversity Goal(s):

8. Please provide a copy of your company's Equal Employment Opportunity statement and any published non-discrimination policies.

Attached? 
□ Yes 
□ No

Contractor hereby verifies that all information submitted to the City including without limitation, this Workforce Diversity Plan and all attachments thereto, is true and correct and Contractor is notified that the submission of false information is subject to the penalties of 18 Pa.C.S. Section 4904 relating to unsworn falsification to authorities.

Prepared by:	Title:
. ,	

Date: \_\_\_\_\_

Signature: \_\_\_\_\_\_

#### ACT 127 VERIFICATION FORM ADDENDUM

The Contractor is hereby notified of the following state law requirement applicable to all public works contracts entered into by the City of Philadelphia:

The Commonwealth of Pennsylvania has enacted Act 127 of 2012, known as the Public Works Employment Verification Act ("the Act") which requires all public work contractors and subcontractors to utilize the Federal Government's E-Verify system to ensure that all employees performing work on public work projects are authorized to work in the United States. The effective date of the Act is January 1, 2013.

The Department defines a "Public Work" to be construction, reconstruction, demolition, alteration and/or repair work other than maintenance work, done under contract and paid for in whole or in part out of the funds of a public body where the estimated cost of the total project is in excess of twenty-five thousand dollars (\$25,000) but shall not include work performed under a rehabilitation or manpower training program. The City of Philadelphia (the "City") is a "public body" pursuant to the Act.

In accordance with section 4(A) of the Act, as a precondition of being awarded a contract for a Public Work, or with respect to a contract that was awarded prior to the effective date of the Act but was not executed prior to January 1, 2013, prior to the execution of the contract, the Contractor is required to provide the Procurement Department of the City with the Verification Form required by the Act. In addition, the Act requires that, prior to any work being performed by a subcontractor on a Public Works contract, the subcontractor must provide the Contractor with the required Verification Form, which must also be submitted to the Procurement Department by the Contractor prior to any work being performed, and that any contract between the Contractor and its subcontractor(s) shall contain information about the requirements of the Act.

The Verification Form may be downloaded by copying and pasting the following web address into your web browser:

http://www.portal.state.pa.us/portal/server.pt/community/construction\_and\_public\_works/1235/public\_works\_employment\_verification/1357211

and clicking on the Public Works Employment Verification Form link at the bottom of the page. In addition, a copy of the verification form is attached to this Addendum. However, the Verification Form and related federal and state requirements may change, and Contractor and subcontractors are responsible to utilize any revised form if applicable.

The Contractor may access the Federal Government's E-Verify system by copying and pasting the following web address into your web browser:

http://www.uscis.gov/portal/site/uscis/menuitem.eb1d4c2a3e5b9ac89243c6a7543f6d1a/?v gnextoid=75bce2e261405110VgnVCM1000004718190aRCRD&vgnextchannel=75bce2e2614 05110VgnVCM1000004718190aRCRD&gclid=CLWey7SYvrQCFU-d4AodFGYA-A

To facilitate access to the Verification Form and the E-Verify System, this Addendum shall be posted on the Procurement Department's web site. However, as stated above, Contractor and subcontractors are responsible for compliance with verification requirements as they may change from time to time, whether or not posted on Procurement's web site.

# NOTICE TO SELLERS

#### Pursuant to the Order, available on-line at

http://www.phila.gov/ExecutiveOrders/Executive%20Orders/EO%207-14.pdf, Contractor agrees that Contractor and all of its Subcontractors, at any tier, shall report to the OIG knowledge of violations subject to investigation by the OIG pursuant to the Order; shall cooperate fully with representatives of the OIG by providing complete and accurate information as well as necessary assistance in matters under investigation; shall keep conversations and contact with the OIG confidential, except and to the extent the OIG may authorize disclosure; and shall instruct their employees that under no circumstances shall any person take or threaten any action in an attempt to prevent anyone from providing information to a City official regarding conduct that may be investigated by the OIG, or from cooperating with the OIG, or retaliate against anyone for doing so or against anyone who is about to do so.

All entities and individuals affected by Mayor's Executive Order 7-14 are advised to thoroughly read the Order, especially Section 3, **Type of Matters Investigated by the OIG**, Section 4, **Entities Subject to Investigation by the OIG**, Section 8, **Duties of Executive Agencies and Other Entities**, Section 9, **Responsibilities of Officers and Employees of Executive Agencies and Other Entities**, and Section 10, **Responsibilities of City Contractors**, **Recipients of City Assistance and Recipients of City Funding**.

# NOTICE TO SELLERS

Contractors and their subcontractors are required to submit weekly certified payroll records to the Labor Standards Unit through an electronic system, LCP Tracker, or as directed by the Labor Standards Unit. Failure to pay Prevailing Wage, as applicable, or to submit certified payroll records is a substantial breach of Contract and may be subject to fines and penalties as prescribed by Section 17-107 of The Philadelphia Code which may include withholding from any sums due to the Contractor under the Contract so much as may be necessary to pay the employees the difference between the wages required to be paid hereunder and the wages actually paid to such employees, and the City may make such payments directly to the appropriate employees.

# City of Philadelphia Specification Language Requiring Diesel Engine Emissions Controls in Public Works Projects

# DIESEL ENGINE EMISSIONS CONTROLS FOR PUBLIC WORKS PROJECTS

In accordance with Executive Order 1-07 and in furtherance of *Greenworks Philadelphia*, City establishes a requirement to include clean diesel specifications in public works contracts. Contractor, by submission of its bid, agrees to meet the requirements of this Section. This Section applies to bids advertised between July 1, 2013 and June 30, 2014 in which the total estimated dollar amount is \$1,000,000 or greater, and to all bids, awarded on or after July 1, 2014, regardless of estimated dollar amount. Notwithstanding the foregoing, engine noncompliance shall not constitute a material breach of contract nor shall monetary penalties be assessed as provided in subsection E.2 until after January 1, 2014. If noncompliant vehicles subject to this Section are observed prior to January 1, 2014, the City may issue written warnings to the contractor.

- A. Covered Vehicles: Vehicles covered under this Section include any nonroad diesel engine that has a horsepower greater than 50.
- B. Requirements
  - 1. All bids for public works contracts and all applicable contracts entered into as a result of such bids covered under this Section shall include specifications that all contractors, and all of the contractor's subcontractors, if any, in the performance of such contracts use ultra-low sulfur diesel fuel, and a listed clean diesel technology for reducing the emission of pollutants for diesel-powered non-road engines. Clean diesel technologies are further defined in part D of this Section. Retrofit emission control devices shall consist of diesel oxidation catalysts ("DOC") or such other technologies that provide a minimum emissions reduction of twenty percent (20%) of particulate matter with a mean aerodynamic width of less than ten (10) microns (PM10) in the application for which it is verified. Any retrofit emission control device installed to comply with this Section must either be listed by EPA or the California Air Resources Board (CARB) as a verified diesel retrofit technology that reduces particulate matter emissions by 20% or more, or must be certified by the diesel retrofit device manufacturer as a product that reduces particulate matter emissions by 20% or more for the covered vehicle.
  - 2. No later than two business days before any covered vehicle is brought onto the City's contract site, the successful bidder (hereinafter, "contractor") shall submit to the City's project manager information about the vehicle including confirmation that the appropriate emissions control technology has been installed on the vehicle or that the vehicle is Tier 4 or Tier 4 Interim. Except as otherwise provided, any vehicle covered under this Section shall be in compliance with this Section prior to being brought onto the contract site.
    - a. Contractor shall submit the following information for each covered vehicle (using *Fleet Roster for Public Works Construction Projects* form):
      - i. vehicle identification number (VIN), if applicable, or vehicle serial number, and the vehicle type, make, year and owner;

- ii. the horsepower rating of each engine;
- iii. the emission control device manufacturer name, model, and verifying/certifying organization; and
- iv. the type of fuel to be used and approximate expected quantity.
- b. In the event contractor has purchased appropriate emissions control technology, but the technology is not delivered before use of the covered vehicle is required on the contract site, the contractor shall, in addition to submission of a.i., through iv. above, submit proof of purchase of the emissions control technology. Installation of the appropriate emissions control technology must be completed within five (5) days of delivery of the technology. In no event may Contractor use the covered vehicle without the use of the emission control technology, for which the technology has already been purchased and identified, on the contract site for longer than sixty (60) days.
- c. If a covered vehicle owned by a contractor breaks down on the contract site, contractor may use, if a compliant replacement is unavailable, a temporary vehicle that is not compliant while the covered vehicle is being repaired; the temporary vehicle cannot remain on site for more than 30 cumulative days after the date of the initial breakdown of the covered vehicle. Contractor shall notify the project manager in writing prior to bringing a non-compliant vehicle on the contract site.
- 3. The contractor shall establish truck-staging zones for vehicles that are waiting to load or unload material at the contract site. Such zones shall be located where the emissions from the trucks will have minimum impact to the public.
- 4. The contractor shall not permit idling of delivery and/or dump trucks, or equipment on the contract site during periods of non-active use, and it should be limited to three (3) minutes in accordance with the Philadelphia Traffic Code Anti-Idling Ordinance Section 12-1127(1) of The Philadelphia Code (http://www.phila.gov/philacode/html/ data/title12/chapter 12\_1100\_miscellaneous\_/12\_1127\_excessive\_idling\_of\_an.html) and the Pennsylvania Diesel-Powered Motor Vehicle Idling Act, Title 35 Purdons Pennsylvania Statutes, Section 4601 *et seq.*

# C. Exemptions

- 1. Subject to written approval by the City of Philadelphia Air Management Services (AMS), covered vehicles will be exempted from low diesel emission controls if one or more of the following conditions exist:
  - a. it is physically impossible to install appropriate emissions control technology on the vehicle;
  - b. installation of the appropriate emissions control technology would render vehicle operation unsafe due to obstructed sightline;

- c. installation of the appropriate emissions control technology would void any applicable expressed manufacturer's warranty on the vehicle; or
- d. the covered vehicle will not be at the work site for more than a total of three (3) business days.
- 2. In support of a request for exemption, contractors shall provide to AMS one of the following:
  - a. a signed letter from one or more diesel technology vendors, written on the vendor's formal stationary, certifying that no emissions controls that would reduce Particulate Matter (PM) emissions by at least 20% and allow for safe operation could be physically installed, or the cost of installing such control technology would cost 150% more than the purchase price of the clean diesel technology device;
  - b. a signed letter from the vehicle manufacturer certifying that the installation of any device to reduce PM emissions by 20% or more would void the applicable expressed manufacturer's warranty, along with a copy of the warranty for each vehicle for which an exemption is sought; or
  - c. a signed letter on the contractor's company letterhead stating that the covered vehicle will remain on site for no longer than three (3) days total during the duration of the project.
- 3. In no event will the City grant an exemption from the required use of ultra-low sulfur diesel fuel or the idling laws.

# D. Definitions

- 1. Contract site all areas covered under the contract, and areas accessed for purposes of performing activity under the contract;
- 2. Non-active use a period of time greater than five (5) minutes when a piece of diesel equipment is not being operated in performance of its work;
- 3. Non-road diesel vehicles listed by EPA for use in non-road applications. These include construction, agricultural, and other industrial vehicles that are not legally operable on highways;
- 4. On-road vehicles listed by EPA for on-highway applications;
- 5. Truck-staging zone a designated area on the contract site where delivery or pickup activities will be located;
- 6. Ultra low sulfur diesel fuel Diesel fuel with a sulfur content of 15 parts per million or less;

- 7. Vehicle a piece of diesel-powered equipment being used for contract activities; and
- 8. Listed clean diesel technology includes:
  - a. Diesel oxidation catalyst a device similar to a catalytic converter that reduces diesel emissions and does not require regeneration;
  - b. Tier 4 or Tier 4 Interim any vehicle certified by EPA as meeting Tier 4 emissions standards or Tier 4 Interim emissions standards;
  - *c.* Particulate filter a device that traps soot produced by the engine and vaporizes this soot through the application of heat, requiring only periodic maintenance;
  - *d.* Closed crankcase ventilation a device that reduces fugitive emissions from the vehicle's crankcase by routing them through the tailpipe;
  - e. Selective catalytic reduction A device that reduces emissions of oxides of nitrogen by treating exhaust with urea;
  - *f. Emissions upgrade groups groups of replacement components that, when installed during vehicle overhaul, reduce engine emissions;*
  - g. Engine repower the replacement of a vehicle's engine with a newer model to reduce tailpipe emissions; and
  - *h.* Any other technology verified by EPA or CARB to reduce diesel particulate emissions by 20% or more.
- E. Monitoring and Penalties for Non-Compliance
  - 1. City reserves the right to request purchase and/or installation documents to verify contractor's, and any subcontractor's installation of the retrofit in the vehicle. These purchase documents shall be provided to the City's project manager by the contractor within five (5) days of the City's request.
  - 2. Any false certification or representation in connection with these requirements for Diesel Engine Emissions Controls and/or any failure to comply with these requirements shall constitute a material breach of contract entitling the City to all rights and remedies provided in the contract and otherwise available at law and/or in equity, including but not limited to the monetary assessment set forth herein. For contracts of \$500,000.00 or less, an assessment of \$500.00 per offense per day shall be imposed upon the contract, an assessment of \$1000.00 per offense per day shall be imposed upon the contract, an assessment of \$1000.00 per offense per day shall be imposed upon the contractor for every covered vehicle operating in violation of this section. For all other contractor for every covered vehicle operating in violation of this section. In addition, it is understood that false certification or representation is subject to penalties under Title 18 Pa. C.S.A. § 4904 (relating to unsworn falsification to authorities).



1500 Market Street Suite 2600 West Philadelphia, PA 19102

#### WORKING CAPITAL LINE-OF-CREDIT

The Philadelphia Industrial Development Corporation's ("PIDC") Contract Line-of-Credit provides access to short-term financing to small businesses who qualify for the program, including minority, woman, disabled-owned businesses performing contracts in the city of Philadelphia. Loans will typically fund the short-term capital needed to provide construction, procurement, or professional services to public, institutional or certain private users. Please contact Marla S. Hamilton at 215-496-8125 or <u>mhamilton@pidcphila.com</u> for more information.

# **MEMORANDUM**

TO:	Municipal Operating Departments and Awarding Agencies
FROM:	Perritti DiVirgilio, Director, Fair Labor Standards
DATE:	Effective July 9, 2019
RE:	Updated Prevailing Wage Schedule for the City of Philadelphia

The Philadelphia Labor Standards Unit has issued an updated prevailing wage rate schedule for construction projects done on behalf of the City of Philadelphia. Enclosed herein you will find the two (2) decisions, which comprise the updated prevailing wage schedule. They are as the follows:

- I. Building Construction
- **II.** Heavy and Highway Construction

Please direct any questions or concerns regarding the prevailing wage rate schedule to my attention:

Philadelphia Labor Standards Unit Municipal Services Bldg., 1st Floor Room 170C 1401 John F. Kennedy Blvd. Philadelphia, PA 19102-1670 Telephone Numbers: (215) 686-2132 Fax Number: (215) 686-2116

Thank you for your cooperation.

Page 1 of 17 Prevailing Wage Schedule (Effective 07/09/2019) Building Construction (cont'd)

### PREVAILING WAGE RATE SCHEDULE FOR CONSTRUCTION WORK DONE ON BEHALF OF CITY OF PHILADELPHIA INCLUDING REPAIR, ALTERATION, AND REMODELING WORK

## I. BUILDING CONSTRUCTION

#### A. Job Classification and Wage Rates

	<b>Basic Hourly Rate</b>	Fringe Benefits
ASBESTOS WORKER		-
Journeyman	51.20	36.95
Handler Level 1	28.59	22.69
Handler Level 2	40.92	22.69
BOILERMAKER	45.51	34.11
BRICKLAYER	43.45	29.96
CARPENTER	47.99	28.74
CEMENT MASON	38.50	32.81
(as of 5/1/20)	38.50	34.31
DRY WALL FINISHER	39.47	28.89
ELECTRICIAN	58.33	37.41
(Telecommunication Senior Tech)	56.16	25.84
(Telecommunication Tech A)	51.62	24.99
ELEVATOR CONSTRUCTOR	55.76	33.005
FOOTNOTES FOR ELEVATOR MECHA	NICS:	

A. PAID VACATION: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% for 6 months to 5 years of service.

B. Eight Paid Holidays (provided employee has worked 5 consecutive days before and the working day after the holiday): New Year's Day; Memorial Day; Independence Day; Labor Day; Veteran's Day; Thanksgiving Day and the Friday after Thanksgiving Day, and Christmas Day.

GLAZIER	43.87	33.38
IRONWORKER		
Structural & Ornamental	49.30	34.41
<b>Reinforcing (Rodsetter)</b>	46.41	30.85
<b>Rigger &amp; Machinery Mover</b>	44.15	28.72
LABORER		
Journeyman Class One	31.65	26.62
Journeyman Class Two	31.75	26.62
Journeyman Class Three	31.80	26.62
Journeyman Class Four	31.95	26.62
Journeyman Class Five	32.05	26.62
Journeyman Class Six	31.79	26.62
Journeyman Class Seven	32.90	26.62
Journeyman Class Eight	32.95	26.62
Journeyman Class Nine	33.05	26.62

Page 2 of 17 Prevailing Wage Schedule (Effective 07/09/2019) Building Construction (cont'd)

Journeyman Class Ten	33.20	26.62
Journeyman Class Eleven	33.45	26.62
Journeyman Class Twelve	32.02	26.62
LABORER: ASBESTOS ABATEMENT,		
LEAD ABATEMENT,		
TOXIC WASTE HANDLING	, <b>J</b> ,	
HAZARDOUS WASTE HAN		
MASTER ABATEMENT TECHNICIAN	33.15	26.50
LANDSCAPE LABORER		
Class I	24.64	23.68
Class II	24.64	23.68
LATHER	47.99	29.92
LINE CONSTRUCTION		
Lineman	53.64	27.46
(as of 5/27/19)	54.66	28.56
Winch Truck Operator	37.55	22.63
(as of 5/27/2019)	38.26	23.47
Line Truck Driver	34.87	21.82
(as of 5/27/2019)	35.53	22.62
Ground hand	32.18	21.01
(as of 5/27/2019)	32.80	21.78
Watch/Flag Person	22.94	18.24
(as of 5/27/2019)	23.37	18.85
MARBLE SETTER	43.25	29.60
MARBLE FINISHER	37.07	26.85
MILLWRIGHT	45.40	33.29
PAINTER		
Brush & Roller	39.04	28.99
Spray, Steel, & Swing	40.89	27.64
Bridges	55.52	28.39
PILEDRIVERMAN	43.45	34.57
(Diver)	52.14	34.47
(Diver Tender)	43.45	34.47
PLASTERER	40.12	30.75
(as of 5/1/2020)	40.12	31.24
PLUMBER	55.45	34.54
POINTER, CAULKER, & CLEANER	44.75	28.70
POWER EQUIPMENT OPERATOR		
Group One	46.41	30.60
Group One A	49.41	31.49
Group Two	46.16	30.53
Group Two A	49.17	31.41
Group Three	42.08	29.72
Group Four	41.78	29.23
Group Five	40.06	28.72

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Group Six	39.07	28.43
Group Seven A	56.30	35.11
Group Seven B	56.00	35.03

## **\*\*\*TOXIC/HAZARDOUS WASTE REMOVAL\*\*\*** Add 20 percent to basic hourly rate for all classifications

ROOFER	37.15	31.27
Shingle, Slate and Tile	27.50	20.37
SHEET METAL WORKER	49.79	42.89
(Sign Makers and Hangers)	25.03	21.41
SOFT FLOOR LAYER (Resilient Floor)	48.61	28.69
(as of 5/1/20)	48.61	30.44
SPRINKLER FITTER	57.20	28.32
STEAM FITTER	56.37	37.79
STONE MASON	43.25	29.60
Surveying and Layout		
(Chief of Party)	55.19	28.19
(as of 5/1/20)	55.19	29.92
(Instrument Person)	47.99	28.19
(as of 5/1/20)	47.99	29.92
(Rodman)	24.00	19.94
(as of 5/1/20)	24.00	20.81
TERRAZZO MECHANIC	46.50	27.52
TERRAZZO FINISHER (Grinder)	41.23	25.52
<b>TERRAZZO FINISHER (Finisher)</b>	40.96	25.52
TILE SETTER	46.50	27.52
TILE FINISHER	37.07	26.85
TRUCK DRIVER		
Journeyman Class I	32.21	19.185
Journeyman Class II	32.31	19.185
Journeyman Class III And Low Boy	32.58	19.185
WALL COVERER	39.42	28.99
WELDER - Rate for craft to which, welding w	ork is incidental.	

WELDER - Rate for craft to which, welding work is incidental.

Page 4 of 17 Prevailing Wage Schedule (Effective 07/09/2019) Building Construction (cont'd)

## **B.** Job Classification Definitions: Building Construction,

## 1. Laborer Classifications:

**Class One:** Strip concrete, dismantle concrete, load, unload, handle and/or transport reinforced steel and steel mesh, carry lumber, handle miscellaneous building materials operate jack hammers, use paving breakers and other pneumatic tools, build scaffolds, perform raking, handle asphalt, perform spading and concrete pit work, perform grading, perform form pinning or shorting, perform demolition work with exception of burners, lay conduits, lay ducts, perform sheating or lagging, lay non-metallic pipe, perform caulking.

Class Two: Power Buggies, Burners on Demolition.

Class Three: Wagon drill operator (single)

**Class Four:** Powderman, wagon drill operator (multiple), perform circular caissons excavations, caisson groundman, perform underpinning excavation, perform laborers' work at depth of eight (8) feet or below.

Class Five: Caisson bottom worker.

Class Six: Yard worker.

**Class Seven:** Trackmen, Brakemen, Groutmen, Bottom Shaft Men, All Other Men in Free Air Tunnels.

Class Eight: Caisson Foreman

Class Nine: Miner Helper, Form Setters.

Class Ten: Miners Bore Driver, Blasters, Drillers, Pneumatic Shield Operator.

Class Eleven: Welders & Burners.

Class Twelve: Mason Tenders

## Landscape Laborers:

Class I: Landscape laborer

**Class II:** Farm tractor driver, hydro seeder, mulched nozzle worker, backhoe operator, bulldozer crawler type loader, tree crane operator.

**Laborer - Lather and Plasterer:** Wheel and/or hod carry any lather and plaster materials used by lathering and plastering contractors' build scaffolds; build runways; perform clean-up and removal of debris as covered by lathering and plastering contractor's contract; deliver any material used by lathering and plastering contractor, from curbside to building and back, unless motor vehicles are permitted to enter building with required materials; all mortar designated for use by plasterer shall be carried via wheel barrow or hod; all plastering and fire proofing machines, as well as guns and mixers requiring the assistance of a worker other than plasterer operator, shall be manned by helper (tender).

## 2. Truck driver classifications:

Class I: Helper, stake body truck operator (single axle, dumpster).

**Class II:** Dump truck operator, tandem truck operator, batch truck operator, semi-trailer truck operator, agitator-mixer truck operator, dump Crete type vehicle operator, asphalt distributor, farm tractor operator (when tractor used to transport materials), stake body truck (tandem) operator.

**Class III:** Euclid type; off highway equipment back truck operator; belly dump truck operator; double-hitched equipment trailer operator; straddle carrier (Ross) operator; low-bed trailer truck operator.

 3. Power Equipment Operator Classifications – Building
 Group One: Handling steel and stone in connection with erection Cranes doing hook work

Any machines handling machinery

Cable spinning machine

Page 5 of 17 Prevailing Wage Schedule (Effective 07/09/2019) Building Construction (cont'd)

> Helicopters Concrete Pumps (building) Machines similar to above, including remote control equipment Group One A: Handling steel and stone in connection with erection. Cranes doing hook work Any machines handling machinery Concrete Pumps (Building) High Rail/Burro Crane Rail Loader (Winch Boom Type) All equipment in this group which previously received the hour in lieu of an oiler will receive Wage Group I (A). Equipment in this Wage Group that does not require an oiler. Machines similar to above, including remote control equipment **Group Two:** All types of cranes All types of backhoes Cableways Draglines Keystones All types of shovels Derricks Pavers 21E and over Trenching machines Trench shovels Gradalls Front- end Loaders **Boat** Captain Hoist with Two Towers Building Hoists-double drum (unless used as a single drum) Pippin type backhoes Tandem scrapers Tower type crane operation erecting dismantling jumping or jacking Drills self-contained (Drillmaster type) Fork lift (20ft. and over) Motor Patrols (fine grade) Batch Plant with Mixer Carryalls, Scrapers, Tournapulls Roller (High Grade Finishing) Spreaders (Asphalt) **Bulldozers and Tractors** Mechanic-Welder Conveyor Loaders (Euclid-Type Wheel) Concrete Pumps (Heavy Highway) Milling Machine Bobcat Side Boom **Directional Boring Machines** Vermeer Saw Type Machine (other than hand held) Tractor Mounted Hydro Axe Chipper with boom

Page 6 of 17 Prevailing Wage Schedule (Effective 07/09/2019) Building Construction (cont'd)

> All Autograde and concrete finishing machines Bundle Pullers/Extractors (Tubular) Machines similar to the above including remote control equipment \*Surcharge Group Two (A): Crawler backhoes and Crawler gradalls over one (1) cubic yard factory rating Hydraulic backhoes over one (1) cubic yard factory rating Single person operation truck cranes 15 ton and over factory rating Cherry picker type machinery and equipment 15 ton and over factory rating, etc. Cranes doing hook work will be paid Wage Group I (A). All equipment in this Group which previously received the hour in lieu of an oiler will receive Wage Group II (A) including concrete pumps (Heavy/Highway). Machines similar to the above including remote control equipment \*Surcharge **Group Three:** Asphalt Plant Engineers Conveyors (except building conveyors) Well Driller Forklift Trucks of all types Ditch Witch (small trenchers) Motor Patrols Fine Grade machines Rollers Concrete Breaking Machines (Guillotine Only) Stump Grinder High or Low Pressure Boilers Building Hoist (single drum) Elevator Operator (New Construction) Machines similar to above including remote control equipment **Group Four:** Seamen Pulverizing Mixer Form Line Graders Farm Tractors **Road Finishing Machines** Concrete Spreaders (Heavy Highway) Power Broom (self-contained) Seed Spreader Grease Truck Machines similar to the above including remote control equipment **Group Five:** Compressors Pumps Well pint pumps Conveyors (Building) Welding Machines Heaters Tireman, Power Equipment Maintenance Engineers (Power Boats) Miscellaneous Equipment Operator

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> Elevator Operator (Renovations) House Car Machines similar to above including remote control equipment **Group Six:** Fireman Oilers and Deck Hands (Personnel Boats)/Grease Truck Helpers \*Surcharge Group Seven (A): Handling steel and stone in connection with erection Cranes doing hook work Any machines handling machinery Cable spinning machine *Helicopters Concrete pumps (Building)* High Rail/Burro Crane Rail Loader (Winch Boom Type) Machines similar to above, including remote control equipment **Group Seven B** All types of cranes All types of backhoes Cableways Conveyor Loader (Euclid-Type Wheel) **Drag Lines** Keystones All types of shovels Derricks Pavers 21E and over Trench shovels Trenching machines Gradalls Front-end Loaders Boat Captain Hoist with two towers Concrete Pumps (Heavy, Highway) Building Hoists-double drum (unless used as a single drum) Milling Machine Mucking Machines in Tunnel Pippin type backhoes **Bobcat** Tandem scrapers Side Boom Tower type crane-operation, erecting, dismantling, Jumping or jacking **Directional Boring Machines** Vermeer Saw Type Machine (other that hand held) Drills self-contained (Drillmaster type) Fork Lift (20 ft. & over) Track or Mounted Hydro Axe Motor Patrols (Fine Grade) Chipper with boom

Page 8 of 17 Prevailing Wage Schedule (Effective 07/09/2019) Building Construction (cont'd)

> Batch Plant with Mixer All autograde and concrete finishing machines Carryalls, Scapers & Tournapulls Rollers (High Grade Finishing) Bundle Pullers/Extractors (Tubular) Spreaders (Asphalt) Bulldozers and Tractors Mechanic – Welders Production Switch Tamper Ballast Regulators Tie Replacer Rail/Road Loader Power Jack liner Machines similar to above, including remote control equipment

# **II. HEAVY AND HIGHWAY CONSTRUCTION**

# A. JOB CLASSIFICATION AND WAGE RATES

	<b>Basic Hourly Rate</b>	<b>Fringe Benefits</b>
BOILERMAKER	46.89	33.73
CARPENTER	47.81	28.04
(as of 5/01/20)	47.81	29.99
(as of 5/01/21)	47.81	31.99
CEMENT MASON	36.85	32.56
(as of 5/01/20)	36.85	34.36
(as of 5/01/21)	36.85	36.16
ELECTRICIAN	58.33	37.41
IRONWORKERS		
Structural & Ornamental	49.30	34.41
<b>Reinforcing</b> (Rodsetter)	46.41	30.85
<b>Rigger &amp; Machinery Mover</b>	44.15	28.72
LABORERS		
Group One	31.95	26.50
(as of 5/1/20)	31.95	28.15
(as of 5/1/21)	31.95	29.90
Group Two	32.15	26.50
(as of 5/1/20)	32.15	28.15
(as of 5/1/21)	32.15	29.90
Group Three	32.15	26.50
(as of 5/1/20)	32.15	28.15
(as of 5/1/21)	32.15	29.90
Group Four	26.75	26.50
(as of 5/1/20)	26.75	28.15
(as of 5/1/21)	26.75	29.90
Group Five	32.80	26.50
(as of 5/1/20)	32.80	28.15
(as of 5/1/21)	32.80	29.90
Group Six	32.85	26.50
(as of 5/1/20)	32.85	28.15
(as of 5/1/21)	32.85	29.90
Group Seven	32.70	26.50
(as of 5/1/20)	32.70	28.15
(as of 5/1/21)	32.70	29.90
Group Eight	32.45	26.50
(as of 5/1/20)	32.45	28.15
(as of 5/1/21)	32.45	29.90

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Group Nine	32.30	26.50
(as of 5/1/20)	32.30	28.15
(as of 5/1/21)	32.30	29.90
Group Ten	32.45	26.50
(as of 5/1/20)	32.45	28.15
(as of 5/1/21)	32.45	29.90
Group Eleven	32.35	26.50
(as of 5/1/20)	32.35	28.15
(as of 5/1/21)	32.35	29.90
Group Twelve	34.05	26.50
(as of 5/1/20)	34.05	28.15
(as of 5/1/21)	34.05	29.90
Group Thirteen	36.08	26.50
(as of 5/1/20)	36.08	28.15
(as of 5/1/21)	36.08	29.90
<b>Group Fourteen</b>	32.20	26.50
(as of 5/1/20)	32.20	28.15
(as of 5/1/21)	32.20	29.90
LANDSCAPING LABORER		
Class I	24.22	23.50
Class II	24.22	23.50
LINE CONSTRUCTION		
Lineman	54.66	28.56
Winch Truck Operator	38.26	23.47
Line Truck Driver	35.53	22.62
Ground hand	32.80	21.78
Watch/Flag Person	23.37	18.85
MILLWRIGHT	45.30	33.29
PAINTERS		
Brush & Roller	39.04	28.99
Spray, Steel, & Swing	40.29	28.99
Bridges	55.52	28.39
8		

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POWER EQUIPMENT OPERAT	OR	
Group One	46.41	30.60
$(as of \frac{5}{01/20})$	46.41	32.60
(as of 5/01/21)	46.41	34.60
Group One A	49.41	31.49
$(as of \frac{5}{01/20})$	49.41	33.49
(as of 5/01/21)	49.41	35.49
Group Two	46.16	30.53
$(as of \frac{5}{01/20})$	46.16	32.53
(as of 5/01/21)	46.16	34.53
Group Two A	49.17	31.41
$(as of \frac{5}{01/20})$	49.17	33.41
(as of 5/01/21)	49.17	35.41
Group Three	42.08	29.72
(as of 5/01/20)	42.08	31.72
(as of 5/01/21)	42.08	33.72
Group Four	41.78	29.23
(as of 5/01/20)	41.78	31.23
(as of 5/01/21)	41.78	33.23
Group Five	40.06	28.72
(as of 5/01/20)	40.06	30.72
(as of 5/01/21)	40.06	32.72
Group Six	39.07	28.43
(as of 5/01/20)	39.07	30.43
(as of 5/01/21)	39.07	32.43
Group Seven A	56.30	35.11
(as of 5/01/20)	56.30	37.51
(as of 5/01/21)	56.30	39.91
<b>Group Seven B</b>	56.00	35.03
(as of 5/01/20)	56.00	37.43
(as of 5/01/21)	56.00	39.83
***TOVIC/II	A 7 A DDOLIG WASTE DEN	10VAT ***

**\*\*\*TOXIC/HAZARDOUS WASTE REMOVAL\*\*\*** Add 20 percent to basic hourly rate for all classifications

POWER EQUIPMENT OPERA	TOR DREDGER	
Class A	38.18	14.28
Class A1	46.93	29.76
Class B1	33.03	13.87
Class B2	31.09	13.71
Class C1	30.24	13.34
Class C2	29.26	13.27
Class D	24.30	12.57
PILEDRIVERMAN	43.45	34.57
(Diver)	53.89	32.57
STEAM FITTER	56.37	37.79
STONE MASON	43.25	29.60

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Surveying and Layout		
(Chief of Party)	54.98	28.04
(as of 5/01/20)	54.98	30.28
(as of 5/01/21)	54.98	32.58
(Instrument Person)	47.81	28.04
(as of 5/01/20)	47.81	30.28
(as of 5/01/21)	47.81	32.58
(Rodman)	38.25	21.34
(as of 5/01/20)	38.25	22.90
(as of 5/01/21)	38.25	24.50
TRUCK DRIVER		
Class I	32.06	19.185
Class II	32.16	19.185
Class III	32.41	19.185

#### **B.** Job Classification Definitions: Heavy and Highway Construction

#### 1. Laborer Classifications:

**Group One:** Yard workers: (laborer, scale mixerman, burnerman, dustman, feeder) **Group Two:** General laborer; Asphalt Shovelers; Sheeting, Shoring & Lagging – Laborer; Stone, Granite & Artificial Stone Setting Laborer; Hod Carriers; Scaffold Building; Relief Joint & Approach Slabs; Assembling & Placing Gabions; Pneumatic Tool Laborers; Concrete Forms & Stripping Laborers; Concrete Lumber Material Laborers; Steel & Steel Mesh (carrying & handling); Form Pinners; Mortar Mixers; Pouring & Placing Concrete; Grade Men.

**Group Three:** Vibrator Laborers; Finish Surface Asphalt Rackers; Jackhammer Operators; Paving Breaker Operator; Pipelayer & Caulker (all joints up to within 5 feet of the Building Foundation Line); Conduit & Duct Layers

Group Four: Flagperson

Group Five: Miners

Group Six: Welders and Burners.

Group Seven: Miner Bore Driver; Blasters; Drillers Pneumatic Shield Operator

Group Eight: Form Setters

**Group Nine:** Trackmen; Brackmen; Groutmen; Bottom Shaft Men; All other Laborers in Free Air Tunnels; Underpinning (When an underpinning excavation for a pier hole of five feet square or less and eight feet or more deep is dug, the rate shall apply only after a depth of eight feet is reached, to the men working in the bottom)

**Group Ten:** Circular Caissons (Where an excavation for circular caissons are dug eight feet or more below the natural grade level adjacent to the starting point of the caisson hole, at ground level, for the men working in the bottom); Welders, Burners & Air Tuggers

Group Eleven: Powdermen; Multiple Wagon Drill Operator Laborer

Group Twelve: Caisson Laborer Foreman

Group Thirteen: Toxic/Hazardous waste Handler

Group Fourteen: Wagon Drill/Hydraulic Track Drill Operator Laborer

### Landscape Laborers:

Class I: Landscape laborer

**Class II:** Farm tractor driver, hydroseeder, mulcher nozzle worker, backhoe operator, bulldozer crawler type loader, tree crane operator.

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## 2. Power Equipment Operator Classifications - Heavy, & Highway **Group One:** Handling steel and stone in connection with erection Cranes doing hook work Any machines handling machinery Cable spinning machine Helicopters Concrete Pumps (building) Machines similar to above including remote control equipment Group One A: Handling steel and stone in connection with erection. Cranes doing hook work Any machines handling machinery Concrete Pumps (Building) High Rail/Burro Crane Rail Loader (Winch Boom Type) All equipment in this group which previously received the hour in lieu of an oiler will receive Wage Group I (A). Equipment in this Wage Group that does not require an oiler. Machines similar to above, including remote control equipment **Group Two:** All types of cranes All types of backhoes Draglines Keystones All types of shovels Derricks Pavers 21E and over Trenching machines Trench shovels Gradalls Front- end Loaders **Boat** Captain Hoist with Two Towers Building Hoists-double drum (unless used as a single drum) Pippin type backhoes Tandem scrapers Tower type crane operation erecting dismantling jumping or jacking Drills self-contained (Drillmaster type) Fork lift (20ft. and over) Motor Patrols (fine grade) Batch Plant with Mixer Carryalls, Scrapers, Tournapulls Roller (High Grade Finishing) Spreaders (Asphalt) **Bulldozers and Tractors** Mechanic-Welder Conveyor Loaders (Euclid-Type Wheel) Concrete Pumps (Heavy Highway) Milling Machine Bobcat Side Boom

Page 14 of 17 Prevailing Wage Schedule (Effective 07/09/2019) Heavy Highway Construction (cont'd)

> **Directional Boring Machines** Vermeer Saw Type Machine (other than hand held) Tractor Mounted Hydro Axe Chipper with boom All Autograde and concrete finishing machines Bundle Pullers/Extractors (Tubular) Machines similar to the above including remote control equipment Group Two A: Crawler backhoes and Crawler gradalls over one (1) cubic yard factory rating Hydraulic backhoes over one (1) cubic yard factory rating Single person operation truck cranes 15 ton and over factory rating Cherry picker type machinery and equipment 15 ton and over factory rating, etc. Cranes doing hook work will be paid Wage Group I (A). All equipment in this Group which previously received the hour in lieu of an oiler will receive Wage Group II (A) including concrete pumps (Heavy/Highway). Machines similar to the above including remote control equipment **Group Three:** Asphalt Plant Engineers Conveyors (except building conveyors) Well Drillers Forklift Trucks of all types Ditch Witch (small trenchers) Motor Patrols Fine Grade machines Rollers Concrete Breaking Machines (Guillotine Only) Stump Grinder High or Low Pressure Boilers Building Hoist (single drum) Elevator Operator (New Construction) Machines similar to above including remote control equipment **Group Four:** Seamen Pulverizing Mixer Form Line Graders Farm Tractors **Road Finishing Machines** Concrete Spreaders (Heavy Highway) Power Broom (self-contained) Seed Spreader Grease Truck Machines similar to the above including remote control equipment **Group Five:** Compressors Pumps Well pint pumps Conveyors (Building) Welding Machines Heaters Tireman, Power Equipment Maintenance Engineers (Power Boats)

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> Miscellaneous Equipment Operator Elevator Operator (Renovations) House Car Machines similar to above including remote control equipment **Group Six:** Fireman Oilers and Deck Hands (Personnel Boats) Grease Truck Helpers **Group Seven A:** Handling steel and stone in connection with erection Cranes doing hook work Any machines handling machinery Cable spinning machinery Helicopters Concrete pumps (Building) High Rail/Burro Crane Rail Loader (Winch Boom Type) Machines similar to above, including remote control equipment **Group Seven B:** All types of cranes All types of backhoes Cableways Conveyor Loader (Euclid-Type Wheel) **Drag Lines** Keystones All types of shovels Derricks Pavers 21E and over Trench shovels Trenching machines Gradalls Front-end Loaders Boat Captain Hoist with two towers Concrete Pumps (Heavy, Highway) Building Hoists-double drum (unless used as a single drum) Milling Machine Mucking Machines in Tunnel Pippin type backhoes Bobcat Tandem scrapers Side Boom Tower type crane operation, erecting, dismantling, Jumping or jacking **Directional Boring Machines** Vermeer Saw Type Machine (other that hand held) Drills self-contained (Drillmaster type) Fork Lift (20 ft & over) Tractor Mounted Hydro Axe Motor Patrols (Fine Grade)

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> Chipper with boom Batch Plant with Mixer All autograde and concrete finishing machines Carryalls, Scapers & Tournapulls Rollers (High Grade Finishing) Bundle Pullers/Extractors (Tubular) Spreaders (Asphalt) **Bulldozers and Tractors** Mechanic – Welders Production Switch Tamper **Ballast Regulators Tie Replacer** Rail/Road Loader Power Jack liner Machines similar to above, including remote control equipment \*Surcharge

#### **Power Equipment Operator Dredger Classifications**

**Class A:** Lead Dredgeman, Operator, Leverman, Licensed Tug Operator over 1000HP. **Class A1:** Dozer Operator, Front-end Loader.

**Class B1:** Derrick Operator, Spider/Spill Barge Operator, Engineer, Electrician, Chief welder Chief Mate, Fill Placer, Operator 2, Maintenance Engineer, Licensed Boat Operator. **Class B2:** Certified Welder.

**Class C1:** Mate, Drag Barge Operator, Steward, Assistant Fill Placer, Welder. **Class C2:** Boat Operator.

Class D: Shoreman, Deckhand, Rodman, Scowman, Cook, Messman, Porter/Janitor, Oiler.

**3. Truck Driver Classifications:** 

Class I: Helper, stake body truck operator (single axle, dumpster)

**Class II:** Dump truck operator, tandem truck operator, batch truck operator, semi-trailer truck operator, agitator-mixer truck operator, dumpcrete type vehicle operator, asphalt distributor, farm tractor operator (when used to transport materials), stake body truck (tandem) operator.

**Class III:** Euclid type, off highway equipment back truck operator, belly dump truck operator, double-hitched equipment trailer operator, straddle carrier (Ross) operator; lowbed trailer truck operator.

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## NOTE:

1. Contractors are advised to contact the Philadelphia Labor Standards Unit with any questions regarding job classification, prevailing wage rates, and fringe benefits.

2. Prior to employing apprentices on a public works project, the contractor is required to provide written evidence of employee's registration with a statewide training program recognized by the U.S. Bureau of Apprenticeship and Training (BAT). Contractors shall forward proper documentation for each bona fide apprentice to:

Philadelphia Labor Standards Unit Municipal Services Building 1401 John F. Kennedy Boulevard – 1st Floor, Room 170C Philadelphia, PA 19102-1670 Telephone Number: (215) 686-2132 Fax Number: (215) 686-2116

## City of Philadelphia Prices for Contingent Work

Prices for Contingent Work The prices listed below are for additional work and signify the amount per unit that will be paid for the complete work, furnished and installed, in place as ordered by the Project Manager in accordance with the Standard Contract Requirements for Public Work Contracts. All contingent work shall be in accordance with the applicable contract specifications, Standard Specifications, and/or Standard Details of the City of Philadelphia

Item Number	Description	Incidentals Included	Units	Unit Price
1	Sheathing & Shoring (ordered left in place)	fastening	MBF	\$1,000.00
2	Reinforcing Steel (grade 60)		LB	\$2.10
3a	Welded Steel Wire Fabric		LB	\$2.60
3b	Welded Steel Wire Fabric with epoxy coating		LB	\$10.00
4	Saw Cutting Concrete Paving (full depth)			
4a	Roadway		LF	\$11.00
4b	Footway		LF	\$6.00
5	PADOT 2A Modified Stone for Vaults	supplying & compacting	Ton	\$35.00
6	PADOT 2A Modified Stone (to replace material excavated from trenches)	supplying, hauling & disposal of unsuitable material	Ton	\$62.00
7	PADOT 2A Modified Stone (to correct soft spots in structure or pipeline subgrade)	excavation & disposal of unsuitable material; supplying & compacting stone excavation & disposal of unsuitable	Ton	\$66.00
8	PADOT 2A Modified stone (to correct soft spots in subgrade) PADOT Pipe Foundation Underdrain	material; supplying & compacting stone	Ton	\$69.00
9	(type A with type 1 backfill)	excavation	LF	\$20.00
10	Sand Backfill (for encasing water mains)	compacting	Ton	\$25.00
11	Ductile Iron Pipe (ANSI/AWWA C151, 150/A21.50, C111) (w/accessories)	joints, sand encasement		
11a	4"		LF	\$45.00
11b	6"		LF	\$60.00
11c	8"		LF	\$75.00
11d	12"		LF	\$110.00
12	Ductile Iron Gate Valves	complete with accessories, sand encasement		
12a	4"		Each	\$1,900.00
12b	б"		Each	\$2,200.00
12c	8"		Each	\$2,900.00
12d	12"		Each	\$4,800.00
12	Ductile Iron Fittings	complete with accessories,		¢0 00
13	(ANSI/AWWA C153/A21.53, C110 & C104/A21.4)	sand encasement	LB	\$8.00
14	Misc. Iron & Steel (for harnessing water mains)	bituminous coating	LB	\$10.00
15	Standard 7" Valve Box Set or Reset Standard 7" Valve Box	furnish only	Each	\$240.00
16	(reconstruction projects)		Each	\$275.00
17	K' Copper Water Service Pipe (relay only)	joints, swing joints and necessary fittings		
17a	3/4"		LF	\$20.00
17b	1"		LF	\$23.00
17c	1.5"		LF	\$35.00
17d	2"		LF	\$45.00

Item Number	Description	Incidentals Included	Units	Unit Price
18	Water Service Ferrule	tapping main, connections		
18a	3/4"		Each	\$175.00
18b	1"		Each	\$225.00
18c	1.5"		Each	\$300.00
18d	2"		Each	\$450.00
19	Water Service Curb Stop	flared connections		
19a	3/4"		Each	\$200.00
19b	1"		Each	\$220.00
19c	1.5"		Each	\$440.00
19d	2"		Each	\$600.00
20	Water Service Box		Each	\$120.00
21	HDPE Subdrain ( 6")	excavation, stone encasement 3" thick around pipe excavation, rubber gaskets	LF	\$16.00
22	Vitrified Clay Sewer Pipe	(not including concrete cradle)		
22a	5" or 6"		LF	\$70.00
22b	8"		LF	\$75.00
22c	10"		LF	\$95.00
22d	12"		LF	\$102.00
22e	15"		LF	\$122.00
23	Resilient Saddle			
23a	(5" or 6" lateral)	core drilling	Each	\$100.00
23b	(8" lateral)	core drilling	Each	\$125.00
	Vitirified Clay Pipe Bends	rubber gaskets (not including concrete cradle)		
24	5" or 6"		Each	\$110.00
24a	8"		Each	\$160.00
24b	10"		Each	\$220.00
24c	12"		Each	\$350.00
24d	15"		Each	\$725.00
25	Reinforced Concrete Pipe Sewer	rubber gaskets (not including concrete cradle)		
25a	15"		LF	\$60.00
25b	18"		LF	\$65.00
25c	21"		LF	\$70.00
25d	24"		LF	\$75.00
25e	27"		LF	\$80.00
25f	30"		LF	\$90.00
26	Manhole for sewers (30" & under)	steps and ladder bars	VF	\$280.00
27	Manhole for sewers (36" & over)	steps and ladder bars	VF	\$310.00
28	Sewer Manhole Frame & Cover (solid or vented)	furnish only	Each	\$500.00
29	Set or Reset Manhole Frame & Cover (reconstruction projects)	excavation, gasket material and HES base concrete	Each	\$310.00

Item Number	Description	Incidentals Included	Units	Unit Price
30	Stormwater Inlets (complete)	excavation, castings and iron trap		
30a	4' OMG		Each	\$7,550.00
30b	6' OMG		Each	\$8,550.00
30c	4' City		Each	\$7,550.00
30d	6' City		Each	\$8,550.00
30e	4' Highway		Each	\$7,550.00
30f	6' Highway		Each	\$8,550.00
31	Precast Concrete Inlet Top Slab (min. 3500 psi)	steel channel nosing and gray iron frame & cover		
31a	4' City		Each	\$800.00
31b	6' City		Each	\$1,000.00
32	Reset Inlet Top	excavation, raising or lowering with brick to meet proper elevation		
32a	up to 4"		Each	\$380.00
32b	over 4" (in addition to first 4" of adjustment)		VF	\$310.00
33	Dripstone (2" thick)		Each	\$180.00
34	Reset Dripstone (any type)		Each	\$125.00
35	Fill Abandoned Inlet	demolish to 12" below subrade, seal outlet, clean earth fill	Each	\$450.00
36	Fill Abandoned Manhole Fill Abandoned Sewers	demolish to 12" below subrade, seal pipe ends, clean earth fill	Each	\$500.00
37	(1:8 grout or 30 psi flowable fill as directed)	bulkheads	CY	\$160.00
38	Sewer Vent (complete)	curb box, trap, standpipe, setting, connections, alignment, excavation, backfill and compacting 24" of standpipe, excavation,	Each	\$2,200.00
39a	Sewer Vent Box	backfill and setting	Each	\$60.00
39b	Vent pipe (schedule 40)	coupling	LF	\$20.00
40	Grading (unclassified)	greater of cut or fill		
40a	Roadway		CY	\$30.00
40b	Footway		СҮ	\$40.00
41	Concrete Roadway Pavement (class A)		CY	\$360.00
42	Concrete Paving Base (class A)		CY	\$310.00
43	Concrete Driveway Approach (class A, 8" thick)	forms, excavation and subbase	SY	\$110.00
44a	<b>Concrete Footway Paving</b> (class A, 4" thick on existing subgrade) - Utility Projects	hauling & disposal of excavated material, foundation, forms	SY	\$80.00
44b	Concrete Footway Paving (class A, 4" thick including 4" stone subbase) Paving & Improvement Projects (whole block)	hauling & disposal of excavated material, foundation, forms	SY	\$90.00
45	Brick or Flagstone Footway Repairs	4" concrete base, cement & sand bedding and new bricks where necessary	SY	\$225.00
46	8" Concrete Curb (class A, any type)	excavation, forms		
46a	Utility Projects (short runs and in-fill sections)		LF	\$45.00
46b	Paving & Improvement Projects (whole block)		LF	\$40.00

Item Number	Description	Incidentals Included	Units	Unit Price
47	Reset Concrete Curb	excavation, foundation concrete	LF	\$25.00
48	Reset Stone Curb	excavation, foundation concrete	LF	\$50.00
49	Concrete Steps (class A)	forms		
49a	1 or 2 steps		LF of Tread	\$110.00
49b	3 or more steps		LF of Tread	\$165.00
50	Base Leveling Asphaltic Binder Course (for adjustment)	preparing subgrade, placing, compacting	Ton	\$225.00
51	Asphalt Binder Course (for temporary paving)	preparing subrade, placing, compacting	Ton	\$200.00
52	Salt Hay (6" depth)	polyethylene	SY	\$2.50
53	6" Topsoil & Seed	fine grading, lime, fertilizer	SY	\$18.00
54	4'' Topsoil & Sod	fine grading, lime, fertilizer	SY	\$20.00
55	Geotextile Filter Fabric (PADOT 408 cl 4 w/ sec 735)		SY	\$6.00
56	Traffic Sign Pole (u channel)	installation	Each	\$250.00
57	Street Name Sign Pole (square breakaway)	installation	Each	\$400.00
58	Silt Barrier Fence		LF	\$6.00
59	Brick Masonry		CY	\$925.00
60	Concrete Block Masonry		CY	\$700.00
61	Rubble Masonry		CY	\$200.00
62	4000 psi Concrete (28 day strength)			
62a	unformed		CY	\$225.00
62b	formed	forms	СҮ	\$450.00
63	HES Cement (substituting for regular)		СҮ	\$8.00
64	Calcium Chloride (added to concrete, 2% by weight)		СҮ	\$6.00
65	Concrete Footway Handicap Ramp Pad (truncated domes)	including furnishing & installation	SF	\$40.00
66	Design of ADA Ramp	Including design, layout, and as- built	EA	\$1,100.00
67	Concrete Curb For ADA Ramp	Including excavation and subgrading	LF	\$50.00
68	Concrete Footway for ADA Ramp	Including Excavation and subbase	SY	\$120.00

## PART 1 - GENERAL

## 1.01 RULES AND REGULATIONS

- A. The Pennsylvania Department of Revenue on September 9, 1972 reissued and/or amended most regulations and rulings promulgated under the Tax Reform Code of 1971. The Pennsylvania sales and use tax exemption as applicable to the City of Philadelphia Water Department's Contractors, whom, when purchasing construction supplies and materials are limited to equipment, machinery and parts used directly in owner's public utility facilities.
- B. Each prospective bidder must determine for himself what materials or items of work are exempt from the Pennsylvania State Sales and Use Tax. The Water Department does not issue determinations on such matters before award of Contract and submission of the properly executed Contract Forms.

### 1.02 TAX EXEMPT SEWER CONSTRUCTION MATERIALS

- A. The state has indicated the following sewer construction materials when purchased by Contractors for Public Utility installations are tax exempt:
  - 1. Reinforced concrete sewer pipe, bends, fittings and rubber gaskets. All size pipe, 18 inches to 72 inches in diameter, when used in combined sewer, sanitary sewer and stormwater sewer purposes.
  - 2. Vitrified clay sewer pipe, bends, gaskets, all sizes 5 inches to 36 inches in diameter for combined, sanitary and stormwater sewers.
  - 3. Saddles, inserts or wye branches, blanks, stoppers for sewer lateral connections for combined, sanitary and stormwater sewers.
  - 4. Sub Drains.
  - 5. Cast iron, ductile iron pipe and fittings for sewer force mains, sewers, vents, laterals, and risers.
  - 6. Concrete for construction of reinforced concrete box sewers and chambers. Predominate sanitary sewer use.
  - 7. Granite block (stone) for box sewer inverts, bottoms, flagstone for well hole bases for combined, sanitary and stormwater sewers.
  - 8. Waterproof coatings (asphaltic) for box sewers, metering chambers, etc.
  - 9. Pre-cast concrete sewer manholes for combined, sanitary and stormwater sewers.
  - 10. Brick, mortar, sand, cement, cast iron castings, manhole frames and covers, inlet castings, grates, clean out doors, steps, ladder bars used for combined, sanitary and stormwater sewer construction.
  - 11. Culverts reinforced concrete structures for transmittal of water or sewerage beneath roadways (less than 60 feet long).
  - 12. Pre-fab sewerage pumping stations used to pump sewerage from low level drainage areas to higher gravity flow sewers.
  - 13. Sewage metering flow chambers (reinforced concrete) with metering flow equipment to measure flow of sewerage for billing purposes from adjoining areas.
  - 14. Reinforced concrete sewer pipe, bends, fittings and gaskets, all sizes, when used for stormwater purposes only or predominant stormwater use in combined sewers.
  - 15. Pre-cast concrete inlet tops including cast iron frames and covers. Stormwater purposes only.
  - 16. Steel reinforcing rods, bars, ties for box sewer reinforcement and chambers.

- 17. Concrete for reinforced concrete box sewers for combined, sanitary and stormwater use.
- 18. Flagstones for wellhole basestones.
- B. The Contractor is not to charge sales tax on the above tax exempt items and sales tax is not to be included in bid submitted.

## 1.03 SEWER CONSTRUCTION MATERIALS - NOT EXEMPT

- A. The State has indicated the following sewer construction materials, when purchased by the Contractors for Public Utility installations, are not tax exempt.
  - 1. Lumber, used for temporary sheathing and shoring of sewer trench.
  - 2. Lumber, used for sheathing and shoring sewer trenches, left in place.
  - 3. Piles, wooden, driven piles for sewer support in unstable soil.
  - 4. Steel soldier beams (H beams) for deep trench sheathing and shoring, braces, etc. left in place.
  - 5. Plywood and lumber used for formwork for box sewers.
  - 6. Nails, nuts, bolts, washers for box sewer formwork.
  - 7. Concrete for reinforced concrete box sewers. Stormwater use only.
  - 8. Broken stone for sewer foundations, soil stabilization.
  - 9. Concrete for sewer cradles, bases, manhole bases, collars, sewer pipe encasement. All sewers.
  - 10. Sand-cement grout (8: 1) for filling abandoned sewers.
  - 11. Stone for rip-rap to prevent soil erosion.
  - 12. Brick masonry bulleyes sewers, temporary or permanent bricking up of sewers to prevent entry, use or flow of sewers, etc.
  - 13. Concrete for paving base, curbs, sidewalks, driveways, traffic islands, headwalls.
  - 14. Broken stone for paving sub-base.
  - 15. Asphalt paving, binder and surface course, restoration paving.
  - 16. Steel or aluminum chain link type fencing and appurtenances for enclosing sewer area outlets, child protection, pumping stations security, etc.
  - 17. Trees and shrubs replacement or new.
  - 18. Topsoil (restoration).
  - 19. Backfill (dirt, soil purchased for job deficiencies) refills, embankments.
  - 20. Fertilizer, lime (soil conditioners).
  - 21. Grass seed (restoration).
  - 22. Salt hay or straw (coverings).
  - 23. Tarps, canvas, plastic coverings.
  - 24. Reinforcing rods, bars, ties for piling tops and cradles.
- B. The above materials are subject to the Pennsylvania Sales and Use Tax and are to be taken into account by the Contractor when submitting his bid.

## 1.04 TAX EXEMPT WATER MAIN CONSTRUCTION MATERIALS

- A. The State has indicated the following water main construction materials when purchased by Contractors for Public Utilities installations are tax exempt:
  - 1. Steel water pipe 6 to 48 inches distribution/supply service mains.
  - 2. Ductile iron pipe and rubber gaskets 3 to 36 inches.
  - 3. Cast iron pipe 3 to 48 inches distribution/supply/service repair mains.
  - 4. Lead or leadite, jute joints).
  - 5. Cast iron/ductile iron M.J. fittings and specials all sizes bends, sleeves, reducers, tees, crosses, offsets, etc.
  - 6. Gate valves all sizes 3 to 60 inches.

- 7. Patent connections (tapping valves and sleeves combined, all sizes).
- 8. Air release valve assemblies.
- 9. Reinforced steel/concrete/brick valve chambers (for housing large valves).
- 10. 7 inch cast iron and/or plastic valve boxes and covers.
- 11. 21, 24 and 36 inch cast iron frames and covers (valve box covers) including precast concrete rings for water valve boxes.
- 12. Water service curb stops (various sizes).
- 13. Water service curb boxes and covers.
- 14. Copper/plastic water service pipe and fittings (bends, couplings, adapters, sleeves, etc., sizes <sup>3</sup>/<sub>4</sub> inch, 1 inch, 1-1/2 inch, 2 inches).
- 15. Corrosion control coatings.
- 16. Polyethylene (tubs) film pipe wrapping for enclosing water pipe and fittings in corrosive soil.
- 17. Corrosion and electrolysis control installations and equipment.
- 18. Sand, cement used in internal coatings (relining) cast iron/steel water mains.
- B. The Contractor is not to charge sales tax on the above tax exempt items and sales tax is not to be included in bid submitted.

# 1.05 WATER MAIN MATERIALS - NOT EXEMPT

- A. The State has indicated the following water main construction materials, when purchased by Contractors for Public Utility installations, are not tax exempt:
  - 1. Lumber used for sheathing and shoring purposes.
  - 2. Steel soldier beams for deep trench sheathing and shoring.
  - 3. Sand used for water pipe encasement.
  - 4. Steel/cast iron high pressure fire service pipe, including fittings, valves, fire hydrants and appurtenances.
  - 5. Fire hydrants (low pressure).
  - 6. Miscellaneous iron and steel (valve and fire hydrants, straps and harnesses, including nuts and bolts).
  - 7. Concrete Class 15-2 (used for anchors, thrust blocks).
  - 8. Concrete for footway paving or repaving.
  - 9. Concrete for driveways, paving or repaving.
  - 10. Concrete for street base.
  - 11. Bricks and sand for sidewalk replacement.
  - 12. Slate or flagstone for sidewalk replacement.
  - 13. Curbs bluestone or concrete, curved or straight, for replacement.
  - 14. Broken stone for bedding, driveways, paving base.
  - 15. Asphalt binder for paving base (reconstruction paving).
  - 16. Asphalt surface paving (reconstruction paving).
- B. The above materials are subject to the Pennsylvania Sales and Use Tax and are to be taken into account by the Contractor when submitting his bid.

# 1.06 DOCUMENTATION OF EXEMPTIONS

- A. Except as noted below, a Contractor may not claim an exemption on his purchases which he installs to become a part of the real estate.
- B. The exemption relating to contracts with public utilities, manufacturers, etc. is limited to purchase of property constituting materials, equipment, machinery and parts subsequently used directly in the rendition of a public utility service upon installation.

- C. "Certification" form will be supplied by the City with "Notice to Proceed" letter. The Contractor shall take this "Certification" to his material supplier or vendors together with a copy of "Blanket Exemption Certificate" (Form 5-RTE completed by Contractor). The supplier shall retain both forms for tax record purposes.
- D. This "Certification" relates only to tax exempt items and a tax charge is not be to included in the bid price submitted.
- E. All other materials are taxable and are to be taken into account by the Contractor when submitting his bid.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

## INSTRUCTIONS TO SELLERS

### PART 1 - GENERAL

#### 1.01 DEFINITIONS

A. For the purpose of this document the words Bidder and Seller shall be interchangeable.

### 1.02 SOURCES OF BIDDING DOCUMENTS

- A. Copies of the Bidding Documents, including the Special Specifications and Prequalification Questionnaire, may be obtained from <u>WWW.PHLCONTRACTS.PHILA.GOV</u>.
- B. Copies of the Plans may be purchased at BluEdge, 1015 Chestnut Street, Philadelphia, PA 19107, telephone (215)-627-6493, fax (215)-627-3070.

### 1.03 STANDARD CONTRACT REQUIREMENTS

A. Attention is directed to the "Standard Contract Requirements for Public Works Contracts" of the Procurement Department of the City of Philadelphia (as amended), a copy of which is included with these Contract Documents. These Standard Contract Requirements contain additional provisions relating to the bidding procedures for this contract and are an integral part of these Instructions to Sellers.

## 1.04 EXAMINATION OF SITE AND DOCUMENTS BY SELLERS

- A. Each Seller must visit the site of the proposed work and fully acquaint himself with the conditions as they exist, so that he may fully understand the facilities, difficulties, and restrictions attending the execution of the work under this contract.
- B. Each Seller must also thoroughly examine and be familiar with the Plans and Special Specifications; the Standard Details and Standard Specifications of the Water Department; reference specifications as cited; and the Standard Contract Requirements.
- C. The failure or omission of any Seller to receive or examine any form, instrument, or document, or to visit the site and acquaint himself with the conditions there existing, shall in no way relieve that Seller from any obligation with respect to his quote.
- D. The low Seller must complete the whole of the work within <u>365 calendar days</u> from the date of the Notice to Proceed.

#### 1.05 INTERPRETATION OF DOCUMENTS

A. No oral interpretations will be made to any Seller as to the meaning of the Plans and Specifications. Every request for an interpretation must be made in writing and e-mailed to <u>Alexander.Fidrych@phila.gov</u> by **Thursday, August 29, 2019**.

B. Every interpretation made to a Seller will be in the form of a written Amendment to the Contract Documents, which, if issued, will be uploaded to the Amendment section of WWW.PHLCONTRACTS.PHILA.GOV, not later than three (3) days prior to the date fixed for the opening of Quotes. All Amendments so issued become part of the Contract Documents. The failure of any Seller to receive any such Amendments or interpretation shall not relieve that Seller from any obligation under his Quote as submitted.

#### 1.06 PREQUALIFICATION OF SELLERS

A. No quote will be accepted unless the prequalification questionnaire, with all questions fully answered, is filed with <u>WWW.PHLCONTRACTS.PHILA.GOV</u>, on or before <u>Thursday</u>, August 29, 2019.

#### 1.07 PREPARATION

- A. Space is provided in the Bid Forms for Unit Prices, Item Totals, and Aggregate Amount Bid. All such spaces must be filled in by the Seller.
- B. Where the indicated sum of a column of figures differs from the correct sum thereof, the correct sum shall govern.
- C. Each quote shall contain an acknowledgment of receipt of all Amendments, identified by number.

#### 1.08 SUBMISSION

A. Quotes are to be submitted until 10:30 a.m. on <u>Thursday, September 12, 2019</u> at <u>WWW.PHLCONTRACTS.PHILA.GOV</u>. An opening of sealed Quotes will be publicly held by the Procurement Commissioner in Room 170A, MSB, 1401 John F. Kennedy Boulevard, 1st Floor, Philadelphia, PA 19102-1685 on the date and at the time indicated.

#### 1.09 REPRESENTATIONS AND WARRANTIES

- A. In consideration of, and to induce, the award of this contract to him, each Seller, in submitting his quote, represents and warrants:
  - 1. That he is not in arrears to the City upon debt of contract.
  - 2. That he is not a defaulter, whether as contractor, as surety, or otherwise.
  - 3. That he is financially solvent, and sufficiently experienced and competent to successfully perform the work.
  - 4. That the facts stated and information given by him, including all associated documents, are true.
  - 5. That the Contract Documents are sufficient in scope and detail to indicate all terms and conditions necessary for successful performance of the work.
  - 6. That the work as called for in the Contract Documents can be successfully performed.

### 1.10 AWARD OF CONTRACT

- A. Quotes will be compared on the basis of the "Aggregate Amount Bid". The contract award will be to the lowest responsible Seller; however, the Procurement Commissioner reserves the right to reject any or all quotes as he may deem best for the interest of the City.
- B. Award of this contract is contingent on the successful Seller's adherence to the requirements of the City Administration's Contract Compliance Program.

#### 1.11 OFFER BINDING

- A. The work under this contract must be performed at the prices bid and fixed in this contract. The City assumes no responsibility for variations in the cost of materials and labor from those existing at the time of submitting proposal for the work.
- PART 2 PRODUCTS Not Used
- PART 3 EXECUTION Not Used

#### SPECIAL INSTRUCTIONS

#### PART 1 - GENERAL

#### 1.01 SPECIFIC PLANT OPERATIONS/RESTRICTIONS

- A. The following section is intended to illustrate the project-specific site conditions, guidelines and/or restrictions. This section has been included for the Contractor's convenience only and shall not be taken as complete or all inclusive.
- B. This project entails of the restoration of the Pretreatment Building at the Queen Lane Water Treatment Plant (WTP). See Section 01010 for information on the summary of work.
- C. The Queen Lane WTP currently operates 24 hours a day, 7 days a week. The continued operation of the WTP is necessary to the proper functioning of the water supply system, which provides a service vital to the community, and must continue in service at all times. See Section 01010 for information on the maintenance of plant operations during construction.
- D. The Contractor is required to maintain a clean work area. Precautions shall be taken so as not to disturb the plant operations, general housekeeping procedures and site personnel. See Sections 01040 and 01500 for further information.
- E. The Contractor will be required to utilize the main entrances unless otherwise directed by the Engineer. The Contractor must comply with all security requirements as specified in Section 01500.

#### 1.02 PROJECT OPERATIONS GUIDELINES/RESTRICTIONS

- A. Due to normal operations of the plant, shut-down of the system during installation is not feasible. Therefore, any service interruption needed by the Contractor shall be included in the Schedule of Operations submitted prior to starting work. See Section 01300 for further details.
- B. The Contractor will NOT be granted plant shutdowns of any kind during the project.
- PART 2 PRODUCTS Not Used

PART 3 - EXECUTION Not Used

#### SUPPLEMENTARY INSTRUCTIONS TO SELLERS

#### PART 1 - GENERAL

#### 1.01 PENNSYLVANIA SALES TAX

A. Each prospective Seller must determine for himself what materials or items of work are exempt from the Pennsylvania State Sales and Use Tax. The Water Department does not issue determinations on such matters before award of Contract and submission of the properly executed Contract Forms.

#### 1.02 LOCATION OF PROJECT

A. The Queen Lane Water Treatment Plant is located on City property in the 38th Ward of Philadelphia, at 3257 Fox Street, Philadelphia, PA 19129.

#### 1.03 EXAMINATION OF SITE

- A. All prospective Sellers and other interested parties are advised that access to the site will be limited to the following two (2) days at the time shown: Wednesday, August 21, 2019 and Wednesday, August 28, 2019 at 10:00 a.m. only each day.
  - 1. Representatives of the Water Department Design Branch will not be available to answer questions on the contract documents.
  - 2. Each Seller must contact the Plant Manager at Queen Lane Water Treatment Plant, Shiju Kuriakose, at (215)-685-2101 to make arrangements for access to the site of work under this project.

#### 1.04 WORK BY OTHER CONTRACTORS

A. Construction work is being done at and adjacent to the site by other contractors, of which no "as-built" records were available during the design phase of this Contract. The Contract Drawings show the "as designed" locations of many utility lines and structures, some of which may not have been constructed prior to the work of this Contract.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

## SUPPLEMENTARY CONDITIONS

### PART 1 - GENERAL

## 1.01 GENERAL CONDITIONS OF THE CONTRACT

- A. The General Conditions of this Contract are the "Standard Contract Requirements for Public Works Contracts" of the Procurement Department of the City of Philadelphia, as amended. A copy of this document is attached to these Specifications.
- B. At various places in these Contract Documents, attention is directed to particular clauses of the Standard Contract Requirements. This is for the convenience of the City only, and does not imply that other clauses not mentioned are thereby of less effect than if they had been mentioned.

#### 1.02 PERMITS

- A. The Water Department or its designated Consultant will obtain the Building and/or Zoning and Use Permits for this project.
- B. For all other permits such as plumbing, electrical permits, etc., it will be the sole responsibility of the Contractor to obtain and pay the required fees for such permits.

#### 1.03 CONFORMITY WITH PLANS AND SPECIFICATIONS

- A. All materials furnished, and all work performed under this Contract, shall be in reasonably close conformity with the lines, grades, cross sections, dimensions (including tolerances), and material requirements shown on the Plans or indicated in the Specifications.
- B. The Engineer will determine the limits of reasonably close conformity in each individual case, and his judgment will be final and conclusive.
- C. The Engineer may find that the materials, or the finished work in which they are used, are not within reasonably close conformity with the Contract Documents, but that reasonably acceptable work has been produced and may remain in place. In this event, he will document the basis of acceptance by a Contract Modification, which will provide for an appropriate adjustment in the Contract Price for such work or materials, as he deems necessary to conform to this determination, based on engineering judgment.
- D. The Engineer may find that the materials, or the finished work in which they are used, are not within reasonably close conformity with the Contract Documents, and have resulted in inferior or unsatisfactory work. In this event, the work or materials shall be removed and replaced, or otherwise corrected by the Contractor, without cost to the City.

#### 1.04 INSTRUCTIONS TO SELLERS

A. All applicable provisions of the "Instructions to Sellers" are hereby incorporated into this Contract.

### 1.05 CURRENT EDITIONS OF REFERENCE STANDARDS

A. Wherever the Contract Documents (including the Standard Specifications of the Department) refer to the standard specifications of technical associations, institutes, or societies, or to standard Federal or State specifications, the reference shall be to the most recent revision or amendment thereof, unless otherwise noted.

#### 1.06 LAWS, ORDINANCES, RULES, AND REGULATIONS

- A. All work under this Contract shall conform to all applicable laws, ordinances, rules, and regulations of the City of Philadelphia, the Commonwealth of Pennsylvania, and the United States of America.
- B. Each and every provision of any law, and clause required by law to be inserted in this Contract, shall be deemed to be inserted herein, and the Contract shall be read and informed as though it were included herein; and if, through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon application of either party, the Contract shall forthwith be physically amended to make such insertion.
- C. If this Contract contains any unlawful provision not an essential part of the Contract, and which shall not have been a controlling or material inducement to the making thereof, such provision shall be deemed stricken from this Contract, without affecting the binding force of the remainder.
- D. Should the Contractor perform any work knowing it to be contrary to any applicable law, ordinance, rule, or regulation, without first giving notice of such to the Engineer, then the Contractor shall thereby assume full responsibility for such work, and shall bear all costs of correcting such work, as directed by the Engineer.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

## DRAWINGS AND SCHEDULES

## PART 1 - GENERAL

## 1.01 CONTRACT DRAWINGS

A.	The following Plans illustrate the work of this Contract and are an integral part thereof.
A-01	Notes, Symbols, and Abbreviations
A-02	PTB - Roof Plan
A-03	PTB - Building Elevations – Sheet 1
A-04	PTB - Building Elevations – Sheet 2
A-05	PTB - Miscellaneous Details – Sheet 1
A-06	PTB - Miscellaneous Details – Sheet 2
A-07	PTB - Miscellaneous Details – Sheet 3
A-08	PTB - Miscellaneous Details – Sheet 4
A-09	PTB - Miscellaneous Details – Sheet 5
A-10	PTB - Miscellaneous Details – Sheet 6
A-11	PTB - Windows, Doors, and Frames Details
A-12	PTB - Roofing Details – Sheet 1
A-13	PTB - Roofing Details – Sheet 1
A-20	Chemical Building – Door and Window Replacement Plan
A-21	Potassium Permanganate Building – Door Replacement Plan
A-22	Maintenance Building – Door and Window Replacement Plan
A-23	PTB – Roll-Up Door Replacement Plan
A-24	Chemical Building, Potassium Permanganate Building, and Maintenance Building – Door Schedules and Details
A-25	Chemical Building – Window Schedules and Details
<b>S-01</b>	PTB - Structural Notes and Standard Details
S-02	PTB - East Platform and Concrete Canopy Plans and Sections
S-03	PTB - Main Entrance Concrete Canopy Plans and Sections
S-04	PTB - North and South Concrete Canopy Plans
S-05	PTB - Roof Plans and Sections
S-06	PTB - Photos and Details
S-07	PTB - Details

#### 1.02 REFERENCE DRAWINGS

A. The following drawings from previous contracts are included as Reference Drawings and are not part of the Contract. The City assumes no responsibility for the correctness, completeness, or accuracy of the Reference Drawings.

Work no. 63064:Queen Lane Preliminary Treatment Building at Fox StreetSheets A-1 – A-3Sheets S-3 – S-5

## 1.03 REFERENCE HAZARDOUS MATERIAL TESTING REPORTS

- A. The following hazardous materials testing reports for the Pretreatment Building, the Maintenance Building, the Control Building, and the Permanganate Building have been attached to these contract documents for reference.
  - 1. 9/7/2017 Queen Lane WTP Hazardous Material Testing
  - 2. 9/25/2017 Queen Lane WTP Hazardous Material Testing
  - 3. 9/20/2018 Queen Lane WTP Hazardous Material Testing

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# SUMMARY OF WORK MEASUREMENT AND PAYMENT

#### PART 1 - GENERAL

## 1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The work of this Contract consists of furnishing, employing, and installing all equipment, materials, and labor necessary to complete all demolition, renovation, and construction as specified and/or as shown on the Plans and Specifications, producing thereby a complete, finished, watertight, neat, safe, rugged, reliable, and fully usable facility ready for operation.
- B. All work done for this Contract shall be of the best quality, free from faults and defects, and in accordance with the Contract Documents.
- C. All existing dimensions shown on the Contract Drawings are approximate. The Contractor is responsible for verifying all existing conditions in the field.
  - The work of this Contract entails of the restoration of the Pretreatment Building at the Queen Lane Water Treatment Plant, as shown on the contract drawings and as specified herein.
- D. Attention is directed to Clause 23, Contractor's Obligation, Clause 63, Materials and Workmanship, and Clause 64, Inspection, of the Standard Contract Requirements.
- E. Payment for all labor, materials, supplies, equipment testing, tools, permit fees, transportation, disposal costs, incidentals, all applicable tax overhead and profit and all other expenses shall be made in accordance with the contract. Bid items consisting of lump sum, unit prices, and allowances, shall be considered as full compensation for the aforementioned work completed by the Contractor.

#### 1.02 CONTINUED OCCUPANCY

- A. Water Department personnel will continue to occupy and work in this facility during the renovation work therein. The Contractor shall employ methods, and conduct his operations in a manner, that will cause the minimum practical interference with normal Water Department operations.
- B. The Pretreatment Building houses the Queen Lane WTP laboratory (second floor) which is a 24 hour per day, 7 day per week, 365 day per year, fully functioning laboratory. At no time during the construction project shall activities of the laboratory be interrupted or interfered with.

#### 1.03 DEFINITIONS

A. Project: The total work involved in this Contract.

- B. Contractor: The firms to which the Contract for this project is awarded.
- C. Abbreviations:
  - 1. CPM Critical Path Method
  - 2. HVAC Heating, Ventilating, and Air Conditioning
  - 3. NIC Not In Contract
  - 4. NTS Not To Scale
  - 5. RC Reinforced Concrete

#### 1.04 DISTRIBUTED WORK

- A. The price(s) bid for this Contract shall also include the cost of all work and materials required by the Contract Documents and not noted as included in or incidental to any particular item. There will be no separate or additional payment for any such costs, including but not limited to the following:
  - 1. Obtaining and maintaining insurance policies.
  - 2. Submittals, including (but not limited to): schedule of operations; list of suppliers; certificates of insurance; shop drawings; samples; as-built drawings; operating and maintenance manuals; etc.
  - 3. Keeping work area in a neat, clean condition; satisfactory disposal of all debris.
  - 4. Obtaining permits and licenses; payment of fees and taxes; giving of notices; compliance with all applicable laws, statutes, rules, regulations, and codes.
  - 5. Construction Facilities and Temporary Controls.
  - 6. Safety measures and safe work practices.
  - 7. Field surveys, wire tracing, layout.
  - 8. Cutting and Patching.
  - 9. Superintendence, Coordination, and Quality Control.
  - 10. Contractor's Overhead and Profit.
  - 11. New Engineer's Field Office with basic janitorial maintenance and supplies as defined in Section 01500, Part 1.14.
- 1.05 ITEMS
  - GC-1 General Work: For providing all labor, materials, and equipment necessary to complete all work in accordance with the Contract Documents. The price bid shall include all work and materials required in these Contract Documents and not included in other bid items.
  - GC-2 Demolition Work: For providing all labor, materials, and equipment necessary to complete all demolition work in accordance with the Contract Documents, exclusive of Items GC-1 and GC-3 through GC-5.

Note: the bid item also includes all demolition costs associated with proper disposal of all materials (see drawing A01 – Hazardous Materials Notes).

- GC-3 Storage Container: Contractor shall procure, furnish, and place on site one (1) modular storage container in accordance with the Contract Documents (see Part 1.05.A below and drawing A01 General Notes).
- GC-4 General Allowance: For all work required as part of this contract and not accounted for in Items GC-1 and GC-5, to be performed as directed by the Engineer.
- GC-5 Additional Maintenance and Janitorial Services: The Allowance amount shall include labor, equipment, materials, and appurtenant work necessary to produce complete facilities as specified in Section 01500, Part 1.14.
- A. Item No. GC-3: The Contractor shall furnish, transport to the site, and place a permanent modular storage unit in accordance with the contract documents.
  - 1. The price bid shall include all work and materials required to procure, deliver, and place an 8' x 20' modular storage container at the Queen Lane WTP. The location and time of delivery of the unit shall be coordinated with PWD during construction.
  - 2. The modular storage container shall be the 8x20 ModSafe Storage unit as manufactured by ModSpace, or equal.

#### 1.06 PAYMENTS

- A. See Clause 46, Scope of Payments, Clause 47, Quantities are Approximate, Clause 52, Force Account, Clause 54, Current Estimates, Clause 56, Semi-final Estimates and Punchlist, and Clause 57, Final Estimates and Inspection, of the Standard Contract Requirements.
- B. As a precedent to receiving final payment, the Contractor shall submit to the Construction Manager a sworn affidavit that all bills for labor, service, and materials have been paid and that there are no suits pending in connection with the work done or labor and materials furnished under the Contract.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# COORDINATION

# PART 1 - GENERAL

# 1.01 PROJECT COORDINATION

- A. In order to complete all the work within the time specified, the Contractor shall prosecute the work of his contract vigorously, and without unnecessary delays.
- B. The continued operation of this facility is necessary to the proper functioning of the water supply/pollution control system, which provides a service vital to the community, and must continue in operation at all times.
- C. Should any interruption of operations be necessary to the work of any Contract, the Contractor involved shall include notice of such necessity in his proposed Schedule of Operations, submitted before starting work.
- D. Interruption of operations will be permitted only after consultation between the Engineer, the Plant Superintendent, and the Contractor(s) involved; and only by the written consent of the Engineer.
- E. The Contractor shall notify the Engineer at least five (5) working days before starting any work that will temporarily discontinue or disrupt service by existing utilities (e.g., electrical, sewer, water, heat, gas, fire lines). No such work shall be performed by any Contractor without the express written consent of the Engineer.
- F. Should interruption of operations or utility services be permitted by the Engineer, the Contractor involved shall have on the site, before starting the interruption, sufficient labor, materials, equipment, supervision, and other necessary resources, to complete the work in the time permitted.
- G. There will be no separate or additional payment for additional labor, equipment, or supervision necessary to complete the work in the time permitted for interruption of operations and/or utility services. There will be no separate or additional payment for delays in permitting any interruption of operations and/or utility services.
- H. Where, in the opinion of any Contractor, any work shown on the Drawings or called for under these Specifications is insufficiently specified, or specified in a manner that will make it impossible for him to produce first-class work which will meet the approval of the Engineer, he shall refer same to the Engineer before proceeding with the work. If any Contractor fails to refer such instances to the Engineer, no excuse for faulty installation or poor workmanship will be entertained.
- I. Where any part of any Contractor's work depends for proper execution or results upon the work of any other Contractor, the first Contractor shall, before proceeding with that work, notify the Engineer of any apparent discrepancies or defects in the other Contractor's work that may render it unsuitable for such proper execution and results. Failure to so

notify the Engineer shall constitute an acceptance of the other Contractor's work as fit and proper to receive the new work.

- J. In the event timely delivery of sleeves and other materials cannot be made, the Contractor affected may, with the approval of the Engineer, arrange to have boxes or other forms set at the locations where the appurtenances are to pass through, or into the floors, roofs, walls, or other work. Upon the subsequent installation of these appurtenances, the voids around them shall be filled with the appropriate materials to the satisfaction of the Engineer. The Contractor required to furnish the appurtenances shall bear the costs of boxing out and filling in.
- K. Anchor bolts, shims, and additional steel reinforcement not shown on the Contract Drawings, where required for the proper installation of any piece of equipment, shall be furnished by the Contractor installing such equipment. Grouting work required for the proper installation of any piece of equipment shall be performed at the expense of the Contractor installing that equipment.
- L. See Clause 26, Contract Time, Clause 34, Subcontracts, Clause 36, Cooperation and Coordination with Other Contractors, Clause 38, Maintenance After Completion and Contractor's Guarantee, Clause 48, Changes, Clause 64, Inspection, and Clause 67, Prosecution and Performance of Work, Clause 68 Right-of-Way, of the Standard Contract Requirements.

#### 1.02 PROJECT MEETINGS

- A. Before the start of work on this project, the Engineer will call a meeting with the Contractors, the inspection staff, and the plant operating personnel to discuss the various aspects of the work, so that a smooth operational procedure can be established for the duration of the work.
- B. The Contractor shall attend progress meetings when called by the Engineer or his representative for the purpose of discussing the execution of the work, and coordinating and expediting the work of all Contractors. Each such meeting will be held at the time and place designated by the Engineer or his representative. All decisions, instructions, or interpretations given by the Engineer or his representative at these meetings shall be conclusive, and binding on the Contractor. The proceedings of these meetings will be recorded, and a copy of the minutes will be sent to the Contractor.

# 1.03 COORDINATION

A. The Contractor is responsible to coordinate his work with all his subcontractors.

# 1.04 JOB SITE ADMINISTRATION

A. No Contractor shall close or obstruct any walkway, passageway, or stairway without authorization of the Engineer. No Contractor shall store or place materials in any passageway, stairway, or other means of egress. The Contractor shall conduct his operations in a manner that will minimize interference with traffic.

- B. The Contractor shall take all necessary precautions to prevent dust and dirt raised by his operations from affecting the occupied portions of the building.
- C. The Contractor shall keep the surfaces of all plant roads and footways affected by the work of the project in a neat and clean condition. He shall sprinkle with water or otherwise treat paved surfaces and exposed earth sufficiently to keep the dust laid during the progress of work. Accumulations of soil and debris on roadways shall be removed daily. All inlets shall be cleaned at the completion of work and as often as necessary during the course of work.
- D. The Contractor shall be responsible for any damage to the existing structure or contents due to his operations and shall promptly repair such damage as directed by the Engineer without cost to the City.
- E. The Contractor shall at all times enforce good discipline and order among his employees, and shall not employ on this project any unfit person or anyone not skilled in the task assigned to him. Where appropriate, only factory-trained or certified mechanics shall be employed to install and/or adjust pieces of equipment.
- F. Rubbish shall be lowered by way of chutes, taken down on hoists, or lowered in receptacles. Under no circumstances shall any rubbish or waste be dropped or thrown from one level to another within or outside the building.
- G. No Contractor's employees, delivery men, or visitors may park on any Water Department property without the prior approval of the Engineer and the Plant Superintendent. Such approval will only be given where such parking privileges will not interfere with the safe and proper operation of the Water Department facility, and also will not conflict with parking requirements for Water Department employees.
- H. Contractor shall comply with the facility's security provisions as addressed elsewhere in the specifications.

#### 1.05 CUTTING AND PATCHING

- A. No Contractor shall cut or otherwise alter the work of any other Contractor without the prior written consent of the Engineer and the other Contractor involved. No Contractor shall unreasonably withhold such written consent.
- B. Wherever alterations occur, or new and old work join, the Contractor involved shall cut, remove, patch, repair, or refinish the adjacent surfaces, or so much thereof as is required by the conditions involved, and shall leave the work in at least as good a condition as existed prior to starting the work. The materials and workmanship employed in the alterations, unless otherwise required by the Contract Documents, shall conform to that of the original work.
- C. The materials and workmanship employed in the alterations, unless otherwise required by the Contract Documents, shall conform to that of the original work.
- D. Where new work is installed, the Contractor involved shall finish the new and adjacent existing surfaces as specified for the new work. He shall remove any plaster, mortar,

loose paint, dirt, grease, and other objectionable materials from the surfaces to be finished.

E. The Contractor shall cut out embedded anchorage's and attachment items as necessary to properly provide for the patching and repair of surfaces adjacent to his work.

#### 1.06 FIELD ENGINEERING

- A. The Contractor shall establish and maintain all necessary reference lines and bench marks and shall lay out and mark the locations of all new or relocated walls and partitions. He will be held responsible for the proper level and location of the work of this Contract, and for furnishing sufficient and reliable information to establish the proper level and location of the work.
- B. The Contractor shall be responsible for the correct layout of all duct work, piping, conduits, and other elements of the work under this Contract, based on the reference lines and bench marks established, and existing conditions. The Contractor shall verify all figures shown on the Contract Drawings and/or Reference Drawings, and shall report any errors or inaccuracies to the Engineer before commencing the work. Should the Contractor fail to verify dimensions, or knowingly perform work in an incorrect or unserviceable manner, he shall thereby assume full responsibility for correcting such work and rendering it serviceable without additional cost to the City.
- C. See Clause 84, Completeness of Data, of the Standard Contract Requirements.

# 1.07 SAFETY

- A. The Contractor shall take all reasonable precautions for the safety of all persons who may be affected by his operations.
- B. The Contractor shall provide all reasonable protection to prevent damage to the property of the City, of any other Contractor, or of any other persons which may be affected by his operations.
- C. The Contractor shall erect and maintain all reasonable safeguards, post danger signs and other warnings of hazards promulgate safety regulations for his own personnel (including his own employees, his deliverymen, and visitors) and shall notify the Engineer of any special safety regulations which should be promulgated for others who may be affected by his operations.
- D. The Contractor shall provide proper personal protective equipment (goggles, helmets, safety lines and belts, protective clothing, etc.). He shall require his employees, subcontractors, deliverymen, and visitors to use such equipment where required or appropriate, and to adhere to safe work practices at all times.
- E. The Contractor shall formulate a plan of action for any medical emergency (e.g., injuries to persons due to an accident) involving his employees or other persons affected by his operations.

- F. See Clause 59, Contractor Claims, Clause 62, False Claims, and Clause 76, Safety and Sanitary Provisions, of the Standard Contract Requirements.
- G. The Contractor shall at all times in the performance of this Contract, comply with the requirements of the Occupational Safety and Health Act of 1970 (OSHA), as amended.
- H. The Contractor shall initiate and maintain a safety program as required to comply with the requirements of the OSHA, and as requested by the Engineer. A written description of the safety plan shall be submitted to the Engineer prior to the start of site work. The Contractor shall designate a competent person who shall conduct frequent and regular inspections of the contractor's job site, materials, and equipment, and submit a written report of the inspection to the on-site Construction Branch representative. The Contractor shall retain full responsibility for the safety of his personnel.

PART 2 - PRODUCTS	Not Used	

PART 3 - EXECUTION Not Used

# CONTRACTOR REQUIREMENTS FOR CONFINED SPACE ENTRY

# PART 1 - GENERAL

# 1.01 SCOPE AND PURPOSE

- A. This Section applies to all personnel on Water Department job sites where confined space entry occurs.
- B. The purpose of this Section is to ensure that Contractor's workers are safeguarded from unsafe atmospheres while entering or occupying any confined space.

# 1.02 DEFINITIONS

- A. Confined Space: is any space that has limited or restricted means of access to a space not intended for continuous occupancy, and that could contain a hazardous atmosphere.
- B. Hazardous Atmosphere: is any atmosphere that has one or more of the following characteristics:
  - 1. Is a toxic atmosphere;
  - 2. Is oxygen-deficient or oxygen-enriched;
  - 3. Is an explosive atmosphere.
- C. Toxic Atmosphere: is any atmosphere in which the concentration of any airborne contaminant exceeds the OSHA Permissible Exposure Limit (PEL) or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) established for the contaminant.
- D. Oxygen-Deficient Atmosphere: is any atmosphere having less than 19.5% oxygen content.
- E. Oxygen-Enriched Atmosphere: is any atmosphere having greater than 22% oxygen content.
- F. Explosive Atmosphere: is any atmosphere that contains a concentration of flammable or combustible material in excess of 10% of its Lower Flammable Limit (LFL, also called LEL).
- G. Confined spaces may include, but are not limited to, storage or processing tanks (either above or below grade), manholes, sewers, conduits or tunnels, wet pits, ducts, and open-topped spaces more than 4 feet deep.

# 1.03 APPLICABLE STANDARDS OF CONFORMANCE

A. Contractor whose employees may enter confined space shall comply with the following regulations:

- 1. Applicable sections of 29 CFR Part 1926 (OSHA Construction Industry Regulations and Standards).
- 2. Commonwealth of Pennsylvania regulations.
- B. Unless the above regulations impose more stringent requirements, the requirements set forth in Section 27 ("Work in Confined Spaces") of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1 (Rev. 1992) shall apply.

#### 1.04 RESPONSIBILITIES

- A. City of Philadelphia Responsibilities:
  - 1. The City of Philadelphia will, wherever applicable, supply contractors with material safety data sheets (MSDSs) as follows:
    - a. Gases known to be generated from wastewater, namely, hydrogen sulfide (H2S) and methane.
    - b. Chemicals presently known to be significant potential contaminants of wastewater from major point-source industrial discharges.
    - c. Chemicals used in City of Philadelphia treatment plants to treat fresh water and wastewater.
- B. Contractor Responsibilities:

1.

- The Contractor shall be solely responsible for complying with applicable standards of conformance, including, but not limited to, the following:
  - a. Establish written procedures for confined space entry that includes entry permit requirements.
  - b. Ensure that all affected personnel are properly trained in all aspects that may affect their safety during confined space entry.
  - c. Ensure that affected employees are provided information and training concerning potentially hazardous atmospheres.
  - d. Established procedures, including (but not limited to):
    - 1) Testing of atmosphere with direct-reading instruments;
    - 2) Personal protective equipment;
    - 3) Non-entry retrieval devices such as body harnesses and winches;
    - 4) Communications devices such as two-way radios;
    - 5) Positive ventilation equipment (e.g., blowers and flexible ducts).
- C. The Contractor shall be solely responsible for interpreting hazard information provided by the City of Philadelphia and for providing training and information to employees in accordance with the requirements of 29 CFR Part 1926. (OSHA Hazard Communication Standard).

#### 1.05 ENFORCEMENT

A. Performance may be audited by the job-site representative of the City of Philadelphia Water Department. The representative may, at his discretion, obtain advice from technical specialists. However, the City is under no contractual obligation to perform such functions.

- B. Failure of the Contractor to conform to applicable safety standards or to meet his responsibilities, whether or not explicitly covered in this section, may cause the job-site representative either to prevent work from starting or to stop work in progress.
- C. Repeated or egregious failures on the part of the Contractor to comply with any requirement of the Section may result in termination of the Contract and/or affect the Contractor's eligibility to bid on future contracts. The City of Philadelphia bears no liability for loses, either direct or incidental, suffered by the Contractor in such cases.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# CONTRACTOR REQUIREMENTS FOR ENTERING WATER DEPARTMENT OPERATING SITES WITH HAZARDOUS MATERIALS

#### PART 1 - GENERAL

#### 1.01 MATERIAL SAFETY DATA SHEETS (MSDS's)

- A. A Contractor who brings any hazardous material onto the site of any Water Department operating facility shall provide the PWD Construction Division Resident Engineer a copy of the Material Safety Data Sheet (MSDS) for each hazardous material brought on site except for the items listed below:
  - 1. Fluids used in automotive equipment (e.g., gasoline, oil, transmission fluid, antifreeze, brake fluid, etc.)
  - 2. Propane; Acetylene; Oxygen; Cement; or Latex Paint.

#### 1.02 LABELING OF HAZARDOUS MATERIALS

- A. The Contractor is responsible for insuring that each portable container of hazardous materials brought on site is labeled in accordance with the requirements of the Pennsylvania Worker and Community Right-to-Know Act of 1984. Legible information firmly affixed by label or tag to the container shall include the following:
  - 1. Manufacturer's name, address, and telephone number.
  - 2. Trade name or common name of the material.
  - 3. Chemical Abstract Services (CAS) number and chemical name of each hazardous ingredient.
  - 4. Appropriate hazard warnings.

# 1.03 STORAGE OF HAZARDOUS MATERIALS

- A. Contractors are responsible for proper storage and dispensing of all hazardous materials brought on site. Practices shall be consistent with recommendations in their respective MSDS's and with applicable codes. Specifically, flammable materials shall be segregated from oxidizers.
- B. All hazardous materials shall be removed from the site prior to job closure.

# 1.04 STORAGE AND HANDLING OF CYLINDERED GASES

- A. Cylinders shall:
  - 1. Be transported and secured in the upright position.
  - 2. Have valve covers screwed in place unless a regulator is connected.
  - 3. Be kept outside and at ground level, except during periods of actual use inside a building.
  - 4. Have main valve shut off when not in use, including during lunch and break periods.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# CONTRACTOR REQUIREMENTS FOR ENTERING WATER DEPARTMENT AREAS WHICH MAY CONTAIN HAZARDOUS GASES

#### PART 1 - GENERAL

#### 1.01 SCOPE AND PURPOSE

- A. This section applies to personnel on Water Department job sites where hazardous gases may be found.
- B. The purpose of this section is to ensure that Contractor's workers are safeguarded from unsafe atmospheres while entering or occupying an area that may contain a hazardous gas.
- 1.02 Definitions:
  - A. Hazardous Area: is any area that has the potential to contain a hazardous atmosphere.
  - B. Hazardous Atmosphere: is any atmosphere that has one or more of the following characteristics:
    - 1. Is a toxic atmosphere;
    - 2. Is oxygen-deficient or oxygen-enriched;
    - 3. Is an explosive atmosphere.
  - C. Toxic Atmosphere: is any atmosphere in which the concentration of any airborne contaminant exceeds the OSHA Permissible Exposure Limit (PEL) or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) established for the contaminant.
  - D. Oxygen-Deficient Atmosphere: is any atmosphere having less than 19.5% oxygen content.
  - E. Oxygen-Enriched Atmosphere: is any atmosphere having greater than 22% oxygen content.
  - F. Explosive Atmosphere: is any atmosphere that contains a concentration of flammable or combustible material in excess of 10% of its Lower Flammable Limit (LFL, also call LEL).
  - G. Hazardous Areas may include, but are not limited to, rooms, channels and building roofs.

## 1.03 APPLICABLE STANDARDS OF CONFORMANCE

- A. Contractor whose employees may enter hazardous areas shall comply with the following regulations:
  - 1. Applicable sections of 29 CFR Part 1926 (OSHA Construction Industry Regulations and Standards).

2. Commonwealth of Pennsylvania regulations.

# 1.04 **RESPONSIBILITIES**

- A. City of Philadelphia Responsibilities:
  - 1. The City of Philadelphia will, wherever applicable, supply contractors with material safety data sheets (MSDSs) as follows:
    - a. Gases known to be generated from wastewater, namely, hydrogen sulfide (H2S) and methane.
    - b. Chemicals presently known to be significant potential contaminants of wastewater from major point-source industrial discharges.
    - c. Chemicals used in City of Philadelphia treatment plants to treat fresh water and wastewater.
- B. Contractor Responsibilities:
  - 1. The contractor shall be solely responsible for complying with applicable standards of conformance, including, but limited to, the following:
    - a. Establish written procedures for hazardous area entry that includes work permit requirements
    - b. Ensure that all affected personnel are properly trained in all aspects that may affect their safety during hazardous area entry.
    - c. Ensure that affected employees are provided information and training concerning potentially hazardous atmospheres.
    - d. Provide all necessary instruments and equipment needed for complying with established procedures, including (but limited to):
      - 1) Testing of atmosphere with direct-reading instruments;
      - 2) Personal protective equipment;
      - 3) Positive ventilation equipment (e.g., blowers and flexible ducts).
- C. The contractor shall be solely responsible for interpreting hazard information provided by the City of Philadelphia and for providing training and information to employees in accordance with the requirements of 29 CFR Part 1926. (OSHA Hazard Communication Standard).

# 1.05 ENFORCEMENT

- A. Performance may be audited by the job-site representative of the City of Philadelphia Water Department. The representative may, at his discretion, obtain advice from technical specialists. However, the City is under no contractual obligation to perform such functions.
- B. Failure of the Contractor to conform to applicable safety standards or to meet his responsibilities, whether or not explicitly covered in this section, may cause the job-site representative either to prevent work from starting or to stop work in progress.
- C. Repeated or egregious failures on the part of the Contractor to comply with any requirements of the Section may result in termination of the Contract and/or affect the Contractor's eligibility to bid on future contracts. The City of Philadelphia bears no liability for loses, either direct or incidental, suffered by the Contractor in such cases.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

#### SUBMITTALS

# PART 1 - GENERAL

#### 1.01 ADDRESSES

- A. Attasit Kaewvichien, Division Engineer Philadelphia Water Department Jefferson Tower, 2<sup>nd</sup> Floor 1101 Market St. Philadelphia, PA 19107
- B. Joe Irrera, Resident Engineer Construction Branch
   Philadelphia Water Department
   Jefferson Tower, 2nd Floor
   1101 Market St.
   Philadelphia, PA 19107
- C. Vahe Hovsepian, PE Manager, Design Branch Philadelphia Water Department Jefferson Tower, 2nd Floor 1101 Market St. Philadelphia, PA 19107
- D. Design Engineer Jeff Naumick, PE Hazen and Sawyer One South Broad St., Suite 900 Philadelphia, PA 19107 Phone: (215)-592-4526
- E. Chief, Materials Engineering Lab Philadelphia Water Department Central Laboratory Facility 1500 E. Hunting Park Ave. Philadelphia, PA 19124
- F. Trisha Grace Manager, Projects Control Unit Philadelphia Water Department Jefferson Tower, 2nd Floor 1101 Market St. Philadelphia, PA 19107 Phone: (215)-685-6336

# 1.02 PRECONSTRUCTION SUBMITTALS

# A. Certificates of Insurance:

- 1. Attention is directed to Clause 31 of the Standard Contract Requirements.
- 2. Each insurance policy required shall reference the contract number and be endorsed to the City of Philadelphia as named insured.
- 3. Each insurance policy required shall be so endorsed that the Philadelphia Water Department shall be notified thirty (30) days in advance of cancellation, or any other change in the insurance provided by the policy.
- 4. Before starting work under his Contract, the Contractor shall deliver acceptable Certificates of Insurance (in triplicate) for each insurance policy required to the Water Department Projects Control Unit.
- 5. If the work goes beyond the expiration date of the insurance policy, Certificate of Renewal shall be sent prior to expiration date in accordance with all of the above requirements. Failure to send this renewal could delay progress payments.
- B. Schedule of Operations:

1.

- 1. Submit Schedule as specified under Section 1323 Construction Progress Schedules.
- C. Lists of Suppliers and Subcontractors:
  - Before starting work, the Contractor shall submit to the Division Engineer of the Construction Branch (with a copy to the Manager of Design Branch) lists of:
    - a. The suppliers of materials to be used for his Contract.
    - b. The subcontractors to be used for his Contract.
- D. Lists of Exempt Materials and Items:
  - 1. Before starting work, the Contractor shall submit a list of materials and items identified by him as exempt from the Pennsylvania State Sales and Use Tax.
    - a. The Water Department will evaluate the list and issue an Exemption Certificate (Form Rev-1220 AS +) listing the materials and items recognized as in accordance with the Commonwealth of Pennsylvania Sales and Use Tax (Tax Reform Code of 1971, Article II Tax for Education with Regulation and Rulings).
    - b. The Contractor shall retain a copy of the Exemption Certificate for his tax records.
    - c. Any Contractor may appeal the Water Department evaluation by contacting the Pennsylvania Department of Revenue, Pennsylvania Sales and Use Tax Bureau, 1846 Brookwood Street, Harrisburg, PA 17127.
    - d. Should the Pennsylvania Department of Revenue determine any additional materials or items to be exempt, the Water Department will, upon receipt of a written request supported by adequate documentation, issue an additional Exemption Certificate for those materials or items.
- E. Disposal Areas: Before starting work, the Contractor shall submit for the approval of the Engineer his proposed arrangements for disposal of excess excavated material and debris. Submit true copies of all necessary approvals, permits, and certifications.
- F. Contractor's Quality Control Plan: See Section 01400, Quality Control.

G. Make all other preconstruction submittals in duplicate unless otherwise indicated.

# 1.03 SHOP DRAWINGS, WORKING DRAWINGS AND SAMPLES

- A. The Contract Documents cover the general design, construction, and arrangement, and certain details, but they do not purport to cover all details involved in the performance of the work.
  - 1. Where contract drawings do not cover all details, the contractor shall submit working drawings clearly showing the intended arrangement of equipment and routing of conduit or piping.
  - 2. Where unanticipated construction conditions, building limitations, or the accommodation of different pieces of equipment requires minor deviations from the Contract Documents, the Contractor involved shall submit Working Drawings for such deviations.
  - 3. Working Drawings shall be submitted to construction for review.
  - 4. Major changes will only be permitted in accordance with Clause 48, Changes of the Standard Contract Requirements.
- B. Submit for approval of the Design Engineer complete Shop Drawings for each element of the work under each Contract.
  - 1. Shop Drawings are generally defined as all Drawings, diagrams, illustrations, brochures, schedules, bills of material, performance charts, instructions, control logic and P&ID diagrams, and other data which are prepared by any Contractor, his subcontractors, suppliers or distributors, or equipment fabricators or manufacturers, and which illustrate the manufacture, fabrication, construction, and/or installation of the work or any part of the work, and which are submitted to the Engineer to establish that the materials, articles, and pieces of equipment proposed to be supplied will when installed meet all contract requirements.
  - 2. Shop Drawings shall be neatly laid out, clear, and complete. Where abbreviations are used, they shall be explained in a legend or index placed prominently on the first sheet of each submission.
  - 3. Assign to each Shop Drawing a sequential number for purposes of identification, and use that number (with appropriate revision number) for each resubmission.
  - 4. Give each Shop Drawing a title and specification section, which will clearly indicate the work involved, and the proposal item(s) under which payment for the work will be claimed.
  - 5. Each Shop Drawing shall be carefully reviewed by the Contractor involved for conformity to all contract requirements, and for compatibility with the other Shop Drawings and with field conditions, and shall be certified correct by him before submittal.
  - 6. The Shop Drawings shall show all dimensions, and all types of materials used, and shall identify each piece of equipment proposed to be installed.
  - 7. Shop Drawings for equipment requiring electrical connections shall include internal wiring diagrams, wiring diagrams for making connections, and terminal identification diagrams.
  - 8. Shop Drawings for equipment requiring plumbing connections shall detail all supply and drainage connections.
- C. Affidavits: Wherever the Contract Documents require that a material, product, or piece of equipment be in accordance with a Federal specification, an ASTM designation, an

ANSI designation, or any other reference specification, the Contractor involved shall present an affidavit from the manufacturer certifying that the product or piece of equipment complies therewith, and, if required, shall furnish suitable supporting test data to substantiate compliance.

- D. Samples are physical examples which illustrate materials, equipment, or workmanship, and establish standards by which the work will be judged. Submit Samples where required.
- E. Manufacturer's standard diagrams, illustrations, brochures, and schedules, and other data may be submitted on 8-1/2" by 11" sheets of paper, with 1" left margin for binding and 1/2" top, bottom, and right margins, clearly labeled with Contract number and title, submission number and title, date of original submission, and date of resubmission. All typewriting shall be Pica size or larger.
- F. All other Shop Drawings shall be submitted on 30" by 42" sheets, with 1-1/2" left margin for binding and 1" top, bottom and right margins, with a title block in the lower right corner containing the Contract number and title, submission number and title, date of original submission, and date of resubmission. All lettering shall be at least 5/32" high.
- G. Submit 3 copies of each Shop Drawing to Design Engineer. (Note that review by Design Engineer is intended to establish that the procedures, materials, articles, and pieces of equipment proposed to be used or supplied meet the contract requirements, and are suitable for the intended purpose. Dimensions may not be checked in detail.)
  - 1. After review, one copy of each Shop Drawing will be returned to the Contractor involved.
  - 2. Revise each Shop Drawing as required, and submit 7 copies to Design Engineer for final approval.
  - 3. If no further revisions are required, 3 "Approved" copies of each Shop Drawing will be returned to the Contractor involved, who shall then forward one copy to the Contractor for Electrical Work.
- H. Transmittal Letters:
  - 1. Each submission of Shop Drawings shall be accompanied by a Transmittal Letter listing each Shop Drawing submitted, its submittal number, whether it is a resubmission, and the number of the applicable proposal item(s).
  - 2. The Transmittal Letter shall also clearly state any deviations from the contract requirements, and any change from prior submissions other than those required by the Design Engineer's comments.
  - 3. Address each Transmittal Letter to the Design Consultant. Send a copy of each Transmittal Letter to the Construction Division Engineer and a copy to the Manager of Design Branch.
- I. Do not fabricate any work, order any equipment or materials, or perform any construction prior to approval by the Engineer of all applicable Shop Drawings and Samples.
- J. The Engineer's approval of Shop Drawings will not relieve the Contractor from his responsibility to fulfill all contract requirements. Changes to the contract

# requirements may only be made by written Change Order by the Engineer in accordance with the Standard Contract Requirements.

#### 1.04 PROJECT RECORD AS BUILT DRAWINGS

- A. As the work progresses, the Contractor shall keep a complete and accurate record of all changes or deviations from the Contract Documents and the Shop Drawings, indicating the work as actually installed.
  - 1. Record Drawings (As-Built Drawings) shall be based on the Contract Drawings, Shop Drawings, and supplementary drawings with all revisions required to depict the actual installation. The Contract Drawings can serve as a basis for preparation of the as-built drawings. However, the contractor is expected to prepare his own drawings and to delineate exactly the installation details of all equipment, using as many additional drawings as are necessary to show the final as-built installation. All drawings shall be prepared in a neat and professional manner.
  - 2. The Record Drawings shall be on 22" x 36" Mylar sheets as described above.
  - 3. Each drawing shall have a title block in the lower right hand corner with the Work Number, description of items shown on the drawing, date, scale ( if appropriate), contractor's name, and the words "As Built".
  - 4. Complete installation details shall be neatly and correctly shown on the respective portion of the drawings, with appropriate supplementary notes.
  - 5. All underground installations shall be dimensioned and referenced to above ground fixed structures. A preliminary, as installed, dimensioned drawing of the underground installation shall be submitted to the engineer prior to backfilling excavation.
  - 6. Preliminary record drawings of all field wiring terminations shall be submitted to the engineer within one week of the completion of these terminations.
  - 7. A list shall be provided on the Drawings, identifying all equipment and materials installed by reference item number, description, manufacturer, and catalog number.
  - 8. Copies of these Record Drawings shall be kept at the job site, up to date and available for inspection by the Engineer or his representative. Preliminary copies of all drawings shall be provided to the Engineer upon his written request at any time during the Contract.
  - 9. Upon completion of the work of the Contract, the Contractor shall deliver to Design Branch three complete preliminary sets of all Record Drawings.
  - 10. After making any corrections required by the Engineer, the Contractor shall submit to Construction Branch two complete final sets of Record Drawings (both Contract Drawings and Shop Drawings) on Mylar as described above, and enclosed in suitable transfer cases (for distribution: 1 set to Design Branch; 1 set to Operations). In addition to the two sets on mylar, the Contractor shall provide two CD-ROMs each containing a complete set of Record Drawings in tag image file format (.tif) and autocad file format (.dwg), with file names based on the drawing number (e.g. 63013\_1.tif; 63013\_1.dwg).
  - 11. Each Drawing shall have an endorsement by the Contractor, certifying that the information is complete and accurate.
- B. Final payment will not be made on the Contract until the required record sets have been furnished in an acceptable manner. No review or receipt of such documents by the

Engineer shall be a waiver of any deviation from the Contract Documents or the Shop Drawings, or in any way relieve any Contractor from his responsibility to perform the work in accordance with the Contract Documents and the approved shop drawings.

# 1.05 OPERATING AND MAINTENANCE MANUALS

- A. The Contractor shall furnish complete sets of O & M Manuals containing the manufacturers' instructions for maintenance and operation of, and parts lists for, each piece of equipment furnished under his Contract, and any additional data required by these Contract Documents. All such information shall clearly indicate the particular piece(s) of equipment to which it applies, including equipment name, manufacturer, model number, serial number(s), and year of manufacture.
- B. Each set of O & M Manuals shall contain a complete set of reduced-size prints of all Record Drawings as described above.
- C. Each Operating and Maintenance Manual for Electrical Work shall also include a complete set of reduced-size prints of all original Electrical Contract Drawings, a complete set of permits, certifications, warranties and manifestos.
- D. The O & M Manuals shall be arranged in proper order, indexed, and suitably bound (e.g., in ring binders of good quality). The Contractor shall certify by endorsement on each Manual that that O & M Manual is complete and accurate.
- E. The Contractor shall submit to the Construction Branch 3 complete preliminary sets of Operating and Maintenance Manuals.
- F. After review, 1 set of the O & M Manuals will be returned to the Contractor.
- G. After making any required additions or corrections, the Contractor shall deliver to Construction Branch 5 complete final sets of O & M Manuals.
- H. In addition two CD-ROMs shall be provided. Each CD-ROM shall contain a complete O & M Manual including all text and drawings (including record drawings) in an identical manner to the printed version. Each CD-ROM shall include a detailed index which allows easy retrieval of information. All documents and graphics stored on the CD-ROM shall be in Adobe Acrobat<sup>™</sup> format and a copy of Acrobat Reader<sup>™</sup> shall be provided on each CD-ROM. All software and CD-ROMs shall be compatible with the MS-Windows operating system.
- I. Final payment on any Contract will not be made until the required Operating and Maintenance Manuals have been furnished in an acceptable manner.
- J. BINDING:
  - 1. Ring binders shall be 3-ring, heavy duty casebound construction, covered with heavy vinyl, have double locking rings, steel spine and piano style hinges, and shall be supplied with page lifters. Binders shall be as manufactured by Wilson Jones, or equal. The cover and binding edge of each manual shall have the work

number, contract title, manual title, volume number, and date displayed thereon in a legible manner using durable materials.

- 2. Each binder shall have a title page, typed table of contents, and heavy section dividers with reinforced holes and identified on each side. The table of contents of all volumes in a set shall be included in each j volume, with the contents of that particular volume highlighted
- 3. All contents shall be punched for binding in a manner that does not obliterate any data, or enclosed in suitable clear protectors. All sheet protectors and pockets shall be of archival quality, extra heavy Mylar or polypropylene. Polyvinylchloride (PVC) material shall not be used.

# 1.06 SUBMITTAL SCHEDULES

- A. As a minimum, the following list must be submitted prior to start of work:
  - 1. Certificate of Insurance
  - 2. Schedule of Operations
  - 3. List of Suppliers & Subcontractors
  - 4. Bid Breakdown
  - 5. Contractor's Quality Control Plan
  - 6. Copy of Contractor's Safety Program
- B. As a minimum, the following list must be submitted within 30 days of the notice-to-proceed:
  - 1. List of Warranty(s)
  - 2. List of Material Samples
  - 3. List of Spare Parts
  - 4. List of Shop Drawings
  - 5. Testing Schedule and Procedures
  - 6. List of Certifications
- C. As a minimum, the following list must be submitted periodically during the project duration:
  - 1. Contractor's Weekly Payroll
  - 2. Monthly Employment Utilization Report (CC-257)
  - 3. Monthly Project Updates
  - 4. Working Drawings
  - 5. Shop Drawings Including Certified Test Reports
- D. As a minimum, the following list must be submitted at the 75% project completion date:
  - 1. Acceptable Preliminary Operating & Maintenance Manuals
  - 2. Acceptable Preliminary Project Record (As-built) Drawings
  - 3. Acceptable Training Course Outline, schedule and training instructor's resume
  - 4. Complete Startup & Acceptance Test Plan and Schedule
- E. As a minimum, the following list must be submitted and approved prior to semi-final payment:
  - 1. Final Project Record (As-built) Drawings
  - 2. Finalized Operating & Maintenance Manuals
  - 3. Acceptance Test Report
  - 4. Warranty(s)

F. Prior to final payment, the Contractor must submit the following: 1. Signed Affidavit (see Section 01010, 1.06B)

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# CONSTRUCTION PROGRESS SCHEDULES

# PART 1 - GENERAL

#### 1.01 SCOPE

- A. In accordance with the contract requirements, a Critical Path Method (CPM) Construction Progress Schedule shall be prepared, for the work to be performed under this Contract. The CPM Progress Schedule shall be used to plan, coordinate, and control the progress of construction and the time fixed for the project's completion.
- B. Section includes the following:
  - 1. References.
  - 2. Quality assurance.
  - 3. Format.
  - 4. Schedules.
  - 5. Submittals.
  - 6. Review and evaluation.
  - 7. Updating schedules.
  - 8. Distribution.

#### 1.02 REFERENCES

A. The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry, Washington, D.C., The Associated General Contractors of America (AGC).

## 1.03 QUALITY ASSURANCE

- A. Contractor's Administrative Personnel: Five (5) years' minimum experience in using and monitoring CPM schedules on comparable projects.
- B. Contractor may employ an outside scheduling sub-contractor. Within 30 days of the NTP the Contractor shall submit the Scheduler for approval.

#### 1.04 SOFTWARE

A. The Contractor shall develop the CPM Schedule using Microsoft Office Project 2007 software, Primavera P6, or approved equal, covering all portions of the work.

# 1.05 FORMAT

- A. Listings: Reading from left to right, in ascending order for each activity.
- B. Diagram Sheet Size: As required.
- C. Scale and Spacing: To allow for notations and revisions.

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## 1.06 RESPONSIBILITY FOR DEVELOPING THE SCHEDULE

- A. The Contractor shall be responsible for developing the construction schedule in the critical path format.
  - 1. The Contractor shall be responsible of obtaining necessary information from his/her Subcontractors.
- B. The Contractor shall be responsible for combining and coordinating all individual construction activities with ongoing operational requirements of the Philadelphia Water Department's Facility and Water Distribution System to generate the construction schedule.
- C. The Contractor shall be responsible for coordinating the construction schedule with the Engineer and with other affected parties. These parties include but are not limited to the Philadelphia Streets Department, the Philadelphia Police Department, Philadelphia Electric Company, Philadelphia Gas Works, City of Philadelphia Department of Licenses and Inspections, etc.

#### 1.07 CONSTRUCTION SCHEDULES

- A. The Contractor shall prepare network analysis diagrams and supporting mathematical analyses using Critical Path Method, under concepts and methods outlined in AGC's "The Use of CPM in Construction A Manual for General Contractors and the Construction Industry".
  - 1. The work plan shall include milestone dates.
- B. All costs incurred by the Contractors to correctly implement the CPM shall be borne by the Contractors.
- C. Illustrate order and interdependence of activities and sequence of work; how start of given activity depends on completion of preceding activities, and how completion of activity may restrain start of subsequent activities.
  - 1. The Contractor shall develop comprehensive baseline Predecessors Diagram Schedule using approved software covering all portions of the work, including work activity descriptions, sequence of work, and time estimates for preparation of the network. Each activity in the CPM network diagram shall be assigned a responsibility code showing which Contractor is responsible for performing that activity.
- D. Illustrate complete sequence of construction by activity, identifying work of separate stages. Indicate dates for submittals including dates for Philadelphia Water Department furnished items and return of submittals; dates for procurement and delivery of critical products; and dates for installation and provision for testing. Include legend for symbols and abbreviations used.

## 1.08 DEVELOPMENT OF WORKING PLANS AND CPM SCHEDULE

A. Within fourteen (14) calendar days after the Notice-to-Proceed the Contractors shall meet with the Engineer to start developing a working plan and schedule.

- B. Within fourteen (14) calendar days after the Notice-to-Proceed each Contractor shall provide the Engineer with a short range schedule. This short range schedule shall be a detailed schedule of mobilization, procurement and construction during the first 90 calendar days.
- C. The network based schedule in approvable form shall be submitted by the Contractor to the Engineer no later than thirty (30) calendar days after Notice-to-Proceed.
- D. Upon acceptance by the Philadelphia Water Department the Contractor will draft and computerize the overall schedule for all Divisions into an activity-on-arrow network schedule for all Divisions. The comprehensive schedule will be provided to each Contractor for review and comment. In the event the completion date or milestone dates indicated by this schedule exceed the contractual dates, the logic and time estimates will be reviewed and revised by the Contractors. After changes in the logic and/or time estimates have been agreed upon, another schedule will be generated. This procedure will be repeated, if necessary, to provide a schedule which meets contract requirements.
- E. Within (60) calendar days after the Notice-to-Proceed the Contractor shall have the comprehensive schedule is completed and is within the contractual limits. The Contractor shall so certify in writing on the face of the comprehensive arrow diagram schedule and submit it to the Engineer for approval.
- F. The computer printout of the comprehensive schedule will be as listed in Article 1.09.

# 1.09 CPM SCHEDULE/NETWORK ANALYSIS SYSTEM DESCRIPTION

- A. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
  - 1. Preceding and following event numbers.
  - 2. Activity description.
  - 3. Estimated duration of activity.
  - 4. Earliest start date.
  - 5. Earliest finish date.
  - 6. Actual start date.
  - 7. Actual finish date.
  - 8. Latest start date.
  - 9. Latest finish date.
  - 10. Milestone Listing
  - 11. Total and free float; accrue float time to City and to City's benefit.
  - 12. Percentage of activity completed.
  - 13. Responsibility.
- B. Analysis Program: Capable of accepting revised completion dates, and recomputation of scheduled dates and float.
- C. Contractor's shall assign time estimates to each activity, however, no activity will have a duration greater than fifteen (15) days, except where approved by the Engineer.
- D. Required Sorts: List activities in sorts or groups:
  - 1. By preceding work item or event number from lowest to highest.

- 2. By longest float, then in order of early start.
- 3. In order of latest allowable start dates.
- 4. In order of latest allowable finish dates.
- 5. Sort by Contractor
- 6. Listing of activities on critical path.
- E. Prepare sub-schedules for each stage of Work.

# 1.10 SUBMITTALS

- A. Within 30 days after date established in Notice to Proceed, submit proposed preliminary network diagram.
- B. Within 30 days after joint review of proposed preliminary network diagram, submit draft of proposed complete network diagram for review. Include written certification that Prime Contractors and Subcontractors have reviewed and accepted proposed schedule.
- C. Within 30 days after joint review, submit complete network analysis consisting of network diagrams and mathematical analysis.
- D. Submit updated CPM schedules monthly at the progress meeting.
- E. Submit under transmittal letter form as specified in Section 01300 Transmittals.

# 1.11 REVIEW AND EVALUATION

- A. Participate in joint review and evaluation of network diagrams and analysis with Engineer at each submittal.
  - 1. Once a month (times to be determined by the Philadelphia Water Department), or more frequently if warranted, a Project Review Meeting shall be held with the Engineer and the Contractor and their field superintendents in accordance with Section 01040 Coordination, Article 1.02 Project Meetings. At this meeting, project problems will be reviewed, and after necessary action has been agreed upon to keep the project on schedule these changes shall be made to the Contractor's CPM program by the Contractor.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
  - 1. If the latest completion time for any significant job does not come within the time allowed by the Contracts, the sequence of activities and the performance activities shall be revised by the Contractor(s), through additional shifts, additional manpower, and overtime, until the schedule produced indicates that all significant Contract completion and occupancy times will be met. No additional cost will be allowed by any Contractor for overtime, additional manpower, equipment, or additional shifts, if such expediting procedures are necessary to maintain the project completion date.
- C. The Philadelphia Water Department will be the final judge as to the approval/acceptance of the CPM Network. The Contractor for each Contract shall remedy the functioning of each and every trade under their jurisdiction, whenever deficiencies of whatever nature occur during the course of the work.

D. After review, revise network diagrams and analysis incorporating results of review, and resubmit within 10 days.

#### 1.12 PROGRESS REPORTING, AND SCHEDULE UPDATING

- A. The Initial Master CPM Schedule Program shall be updated, at monthly intervals during the entire construction program.
- B. Maintain schedules to record actual start and finish dates of completed activities.
  - 1. The CPM schedule may not include every item of work necessary to complete the project. However, this does not relieve the Contractor of his responsibility to schedule and complete all items of his work within the contractual time 1 imits.
  - 2. Indicate progress of each activity to date of revision, with projected completion date of each activity. Update diagrams to graphically depict current status of Work.
  - 3. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
  - 4. Indicate changes required to maintain Date of Substantial Completion.
  - 5. Submit sorts required to support recommended changes.
  - 6. Prepare narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken or proposed and its effect.
  - 7. Each request for change in any milestone or the contract completion date shall be submitted to the Engineer by the Contractor within seven (7) calendar days after the beginning of the delay for which a time extension is requested. No time extension will be granted for a request which is not submitted within the foregoing time limit.
- C. After receipt of a request for a time extension the Engineer will make a determination based on the facts and will advise the Contractor in writing. The Engineer's decision on the time extension request will be final.
- D. If the Water Department finds that the Contractor is entitled to an extension of any milestone or the Contract completion date under the provisions of the Contract, the Water Department's determination of the total number of days extension shall be based upon the current computer mathematical analysis for the schedule and upon all data relevant to the extension. Such data shall be incorporated in the next monthly update of the project schedule.
- E. Delays in activities which, according to the computer mathematical analysis, do not affect any milestone dates or the completion date shown on the project schedule will not be the basis for a change.

#### 1.13 DISTRIBUTION

- A. Following joint reviews, the Contractor shall distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, and the Engineer.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

C. The monthly update of the Construction Schedule shall be an integral part and the basic element upon which the Contractors shall apply for payment. If in the judgment of the Philadelphia Water Department, the Contractor(s) fails or refuses to provide the information required to complete the update of the Construction Schedule as specified, the Contractor(s) shall be deemed to not have provided the required estimate upon which payments may be made, and he shall not be entitled to partial payments until the information is furnished. If the Contractor(s) does not record any exceptions to the published Construction Schedule update within ten calendar days of its receipt, he will be deemed to have accepted and approved it.

### 1.14 SCHEDULE COSTS

- A. The Contractor is deemed to have included in his bid price, a sum of money sufficient to pay for all costs attendant to the preparation and updating of the Construction Schedule.
- 1.15 REVIEW OF VENDOR PRINT AND MATERIALS STATUS REPORTS.
  - A. As a functional part of the scheduling activity, each Contractor shall review, comment and update, on a monthly basis, the Vendor Prints and Materials Status Report prepared by the Engineer.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# QUALITY CONTROL

# PART 1 - GENERAL

# 1.01 TESTING LABORATORY SERVICES

- A. Selected testing services will be provided by the Water Department Materials Engineering Laboratory at no cost to the Contractor.
  - 1. Cylinder testing of concrete shall be performed by the Water Department Materials Engineering Laboratory. The Contractor shall provide the concrete and the cylinders to make the concrete test cylinders in accordance with the requirements in Division 3.
- B. All other tests shall be the responsibility of the Contractor and shall be performed at his own expense.

# 1.02 CONTRACTOR'S QUALITY CONTROL

- A. Contractor's Quality Control Plan: The Contractor shall, before starting work, submit to the Engineer for approval a Contractor's Quality Control Plan outlining the procedures, instructions, forms, and equipment to be used as follows:
  - 1. Names and qualifications of inspection personnel.
  - 2. Authority and responsibility of inspection personnel.
  - 3. Schedule of inspections for each class of work, coordinated with the Contractor's overall schedule of operations.
  - 4. Sample forms for reports of inspections (checklists).
  - 5. Facilities, instruments, and testing devices required.
- B. Preparatory Inspection: The Contractor shall perform a preparatory inspection prior to beginning any work, including:
  - 1. A review of Contract Requirements with the supervisors directly responsible for the performance of the work; noting of safety hazards and appropriate safety measures.
  - 2. A check to ensure that materials, products, and equipment have been tested, submitted, and approved.
  - 3. A check to ensure that provisions have been made for any required control testing.
  - 4. An examination of the work area to ascertain that preliminary work has been completed.
  - 5. A physical examination of materials and equipment to ensure that they are on hand and conform to the Shop Drawings, and that the equipment is in proper operating condition, with no badly worn, deformed, broken, or missing parts.
- C. Initial Inspection: The Contractor shall perform an initial inspection of each class of work under his Contract as soon as a representative portion of such work has been completed, to ensure that the work as performed will be able to meet all contract requirements, and that appropriate safe work practices are being employed.

- D. Follow-Up Inspections: The Contractor shall perform follow up inspections of each class of work under his Contract on a continuing basis to ensure continuing compliance with all contract requirements and safe work practices.
- E. Inspection Personnel: Each inspection shall be performed by a principal or employee of the Contractor, who has at least five years' experience in performing, supervising, or inspecting that class of work in an industrial plant or equivalent environment.
- F. Reports: Reports of inspections performed shall be prepared during inspection using approved forms, signed by the qualified person performing the inspection, and maintained on file by the Contractor for the duration of the project. Work found to be defective shall be noted, together with a statement of corrective measures ordered. Follow up inspections shall note whether defective work has been corrected in a satisfactory manner. The file of reports of inspections shall be maintained by the Contractor and made available to the Engineer or his representative at the job site during normal working hours.
- G. Summary: The Contractor shall prepare a summary of inspections performed for submission at each scheduled Progress Meeting. Each summary shall include a certification by the Contractor that all classes of work begun or continued up to 7 working days before the Progress Meeting have been inspected, and that no defective work has remained uncorrected except as noted.
- H. Safety: The Engineer's review of the Contractor's Quality Control Plan does not include a review of the adequacy of the Contractor's proposed safety program or practices, nor does it relieve the Contractor of his full responsibility for any injuries to persons or damage to property as a result of his operations.

# PART 2 - PRODUCTS

# 2.01 PREQUALIFICATION OF SUPPLIERS

- A. Suppliers of materials must be prequalified in accordance with Water Department Quality Certification Standards QC-1 for Precast Concrete Products, QC-2 for Gray / Ductile Iron Castings, QC-3 for Ready-Mixed Concrete, QC-4 for Welded Steel Inlet Frames and Grates, QC-5 for Standard Pressure Fire Hydrants, QC-6 for Reinforced Concrete Pipe, QC-7 for Filter Media Products, QC-8 for Ductile Iron Pipe and Fittings, QC-9 for Vitrified Clay Pipe and Fittings, QC-10 for Standard Pressure Gate valves ( 3" to 12" ) & (16" & Larger ), QC-11 for Standard Pressure Butterfly Valves ( 3" to 20" ) & (24" & Larger ), and QC-12 for Resilient-Seated Gates Valves ( 3" to 12" Dia. & 16" Dia. to 48" ).
- B. Prospective Sellers may determine the status of suppliers of covered items by contacting the Quality Certification Staff, Central Laboratory Facility, Materials Engineering Laboratory, 1500 E. Hunting Park Avenue, Phila., PA 19124, phone (215)-685-1447.

WORK NO. 63096

PART 3 - EXECUTION Not Used

## CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

# PART 1 - GENERAL

## 1.01 TEMPORARY ELECTRICITY AND LIGHTING

- A. The Contractor shall make all necessary arrangements and provisions for temporary power distribution and lighting required for this project.
- B. The electrical service shall be of adequate capacity for all construction tools and equipment without overloading the temporary facilities, and shall be made available for power, lighting, and construction operations of all Contractors on this Project. At a minimum, 120/208 Volt, three phase, four-wire, grounded, 60 Hertz power at 20 Amperes shall be supplied to termination's at convenient locations throughout the work area. Termination's shall include circuit breakers, disconnect switches, and other electrical devices as required to protect the power supply system.
- C. The temporary lighting system shall be furnished, installed, and maintained as required to satisfy minimum requirements of safety and security. The temporary lighting system shall afford general illumination in all work areas, and shall supply at least one watt per square foot of floor area for illumination in areas where tasks are being performed. Non-functioning lamps shall be replaced promptly.
- D. All temporary equipment and wiring for power and lighting shall be in accordance with the applicable provisions of the governing codes. All temporary wiring shall be maintained in a safe manner and used so as not to constitute a hazard to persons or property.
- E. When and where the Water Department plant electrical power system, or the building permanent electrical power and lighting systems are in operating condition, they may be used for temporary power and lighting for construction, provided that the Contractor:
  - 1. Obtains the prior written approval of the Engineer.
  - 2. Assumes full responsibility for any damage to the entire power and lighting systems, or any part thereof, due to the temporary power and lighting systems or their use by any Contractor.
  - 3. Pays all costs for power, operation, and maintenance of the temporary systems, and restoration of the permanent systems.
- F. At the completion of work on this project, the Contractor shall remove and dispose of all temporary wiring, lighting, and other temporary electrical equipment and devices, and shall restore all disturbed facilities and surfaces to at least their original condition.

# 1.02 TEMPORARY HEATING

A. The Contractor shall provide temporary heat as required during construction to protect the work from freezing or frost damage, and as necessary to ensure suitable working conditions for the construction operations of all Contractors and subcontractors. In areas of the building where work is being conducted, the temperature shall be maintained as specified in the various sections of the specifications, but not less than 45 degrees F. Under no circumstances shall the temperature be allowed to reach a level that will cause damage to any portion of the work which may be subject to damage by low temperatures.

- B. Until the building, or any major portion thereof, is enclosed, temporary heating shall be by smokeless portable unit heaters of a type listed by Underwriter's Laboratories, Factory Mutual, and the Fire Marshall. The Contractor shall provide all necessary fuel, maintenance, and operating personnel required in connection with the portable unit heaters. The Contractor shall replace with new materials, or refinish to the satisfaction of the Engineer, any interior or exterior surfaces damaged by the use of these space heaters.
- C. The building shall be considered enclosed when exterior walls have been erected, the roof substantially completed, exterior openings closed up either by the permanently glazed windows and doors or by adequate temporary closing, and the building is ready for interior masonry and plastering operations.
- D. After the building, or any major portion thereof, has been enclosed the permanent heating system as specified below may be used for temporary heat.
- E. When the permanent heating system, or a suitable portion thereof, is in operating condition, the system may be used for temporary heating, provided that the Contractor:
  - 1. Obtains prior written approval from the Engineer.
  - 2. Assumes full responsibility for any damage to the entire heating system or any part thereof.
  - 3. Pays all costs for fuel, operation, maintenance, and restoration of the permanent heating system.
- F. Upon conclusion of each heating period, the Contractor shall remove all temporary piping, temporary heating units, and other equipment, and pay all costs in connection with repairing any damage caused by the installation or removal of temporary heating equipment. He shall also clean and recondition those parts of permanent heating system used.
- G. Attention is directed to Clause 83, Work in Freezing Weather, of the Standard Contract Requirements.

# 1.03 TEMPORARY COOLING AND VENTILATING

- A. The Contractor shall provide adequate ventilation as required to keep the temperature of the building within 10 degrees F of the ambient outdoor temperatures when such temperatures exceed 70 degrees F, and to prevent the accumulation of excess moisture, and to prevent excess thermal movement in the building.
- B. When the permanent air circulation system, or a suitable portion thereof, is in operating condition, it may be used without refrigeration or chilling, provided the Contractor:
  - 1. Obtains prior written approval of the Engineer.
  - 2. Assumes full responsibility for any damage to the entire ventilating system or any part thereof.

- 3. Pays all costs for power, operation, maintenance, and restoration of the ventilating system.
- 4. Provides temporary filters to adequately filter air being distributed through the duct work to the supply outlets.
- 5. Places disposable filters in front of all exhaust registers to keep construction dirt out of exhaust duct work.
- 6. Thoroughly cleans the interior of the air handling units and duct work prior to acceptance of the work.

### 1.04 TEMPORARY WATER

A. The Contractor shall provide at a point within 10 feet of the building, all water necessary for construction purposes (at least one 3/4 inch hose bib for the use of all Contractors). He shall make all temporary connections, provide a temporary meter, and shall remove all temporary equipment and piping upon completion of the project, or when so directed by the Engineer.

### 1.05 TEMPORARY SANITARY FACILITIES

- A. The Contractor shall provide and maintain in a sanitary condition, enclosed weathertight toilets for the use of all construction personnel on the site. The toilets shall be temporary structures approved by the Engineer. The number of toilets provided shall be in accordance with the ANSI Standard Safety Code for Building Construction unless otherwise required by law or regulation. Suitable facilities for washing hands shall also be provided. Upon completion of the work, the toilets and their appurtenances shall be removed, and the site restored to at least its condition prior to the project.
- B. Drinking Water: The Contractor shall furnish drinking water with suitable containers and cups for use of all workmen of Contractors and subcontractors, and City inspectors. Drinking water dispensers shall be conveniently located in the building where work is in progress.
- C. Attention is directed to Clause 76, Safety and Sanitary Provisions, and Clause 80, Use of Water, of the Standard Contract Requirements.

#### 1.06 TEMPORARY FIRE PROTECTION

- A. The Contractor shall furnish all labor, equipment, and materials necessary to maintain adequate fire protection on the site in accordance with Fire Department regulations.
- B. The Contractor shall take adequate precautions against fire; keep flammable material at an absolute minimum; and ensure that such material is properly handled and stored. No fires shall be built, or open salamanders used in any part of the work.

#### 1.07 CONSTRUCTION AIDS

A. The Contractor shall provide and maintain during his work all necessary scaffolding and staging; working platforms; temporary stairs, ladders, ramps, runways, and chutes; covers over openings; padding on projections; and so on, which may be required for the proper conduct of the work of his Contract, and shall promptly erect suitable safe railings and

kickboards at all openings, and such other temporary constructions as are required for compliance with Federal and State regulations, and for the safe conduct of the work. He shall periodically inspect all such constructions for unsafe conditions, and promptly repair any such conditions.

- B. The Contractor shall provide a material hoist as required for normal use by all Contractors and subcontractors. He shall provide all necessary guards, signals, safety devices, and so on, required for safe operations, and suitable runways from the hoists to each floor level and roof. The construction and operation of the material hoist shall comply with all applicable requirements of ANSI A10.5. The material hoist shall not be used for transporting personnel.
- C. The Contractor shall provide all special rigging and hoisting facilities required for the work of his own Contract.
- D. The Contractor shall provide all necessary openings in slabs, walls, and partitions where required for moving in large pieces of equipment of all kinds. He shall close, restore, and refinish all such openings after the equipment is in place. Shop Drawings shall be submitted for all such work for approval by the Engineer.
- E. All temporary structures required by any Contractor for the handling and storage of materials and equipment shall be provided by and at the expense of that Contractor. Locations for such structures shall be subject to approval by the Engineer. The Contractor involved shall maintain such structures in good condition and neat appearance, including painting with two coats of approved paint of a color selected by the Engineer. Upon completion of the work, the Contractor shall remove all of his equipment and temporary structures from the site.
- F. Attention is directed to Clause 72, Temporary Buildings, of the Standard Contract Requirements.

## 1.08 SECURITY

- A. The Contractor shall cooperate with the Facility's security requirements in maintaining security against unauthorized entry, damage to plant equipment, and theft.
- B. The Contractor is responsible for the on-site security of his own equipment, tools, and supplies, and those of his employees, subcontractors, suppliers, and visitors.
- C. The Contractor shall submit a daily report to the on-site Construction Branch Representative each day no later than 9:00AM. The report shall list all contractor personnel on the facility, their labor category, and employer. All contractor personnel shall carry approved identification documentation while on facility grounds.

#### 1.09 PROTECTION OF WORK AND PROPERTY

A. The Contractor shall provide all temporary enclosures required for protecting the project from the exterior, for providing passageways, for the protection of openings both exterior and interior, and any other location where temporary enclosures and protection may be required.

- B. The Contractor shall make such explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal. He shall give particular attention to shoring and bracing to prevent any damage to existing facilities or to the work of other Contractors.
- C. The Contractor shall provide, erect, and maintain catch platforms, lights, barriers, warning signs, dustproof partitions, and other items as required for proper protection of the workmen engaged in demolition operations, occupants of the building, and adjacent construction.
- D. The Contractor shall provide and maintain temporary protection for all existing facilities designated to remain or to be reused, wherever demolition, removal, or new construction are to be done, connections made, materials handled, or equipment moved by his forces.
- E. The Contractor shall perform all demolition work under his Contract with due care, including use of shoring, struts, and bracing, and other appropriate measures.
- F. The Contractor shall provide and maintain weather protection at exterior openings, thereby fully protecting the interior premises against damage from the elements until such openings are closed by new construction. The other Contractors shall conduct their operations in a manner that will avoid damage to such weather protection. Should the Engineer determine that any Contractor has damaged such weather protection, that Contractor shall promptly repair such damage as directed by, and to the satisfaction of the Engineer. Should the weather protection suffer any damage not attributable (in the Engineer's judgment) to any other Contractor(s), the Contractor shall promptly repair such damage as directed by, and to the satisfaction of, the Engineer, without additional cost to the City.
- G. Attention is directed to Clause 85, Support and Protection, Clause 86, Structures Interfering with Construction, and Clause 87, Abandonment of Structures, of the Standard Contract Requirements.

## 1.10 CONSTRUCTION CLEANING

- A. The Contractor shall maintain the job site in a reasonably neat and orderly condition, and free from accumulations of waste materials and rubbish, during the entire construction period. He shall remove empty crates, cartons, and other flammable waste materials and trash from the work areas at the end of each working day.
- B. The Contractor shall clean areas of the building in which he is to perform painting and finishing work, just prior to starting such work. This cleaning includes the removal of trash and rubbish from such areas, and broom cleaning of floors.
- C. The Contractor shall take care that finished surfaces are not marked or soiled due to his operations. Should finished surfaces become defaced, the Engineer will direct the Contractor(s) responsible to clean and restore such surfaces. The decision of the Engineer concerning the Contractor responsible shall be final, and there will be no separate or additional payment for this work.

- D. The Contractor shall keep all parts of the project free from accumulations of water, snow, and ice, and shall furnish, install, operate, maintain, and remove all necessary pumping and bailing equipment.
- E. The Contractor shall perform a final cleaning of all areas affected by the work under this Contract, to prepare the building for occupancy. This shall involve a thorough cleaning throughout, including:
  - 1. Removal of all trash and debris.
  - 2. Broom cleaning of floors.
  - 3. Removal of plaster spatters, mortar, dust, and dirt by washing or other approved methods.
  - 4. Washing glass on both sides.
  - 5. Putting all equipment in an undamaged, bright, clean, and polished condition.
- F. Attention is directed to Clause 81, Prevention of Dust and Smoke, of the Standard Contract Requirements.

### 1.11 RODENT CONTROL

- A. The Contractor shall institute an effective program of rodent control for the entire site within the limits of contract. He shall provide the regular services of an experienced exterminator who shall visit the site at least once a month for the entire construction period. If the program is not effective, the Contractor shall take whatever steps are necessary to rid the project of rodents without charge to the City.
- B. Rodenticides shall be placed and maintained to prevent the migration of rodents to areas surrounding all excavations in accordance with the "Philadelphia Rat Control Project Guidelines for Rat Eradication and Control in Demolition's and Excavations".
- C. The Contractor shall provide marked metal containers for all edible rubbish, and shall empty the containers and remove their contents from the site as often as required.
- D. The Contractor shall require all of his personnel, and those of his subcontractors, to use the above metal containers for all edible rubbish.

## 1.12 PROJECT IDENTIFICATION AND SIGNS

- A. The Contractor shall furnish, erect and maintain a Project Identification Sign, at no additional cost to the City, where directed by the Engineer.
- B. The size, materials and arrangement of the sign shall conform to the Water Department Standard Drawing, "PWD Project ID Sign", dated May 22, 2018, a copy of which is available free of charge from Projects Control Unit, Second Floor, Jefferson Tower, 1101 Market Street, Philadelphia, PA 19107.
- C. No Contractor shall post any other sign or advertisement on the premises without the written consent of the Engineer.

## 1.13 ENGINEER'S FIELD OFFICE

- A. The Contractor shall furnish and maintain at the site a Field Office for the Engineer and Inspector. The Field Office shall have a floor area not less than 300 square feet, and shall have heat, light, and air conditioning satisfactory to the Engineer. Telephone service, other than that of the "pay station" type, and toilet and washing facilities, shall be provided for the exclusive use of the Engineer and Inspector. The Field Office may be either a trailer-type office acceptable to the Engineer, or a temporary building.
- B. Should it be impossible to schedule the utility hookups prior to the scheduled start of construction, the field office shall then be equipped with a generator for electricity and cellular telephone, temporary toilet and wash facilities, HVAC, etc. Construction work shall not begin until the field office is ready unless authorized in writing by the Engineer. Any loss time in waiting for the field office to be ready shall be made up by the Contractor in order to meet time constraints specified. In making up the loss time, any extra working hours the City incurs, the Contractor shall reimburse the City for all costs.
- C. The Contractor is required to clean facilities weekly for the duration of the Contract.

# 1.14 ENGINEER'S FIELD OFFICE MAINTENANCE

- A. The contractor shall provide maintenance and janitorial services and materials for the Water Department's existing Field Office trailer for the full duration of the contract, as defined by the date of the notice to proceed to the date of the final payment.
- B. Services shall include, but not be limited to the following items:
  - 1. Local and long distance telephone service and maintenance of telephone equipment in the office trailer.
  - 2. Weekly janitorial services and supplies for the Engineer's field office including sweeping, mopping, waxing, cleaning of washroom facilities, provision of paper towels, paper cups, toilet paper, soap, disinfectant, and light bulbs.
  - 3. Provide and change all HVAC system filters monthly.
  - 4. Provide and maintain a water cooler and bottled spring water.
  - 5. Replenish first aid kits and fire extinguishers.
  - 6. Promptly removal snow and application of de-icing salts to the access walkways and driveways to the Engineer's field office as required and directed.
  - 7. The contractor shall provide other materials, repair, maintenance, and janitorial services in addition to those specified in above as directed and approved by the Engineer.
- C. Method of Payment:
  - 1. Payment for services shall be on the basis of approved invoices submitted by the contractor for work, services, and supplies ordered by the Engineer. The allowable markup is limited to that described in the Standard Contract Requirements Clause 52, Force Account. Approved amounts will be deducted from the amount assigned for bid item **GC-5**.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

# MATERIAL AND EQUIPMENT

## PART 1 - GENERAL

## 1.01 STORAGE AND PROTECTION

- A. All materials, products, and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and handling.
- B. All equipment and materials shall be neatly stockpiled. All new materials shall be stored in manufacturer's containers to the extent practicable, and sheltered from the weather.
- C. Materials or items designated to remain the property of the City shall be removed with care and stored on site in a location designated by the Engineer.
- D. Where existing materials or items are required to be removed and reinstalled, the Contractor shall remove those materials or items with care, and protect and store them until required for reinstallation. The Contractor shall replace any such materials damaged in removal or storage with similar new material to the satisfaction of the Engineer.
- E. Materials or items to be demolished and not designated to remain the property of the City, or to be reinstalled, shall become the property of the Contractor, who shall promptly remove such from the site.
- F. Where existing equipment and fixtures are indicated to be reused, the Contractor shall repair such equipment and fixtures, refinish them if necessary, and put them into perfect working order.

## 1.02 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Whenever a material, article, or piece of equipment is identified on the Drawings or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers, or the like, it is so identified for the purpose of establishing a standard.
- B. Any material, article, or piece of equipment of other reputable manufacturers or vendors which will perform equally the duties imposed by the general design will be considered equally acceptable, provided the material, article, or piece of equipment so proposed is, in the opinion of the Engineer, of equal substance, appearance, function, compatibility with existing facilities and equipment; service life; reliability; availability of replacement parts and suitably trained service personnel.
- C. No substitute material, article, or piece of equipment shall be purchased or installed by the Contractor without the Engineer's prior written approval. Should the Contractor furnish or install any substitute material, article, or piece of equipment without obtaining the Engineer's prior written approval, and the Engineer subsequently deny such approval, the Contractor shall remove the substitute material, article, or piece of equipment and

replace it with that identified on the Drawings or in the Specifications, without charge to the City.

- D. Time is of the essence for this project. The Contractor shall act diligently to obtain the required materials, articles, and pieces of equipment in a timely manner, so that the work of the project will not be delayed. Should the Contractor request permission to furnish a substitute material, article, or piece of equipment, he shall thereby assume full responsibility for any resulting delays, whether approval of the substitution is subsequently granted or denied.
- E. The Contractor, when proposing a substitution, shall furnish a list of at least five installations in which the proposed substitute material, article, or piece of equipment has been used in the past five years and found satisfactory. The installations shall be comparable in type, size, capacity, and conditions of service to the work of this project. The Contractor shall furnish the name and telephone number of at least one reference (owner, architect, or engineer) for each installation.
- F. The Engineer may require the Contractor to furnish a special performance guarantee or other surety for the substitute material, article, or piece of equipment, as a condition for approval.
- G. Should approval of any proposed substitute be denied, the Contractor shall immediately proceed to furnish the material, article, or piece of equipment identified on the Drawings or in the Specifications.
- H. All materials, products, and equipment for which no detailed requirements are specified shall be of the quality and character best adapted and most suited to the service for which they are proposed, and shall be subject to the approval of the Engineer.
- I. All materials and equipment furnished for this project shall be new unless otherwise required by the Contract Documents.
- J. Attention is directed to Clause 32, Proprietary Rights Indemnity, and Clause 63, Materials and Workmanship, of the Standard Contract Requirements.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

## CONTRACT CLOSEOUT

## PART 1 - GENERAL

#### 1.01 FINAL CLEANING

- A. The Contractor shall perform a final cleaning of all areas affected by the work under these Contracts, to prepare the building for occupancy. This shall involve a thorough cleaning throughout, including:
  - 1. Removal of all trash and debris.
  - 2. Broom cleaning of floors.
  - 3. Removal of plaster spatters, mortar, dust, and dirt by washing or other approved methods.
  - 4. Washing glass on both sides.
  - 5. Putting all equipment in an undamaged, bright, clean, and polished condition.
- B. Upon completion of the work, the Contractor shall remove all temporary buildings and structures; fences, gates; stairs, ladders, ramps, runways, chutes; railings; scaffolding; surplus materials; and rubbish of every kind from the site.
- C. Attention is directed to Clause 37 Clean-up of Project Site, of the Standard Contract Requirements.

#### 1.02 FINAL DOCUMENTATION

- A. The contractor shall submit the following documentation prior to contract closeout:
  - 1. Certificate of Occupancy
  - 2. Copies of all Permits obtained for this project.
  - 3. Certifications
  - 4. Warranties
  - 5. Affidavits

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

## SPARE PARTS

## PART 1 - GENERAL

## 1.01 SPARE PARTS SUPPLIED UNDER THIS CONTRACT

- A. When called for in other sections of this Contract, the Contractor shall supply all spare parts in the number and quality specified.
- B. Spare parts shall be properly wrapped for long term storage according to all manufacturers' directions, and if appropriate, coated with protective oil or grease. In addition, all parts shall be boxed or crated and suitably labeled to the satisfaction of the Engineer.
- C. Crates over 100 lbs. shall be furnished on a pallet.
- D. Spare parts shall be delivered to the storage area by the contractor as directed by the Engineer.
- E. The contractor shall provide to the Engineer a complete list of parts including part number and unit cost of each required spare part prior to turning the part over to the Department.
- PART 2 PRODUCTS Not Used
- PART 3 EXECUTION Not Used

### REMOVAL AND DISPOSAL OF HAZARDOUS MATERIAL

### PART 1 -- GENERAL

## 1.01 THE REQUIREMENT

- A. The Contractor shall provide all labor, equipment, tools, materials, and permits to satisfactorily complete the work in this section as it relates to the removal and disposal of materials containing lead and/or asbestos and/or other hazardous materials in accordance with all Federal, State, and Local laws, regulations and ordinances. For clarity, the remainder of this section only identifies lead and asbestos but any hazardous material is included.
- B. The Contractor shall furnish all labor, materials and equipment required to properly remove and dispose of hazardous materials as required for completion of the project in accordance with all relevant codes. Contractor shall be responsible for all associated disposal fees.
- C. The Contractor shall perform work using methods demonstrated to prevent lead and/or asbestos emissions from the immediate work area. The Contractor shall perform work to minimize the creation of airborne dust; minimize the quantity of hazardous waste generated; protect the health and welfare of all site personnel and the public; and avoid adverse environmental impacts.
- D. The Contractor shall be aware of the presence of asbestos and lead containing materials identified within the work areas, as indicated within the hazardous material testing reports attached to Appendix A of this section. The Contractor shall be aware that the areas indicated in the hazardous material testing reports are not inclusive of all work areas included in this project.
- E. It is the sole responsibility of the Contractor to determine all items disturbed by work of this contract that are lead and/or asbestos containing which require removal and disposal in accordance with applicable Federal, State, and Local laws, regulations and ordinances.
- F. The Contractor shall be solely responsible for all associated costs, including but not limited to disposal, transport, testing, permitting, etc.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Contract Drawing A01 Hazardous Materials Notes
- B. Section 01126 Contractor Requirements for Entering Water Department Operating Sites with Hazardous Materials
- C. Section 01127 Contractor Requirements for Entering Water Department Areas which May Contain Hazardous Gases
- 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Standards: the publications listed below form a part of this Specification to the extent referenced. The Contractor asserts by submission of a bid on this Contract that all persons assigned to work on this Contract are familiar with and will adhere to all standards referenced.

- 1. ANSI Z88.2- Practices for Respiratory Protection.
- 2. ANSI Z9.2 Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems.
- 3. ASTM D 4397 Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.
- 4. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.
- 5. ASTM E 119 Test Methods for Fire Tests of Building Construction and Materials.
- 6. ASTM E 1368 Practice for Visual Inspection of Asbestos Abatement Projects.
- 7. 29 CFR Part 1910 Occupational Safety and Health Standards.
- 8. 29 CFR Part 1926 Safety and Health Regulations for Construction.
- 9. 40 CFR 50 National Primary and Secondary Ambient Air Quality Standards
- 10. 40 CFR 60 Standards of Performance for New Stationary Sources.
- 11. 40 CFR Part 61 National Emissions Standards for Hazardous Air Pollutants.
- 12. 40 CFR 117 "Determination of Reportable Quantities of Hazardous Substances".
- 13. 40 CFR 171 Standards for Transportation of Hazardous Materials.
- 14. 40 CFR 172 Hazardous Materials Tables and Hazardous Materials Communications Regulations.
- 15. 40 CFR 173 General Requirements for Shipments and Packaging.
- 16. 40 CFR 178 Shipping Container Specifications.
- 17. 40 CFR 260 Hazardous Wastes Management Systems General.
- 18. 40 CFR 261 Identification and Listing of Hazardous Waste.
- 19. 40 CFR 262 Generators of Hazardous Wastes.
- 20. 40 CFR 263 Transporters of Hazardous Wastes.
- 21. 40 CFR 264/265 Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

- 22. 40 CFR 268 Land Disposal Restrictions.
- 23. 40 CFR 302 Designation, Reportable Quantities and Notification.
- 24. 40 CFR 745-225 U.S. Department of Health and Human Services National Institute for Occupational Safety & Health (NIOSH).
- 25. 40 CFR Part 763 Asbestos.
- 26. 49 CFR Parts 106 Transportation Standards 107, 171 to 180.
- 27. EPA 340/1 90 018 Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance.
- 28. EPA 340/1 90 019 Asbestos/NESHAP Adequately Wet Guidance.
- 29. 14. EPA 560/5 85 024 Guidance for Controlling Asbestos Containing Materials in Building.
- 30. NFPA 10 Portable Fire Extinguishers.
- 31. NFPA 70 National Electrical Code.
- 32. NFPA 90A Installation of Air Conditioning and Ventilating Systems.
- 33. NFPA 101 Safety to Life from Fire in Buildings and Structures.
- 34. NFPA 701 Methods of Fire Test for Flame Resistant Textiles and Films.
- 35. NIOSH Pub No. 84 100 NIOSH Manual of Analytical Methods.
- 36. UL 586 High Efficiency, Particulate, Air Filter Units.
- 37. RCSA 19a-332a Standards for Asbestos Abatement.
- 38. RCSA 20-440 Licensure and Training Requirements for Persons Engaged in Asbestos Abatement and Consultation Service.
- 39. Commonwealth of Pennsylvania Department of Public Health.
- 40. U.S. Environmental Protection Agency (EPA):
  - a. Method 7082 Test Methods for Evaluating Solid Wastes.
  - b. SW-846 Test Methods for Evaluating Soil Waste Physical/Chemical Methods.
  - c. EPA Method 3050 Acid Digestion of Sediments, Sludge, and Soils.
- 41. Underwriters Laboratory Inc. (UL):

- a. UL 586 1990 High-Efficiency, Particulate, Air Filter Units.
- 42. National Institute of Building Sciences (NIBS):
  - a. Guideline Specifications for Reducing Lead-Based Paint Hazards.
- 43. American Society for Testing & Materials (ASTM):
  - a. ASTM D3335 Test Method for Low Concentration for Lead, Cadmium and Cobalt in Paint by Atomic Absorption Spectroscopy; Compilation of ASTM Standard Guides, Test Methods and Practices on Lead-Based Paint Abatement.
- 44. Steel Structures Painting Council (SSPC):
  - a. SSPC GUIDE 6 (CON) Guide for Containing Debris Generated During Lead Removal Operations.
  - b. SSPC GUIDE 7 (DIS) Guide for the Disposal of Lead-Contaminated Surface Preparation Debris.
  - c. SSPC SP-11 Surface Preparation Specification Power Tool Cleaning to Bare Metal.

### 1.03 SUBMITTALS

- A. Submit the following: The contractor shall submit the following for review by the Engineer
  - 1. Information on the proposed disposak site(s) within 2 weeks of the notice to proceed.
  - 2. Documentation indicating materials were properly transported and received by an appropriate disposal facility within 48 hours of disposal.
  - 3. Safety plan/procedures for working around and disposal of hazardous materials

#### PART 2 -- PRODUCTS

## NOT USED

## PART 3 -- EXECUTION

#### NOT USED

### CONCRETE FORMWORK

#### PART 1 -- GENERAL

### 1.01 THE REQUIREMENT

A. Provide materials, labor, and equipment required for the design and construction of all concrete formwork, bracing, shoring and supports in accordance with the provisions of the Contract Documents.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03200 Reinforcing Steel
- B. Section 03250 Concrete Accessories
- C. Section 03290 Joints in Concrete
- D. Section 03300 Cast-in-Place Concrete

## 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. Philadelphia Building Code
  - 2. ACI 318 Building Code Requirements for Structural Concrete
  - 3. ACI 301 Specifications for Structural Concrete for Buildings
  - 4. ACI 347 Recommended Practice for Concrete Formwork
  - 5. U.S. Product Standard for Concrete Forms, Class I, PS 1
  - 6. ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials

## 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Manufacturer's data on proposed form release agent

2. Manufacturer's data on proposed formwork system including form ties

## 1.05 QUALITY ASSURANCE

A. Concrete formwork shall be in accordance with ACI 301, ACI 318, and ACI 347.

## PART 2 -- PRODUCTS

## 2.01 FORMS AND FALSEWORK

- A. All forms shall be smooth surface forms unless otherwise specified.
- B. Wood materials for concrete forms and falsework shall conform to the following requirements:
  - 1. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.
  - 2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.
- C. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

# 2.02 FORMWORK ACCESSORIES

- A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 7/8-inch, and all such fasteners shall be such as to leave holes of regular shape for reaming.
- B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. A preformed mechanical EPDM rubber plug shall be used to seal the hole left after the removal of the taper tie. Plug shall be X-Plug by the Greenstreak Group, Inc., or approved equal. Friction fit plugs shall not be used.
- C. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "bug holes" in cast-in-place concrete.

## PART 3 -- EXECUTION

## 3.01 FORM DESIGN

- A. Forms and falsework shall be designed for total dead load, plus all construction live load as outlined in ACI 347. Design and engineering of formwork and safety considerations during construction shall be the responsibility of the Contractor.
- B. Forms shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members.
- C. All forms shall be designed for predetermined placing rates per hour, considering expected air temperatures and setting rates.

## 3.02 CONSTRUCTION

- A. The type, size, quality, and strength of all materials from which forms are made shall be subject to the approval of the Engineer. No falsework or forms shall be used which are not clean and suitable. Deformed, broken or defective falsework and forms shall be removed from the work.
- B. Forms shall be smooth and free from surface irregularities. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Joints between the forms shall be sealed to eliminate any irregularities. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum.
- C. Forms shall be true to line and grade, and shall be sufficiently rigid to prevent displacement and sagging between supports. Curved forms shall be used for curved and circular structures. Straight panels joined at angles will not be acceptable for forming curved structures. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. Facing material shall be supported with studs or other backing which shall prevent both visible deflection marks in the concrete and deflections beyond the tolerances specified.
- D. Forms shall be mortar tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form.
- E. All vertical surfaces of concrete members shall be formed, and side forms shall be provided for all footings, slab edges and grade beams, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1-inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where

the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

- F. All forms shall be constructed in such a manner that they can be removed without hammering or prying against the concrete. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.
- G. Adequate clean-out holes shall be provided at the bottom of each lift of forms. Temporary openings shall be provided at the base of column forms and wall forms and at other points to facilitate cleaning and observation immediately before the concrete is deposited. The size, number and location of such clean-outs shall be as acceptable to the Engineer.
- H. Construction joints shall not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. For flush surfaces at construction joints exposed to view, the contact surface of the form sheathing over the hardened concrete in the previous placement shall be lapped by not more than 1 inch. Forms shall be held against hardened concrete to prevent offset or loss of mortar at construction joints and to maintain a true surface.
- I. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. Set forms and intermediate screed strips for slabs accurately to produce the designated elevations and contours of the finished surface. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. When formwork is cambered, set screeds to a like camber to maintain the proper concrete thickness.
- J. Positive means of adjustment (wedges or jacks) for shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Shores and struts shall be securely braced against lateral deflections. Wedges shall be fastened firmly in place after final adjustment of forms prior to concrete placement. Formwork shall be anchored to shores or other supporting surfaces or members to prevent upward or lateral movement of any part of the formwork system during concrete placement. If adequate foundation for shores cannot be secured, trussed supports shall be provided.
- K. Runways shall be provided for moving equipment with struts or legs. Runways shall be supported directly on the formwork or structural member without resting on the reinforcing steel.

## 3.03 TOLERANCES

- A. Unless otherwise indicated in the Contract Documents, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in ACI 117.
- B. Structural framing of reinforced concrete around elevators and stairways shall be accurately plumbed and located within 1/4 in. tolerance from established dimensions.

- C. The Contractor shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project, sufficient control points and bench marks to be used for reference purposes to check tolerances. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.
- D. Regardless of the tolerances specified, no portion of the building shall extend beyond the legal boundary of the building.

## 3.04 FORM ACCESSORIES

- A. Suitable moldings shall be placed to bevel or round all exposed corners and edges of beams, columns, walls, slabs, and equipment pads. Chamfers shall be 3/4 inch unless otherwise noted.
- B. Form ties shall be so constructed that the ends, or end fasteners, can be removed without causing appreciable spalling at the faces of the concrete. After ends, or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 inches from the formed face of the concrete that is exposed to water or enclosed surfaces above the water surface, and not less than 1 inch from the formed face of all other concrete. Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as specified in Section 03350 Concrete Finishing. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete member. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. No snap ties shall be broken off until the concrete is at least three days old. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste.

## 3.05 APPLICATION - FORM RELEASE AGENT

A. Forms for concrete surfaces that will not be subsequently waterproofed shall be coated with a form release agent. Form release agent shall be applied on formwork in accordance with manufacturer's recommendations.

#### 3.06 INSERTS AND EMBEDDED ITEMS

A. Sleeves, pipe stubs, inserts, anchors, expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement prior to concreting. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

## 3.07 FORM CLEANING AND REUSE

A. The inner faces of all forms shall be thoroughly cleaned prior to concreting. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

## 3.08 FORM REMOVAL AND SHORING

- A. Forms shall not be disturbed until the concrete has attained sufficient strength. Sufficient strength shall be demonstrated by structural analysis considering proposed loads, strength of forming and shoring system, and concrete strength data. Shoring shall not be removed until the supported member has acquired sufficient strength to support its weight and the load upon it. Members subject to additional loads during construction shall be adequately shored to sustain all resulting stresses. Forms shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete to be exposed by form removal shall have sufficient strength not to be damaged thereby.
- B. Provided the strength requirements specified above have been met and subject to the Engineer's approval, forms may be removed at the following minimum times. The Contractor shall assume full responsibility for the strength of all such components from which forms are removed prior to the concrete attaining its full design compressive strength. Shoring may be required at the option of the Engineer beyond these periods.

	<u>Over 95°</u>	<u>70°-95°</u>	<u>60°-70°</u>	<u>50°-60°</u>	Below 50°
Walls	5 days	2 days	2 days	3 days	Do not remove until directed by Engineer (7 days minimum)
Columns	7 days	2 days	3 days	4 days	
Beam Soffits	10 days	7 days	7 days	7 days	
Elevated Slabs	12 days	7 days	7 days	7 days	

## Ambient Temperature (°F.) During Concrete Placement

- C. When, in the opinion of the Engineer, conditions of the work or weather justify, forms may be required to remain in place for longer periods of time.
- D. An accurate record shall be maintained by the Contractor of the dates of concrete placings and the exact location thereof and the dates of removal of forms. These records shall be available for inspection at all times at the site, and two copies shall be furnished the Engineer upon completion of the concrete work.

## 3.09 RESHORING

- A. When reshoring is permitted or required the operations shall be planned in advance and subjected to approval by the Engineer.
- B. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.
- C. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no construction or live loads shall be permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is

overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified.

- D. For floors supporting shores under newly placed concrete, the original supporting shores shall remain in place or reshores shall be placed. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores shall be located directly under a reshore position above unless other locations are permitted.
- E. In multi-story buildings, reshoring shall extend over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

#### REINFORCING STEEL

#### PART 1 -- GENERAL

### 1.01 THE REQUIREMENTS

- A. Provide all concrete reinforcing including all cutting, bending, fastening and any special work necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this section.
- B. Provide deformed reinforcing bars to be grouted into reinforced concrete masonry walls.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 Concrete Formwork
- B. Section 03250 Concrete Accessories
- C. Section 03300 Cast-in-Place Concrete

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. Philadelphia Building Code
  - 2. CRSI Concrete Reinforcing Institute Manual of Standard Practice
  - 3. ACI SP66 ACI Detailing Manual
  - 4. ACI 315 Details and Detailing of Concrete Reinforcing
  - 5. ACI 318 Building Code Requirements for Structural Concrete
  - 6. ICC-ES AC193 Acceptance Criteria for Expansion and Screw Anchors (Concrete)
  - 7. WRI Manual of Standard Practice for Welded Wire Fabric
  - 8. ASTM A 615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcing

9. ASTM A 1064 - Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual (SP66), shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, spacing and splicing of the bars.
  - 2. Mill test certificates 3 copies of each.
  - 3. Description of the reinforcing steel manufacturer's marking pattern.
  - 4. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.
  - 5. Proposed supports for each type of reinforcing.
  - 6. Request to use splices not shown on the Drawings.
  - 7. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation, and certified test reports on the couplers' capacity.
  - 8. Request for placement of column dowels without the use of templates.
  - 9. Request and procedure to field bend or straighten partially embedded reinforcing.
  - 10. International Code Council–Evaluation Services Report (ICC-ES ESR) for dowel adhesives.
  - 11. Certification that all installers of dowel adhesive are certified as Adhesive Anchor Installers in accordance with the ACI-CRSI Anchor Installer Certification Program.
  - 12 Adhesive dowel testing plan.

### 1.05 QUALITY ASSURANCE

- A. If requested by the Engineer, the Contractor shall provide samples from each load of reinforcing steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.
- B. Provide a list of names of all installers who are trained by the Manufacturer's Field Representative on this jobsite prior to installation of products. Record must include the installer name, date of training, products included in the training and trainer name and contact information.

- C. Provide a copy of the current ACI/CRSI "Adhesive Anchor Installer" certification cards for all installers who will be installing adhesive anchors in the horizontal to vertically overhead orientation.
- D. Special inspections for adhesive dowels shall be conducted in accordance with the manufacturer's instructions and Specification Section 01450. Downward installations require periodic inspection and horizontal and overhead installations require continuous inspection.

## PART 2 -- PRODUCTS

## 2.01 REINFORCING STEEL

- A. Bar reinforcing shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel reinforcing. All reinforcing steel shall be from domestic mills and shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on Drawings.
- B. Welded wire fabric reinforcing shall conform to the requirements of ASTM A 1064 and the details shown on the Drawings.
- C. A certified copy of the mill test on each load of reinforcing steel delivered showing physical and chemical analysis shall be provided, prior to shipment. The Engineer reserves the right to require the Contractor to obtain separate test results from an independent testing laboratory in the event of any questionable steel. When such tests are necessary because of failure to comply with this Specification, such as improper identification, the cost of such tests shall be borne by the Contractor.
- D. Field welding of reinforcing steel will not be allowed.
- E. Use of coiled reinforcing steel will not be allowed.

## 2.02 ACCESSORIES

- A. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers and other devices to position reinforcing during concrete placement. Wire bar supports shall be plastic protected (CRSI Class 1).
- B. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located.

## 2.03 MECHANICAL COUPLERS

- A. Mechanical couplers shall develop a tensile strength which exceeds 100 percent of the ultimate tensile strength and 125 percent of the yield strength of the reinforcing bars being spliced. The reinforcing steel and coupler used shall be compatible for obtaining the required strength of the connection.
- B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied.

- C. Hot forged sleeve type couplers shall not be used. Acceptable mechanical couplers are Dayton Superior Dowel Bar Splicer System by Dayton Superior, Dayton, Ohio, or approved equal. Mechanical couplers shall only be used where shown on the Drawings or where specifically approved by the Engineer.
- D. Where the threaded rebar to be inserted into the coupler reduces the diameter of the bar, the threaded rebar piece shall be provided by the coupler manufacturer.

## 2.04 DOWEL ADHESIVE SYSTEM

- A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.
- B. All holes shall be drilled in accordance with the manufacturer's instructions except that core drilled holes shall not be permitted unless specifically allowed by the Engineer. Cored holes, if allowed by the manufacturer and approved by the Engineer, shall be roughened in accordance with manufacturer's requirements.
- C. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with manufacturer's instructions prior to installation of adhesive and reinforcing bar.
- D. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be either dry or water-saturated. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer.
- E. Injection of adhesive into the hole shall be performed in a manner to minimize the formation of air pockets in accordance with the manufacturer's instructions.
- F. Embedment Depth:
  - 1. The embedment depth of the bar shall be as shown on the Drawings. Although all manufacturers listed below are permitted, the embedment depth shown on the Drawings is based on "HIT-RE 500" by Hilti. If the Contractor submits one of the other named dowel adhesives from the list below, the Engineer shall evaluate the required embedment and the Contractor shall provide the required embedment depth stipulated by the Engineer specific to the approved dowel adhesive.
  - 2. Where the embedment depth is not shown on the Drawings, the embedment depth shall be determined to provide the minimum allowable bond strength equal to the tensile strength of the rebar according to the manufacturer's ICC-ES ESR.
  - 3. The embedment depth shall be determined using the actual concrete compressive strength, a cracked concrete state, maximum long term temperature of 110 degrees F, and maximum short term temperature of 140 degrees F. In no case shall the embedment depth be less than the minimum, or more than the maximum, embedment depths stated in the manufacturer's ICC-ES ESR.

- G. Engineer's approval is required for use of this system in locations other than those shown on the Drawings.
- H. The adhesive system shall be IBC compliant for use in both cracked and uncracked concrete in all Seismic Design Categories and shall be "Epcon C6+ Adhesive Anchoring System" as manufactured by ITW Redhead, "HIT-HY 200 Adhesive Anchoring System" as manufactured by Hilti, Inc. "SET-XP Epoxy Adhesive Anchors" as manufactured by Simpson Strong-Tie Co. or "Pure 110+ Epoxy Adhesive Anchor System" by DeWalt. Fast-set epoxy formulations shall not be acceptable. No or equal products will be considered, unless pre-qualified and approved.
- I. All individuals installing dowel adhesive system shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRSI Anchor Installation Certification Program.

## PART 3 – EXECUTION

## 3.01 TEMPERATURE REINFORCING

A. Unless otherwise shown on the Drawings or in the absence of the concrete reinforcing being shown, the minimum cross sectional area of horizontal and vertical concrete reinforcing in walls shall be 0.0033 times the gross concrete area and the minimum cross sectional area of reinforcing perpendicular to the principal reinforcing in slabs shall be 0.0020 times the gross concrete area. Temperature reinforcing shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

## 3.02 FABRICATION

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.
- B. The Contractor shall fabricate reinforcing bars for structures in accordance with the bending diagrams, placing lists and placing Drawings.
- C. No fabrication shall commence until approval of Shop Drawings has been obtained. All reinforcing bars shall be shop fabricated unless approved to be bent in the field. Reinforcing bars shall not be straightened or rebent in a manner that will injure the material. Heating of bars will not be permitted.
- D. Welded wire fabric with longitudinal wire of W9.5 size or smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches. Welded wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only.

## 3.03 DELIVERY, STORAGE AND HANDLING

A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.

- B. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.
- C. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- D. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be reinspected and if necessary recleaned.

## 3.04 PLACING

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or plastic protected (CRSI Class 1) metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the reinforcing bars without settlement. In no case shall concrete block supports be continuous.
- B. The portions of all accessories in contact with the formwork shall be made of plastic or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- D. Reinforcing bars additional to those shown on the Drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcing in position, shall be provided by the Contractor at no additional cost to the Owner.
- E. Reinforcing placing, spacing, and protection tolerances shall be within the limits specified in ACI 318 except where in conflict with the Building Code, unless otherwise specified.
- F. Reinforcing bars may be moved within one bar diameter as necessary to avoid interference with other concrete reinforcing, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed placing tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer.
- G. Welded wire fabric shall be supported on slab bolsters spaced not less than 30 inches on centers, extending continuously across the entire width of the reinforcing mat and supporting the reinforcing mat in the plane shown on the Drawings.
- H. Reinforcing shall not be straightened or rebent unless specifically shown on the drawings. Bars with kinks or bends not shown on the Drawings shall not be used. Coiled reinforcement shall not be used.
- I. Dowel Adhesive System shall be installed in strict conformance with the manufacturer's

recommendations and as required in Article 2.04 above. A representative of the manufacturer must be on site prior to adhesive dowel installation to provide instruction on proper installation procedures for all adhesive dowel installers. Testing of adhesive dowels shall be as indicated below. If the dowels have a hook at the end to be embedded in subsequent work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate adhesive dowel testing while maintaining required hook embedment in subsequent work.

- J. All adhesive dowel installations in the horizontal or overhead orientation shall be conducted by a certified Adhesive Anchor Installer as certified by ACI/CSRI per ACI 318-11 9.2.2. Current AAI Certificated must be submitted to the Engineer of Record for approval prior to commencement of any adhesive anchor installations.
- K. Adhesive Dowel Testing
  - 1. At all locations where adhesive dowels are shown on the Drawings, at least 25 percent of all adhesive dowels installed shall be tested to the value indicated on the Drawings, with a minimum of one tested dowel per group. If no test value is indicated on the Drawings but the installed dowel is under direct tension, the Contractor shall notify the Engineer to verify the required test value.
  - 2. Contractor shall submit a plan and schedule indicating locations of dowels to be tested, load test values and proposed dowel testing procedure (including a diagram of the testing equipment proposed for use) prior to conducting any testing. The testing equipment shall have a minimum of three support points and shall be of sufficient size to locate the edge of supports no closer than two times the anchor embedment depth from the center of the anchor.
  - 3. Where Contract Documents indicate adhesive dowel design is the Contractor's responsibility, the Contractor shall submit a plan and schedule indicating locations of dowels to be tested and load test values, sealed by a Professional Engineer currently registered in the State of Pennsylvania. The Contractor shall also submit documentation indicating the Contractor's testing procedures have been reviewed and the proposed procedures are acceptable.
  - 4. Adhesive Dowel shall have no visible indications of displacement or damage during or after the proof test. Concrete cracking in the vicinity of the dowel after loading shall be considered a failure. Dowels exhibiting damage shall be removed and replaced. If more than 5 percent of tested dowels fail, then 100 percent of dowels shall be proof tested.
  - 5. Proof testing of adhesive dowels shall be performed by an independent testing laboratory hired directly by the Contractor. The Contractor shall be responsible for costs of all testing, including additional testing required due to previously failed tests.

# 3.05 SPLICING

A. Reinforcing bar splices shall only be used at locations shown on the Drawings. When it is necessary to splice reinforcing at points other than where shown, the splice shall be as acceptable to the Engineer.

- B. The length of lap for reinforcing bars, unless otherwise shown on the Drawings shall be in accordance with ACI 318 for a class B splice.
- C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
- D. Mechanical splices shall be used only where shown on the drawings or when approved by the Engineer.
- E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Drawings. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

### 3.06 INSPECTION

- A. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.
- B. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

## 3.07 CUTTING OF EMBEDDED REBAR

A. The Contractor shall not cut embedded rebar cast into structural concrete without prior approval.

### CONCRETE ACCESSORIES

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

A. Furnish all materials, labor and equipment required to provide all concrete accessories including waterstops, expansion joint material, joint sealants, expansion joint seals, contraction joint inserts, and epoxy bonding agent.

# 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 Concrete Formwork
- B. Section 03290 Joints in Concrete
- C. Section 03300 Cast-in-Place Concrete
- D. Section 07900 Joint Fillers, Sealants, and Caulking
- 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS
  - A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
    - 1. ASTM C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
    - 2. ASTM D412 Standard Tests for Rubber Properties in Tension
    - 3. ASTM D 624 Standard Test method for Rubber Property Tear Resistance
    - 4. ASTM D 638 Standard Test Method for Tensile Properties of Plastics
    - 5. ASTM D1751 Standard Specifications for Preformed Expansion Joint fillers for Concrete Paving and Structural Construction (nonextruding and resilient bituminous types)
    - 6. ASTM D 1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
    - 7. ASTM D 1171 Standard Test Method for Ozone Resistance at 500 pphm

8. ASTM D 471 Standard Test Method for Rubber Properties

### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Manufacturer's literature on all products specified herein including material certifications.
  - 2. Proposed system for supporting PVC waterstops in position during concrete placement
  - 3. Samples of products if requested by the Engineer.

### PART 2 -- PRODUCTS

## 2.01 POLYVINYL CHLORIDE (PVC) WATERSTOPS

- A. PVC waterstops for construction joints shall be flat ribbed type, 6 inches wide with a minimum thickness at any point of 3/8 inches.
- B. Waterstops for expansion joints shall be ribbed with a center bulb. They shall be 9 inches wide with a minimum thickness at any point of 3/8 inch unless shown or specified otherwise. The center bulb shall have a minimum outside diameter of 1 inch and a minimum inside diameter of 1/2 inch.
- C. The waterstops shall be manufactured from virgin polyvinyl chloride plastic compound and shall not contain any scrap or reclaimed material or pigment whatsoever. The properties of the polyvinyl chloride compound used, as well as the physical properties of the waterstops, shall exceed the requirements of the U.S. Army Corps. of Engineers' Specification CRD-C572. The waterstop material shall have an off-white, milky color.
- D. The required minimum physical characteristics for this material are:
  - 1. Tensile strength 1,750 psi (ASTM D-638).
  - 2. Ultimate elongation not less than 280% (ASTM D-638).
- E. No reclaimed PVC shall be used for the manufacturing of the waterstops. The Contractor shall furnish certification that the proposed waterstops meet the above requirements.
- F. PVC waterstops shall be as manufactured by BoMetals, Inc., DuraJoint Concrete Accessories, or Sika Greenstreak.
- G. All waterstop intersections, both vertical and horizontal, shall be made from factory fabricated corners and transitions. Only straight butt joint splices shall be made in field.
- 2.02 RETROFIT WATERSTOPS

- A. Retrofit waterstops shall be used where specifically shown on Drawings for sealing joints between existing concrete construction and new construction.
- B. Retrofit waterstops shall be PVC waterstops fabricated from material as described in Section 2.01 of this Specification.
- C. Retrofit waterstop shall be attached to existing concrete surface as shown on Drawings.
- D. Use of split waterstop in lieu of specially fabricated retrofit waterstop will not be acceptable.
- E. Retrofit Waterstop manufacturer must provide a complete system including all Waterstop, stainless steel anchoring hardware, and epoxy for installation.
- F. For construction joints, retrofit waterstop shall be style number 609 by Sika Greenstreak, RF-638 by BoMetals, Inc., Type 18 kit by DuraJoint Concrete Accessories, or approved equal. For expansion joints, retrofit waterstop shall be style number 667 by Sika Greenstreak, RF-912 by BoMetals, Inc., Type 18-9 kit by DuraJoint Concrete Accessories, or approved equal.

### 2.03 CHEMICAL RESISTANT WATERSTOPS

- A. Where specifically noted on Contract Drawings, chemical resistant waterstops shall be used instead of PVC waterstops.
- B. Chemical resistant waterstops for construction joints shall be ribbed with a center bulb. They shall be 6 inches wide with a minimum thickness at any point of 3/16 inches.
- C. Chemical resistant waterstops for expansion joints shall be ribbed tear web. They shall be 9 inches wide with a tear web designed to accommodate 1 inch of free movement minimum.
- D. Chemical resistant retrofit waterstop shall be a minimum of 2½" wide along the ribbed side and a minimum 5" wide along the side attached to the existing concrete surface. Retrofit waterstop shall include a centerbulb and shall have a minimum thickness of 3/16". Retrofit waterstop manufacturer shall provide a complete system including waterstop, stainless steel anchoring hardware and epoxy for installation.
- E. Chemical resistant waterstops shall be manufactured from a fully crosslinked thermoplastic vulcanizate rubber.
- F. Waterstops shall be TPER by BoMetals, Inc., Earth Shield TPV/TPE-R by JP Specialties, Inc., Westec TPER by Westec Barrier Technologies, or TPE-R by DuraJoint Concrete Accessories.

### 2.04 HYPALON RUBBER WATERSTOPS

- A. Hypalon rubber waterstops shall be Sikadur Combiflex by Sika Corporation or approved equal. Minimum width of waterstop material shall be twelve (12) inches unless shown otherwise on Contract Drawings.
- 2.05 EXPANDING RUBBER WATERSTOP

- A. Expanding rubber shall be designed to expand under hydrostatic conditions. Waterstops shall be Adeka Ultra Seal MC-2010MN by Adeka Ultra Seal/OCM, Inc., or Hydrotite CJ-1020-2K by Sika Greenstreak, for concrete thickness greater than nine inches. For thicknesses less than nine inches, Adeka Ultra Seal KBA-1510FF or Hydrotite CJ-1020-2K shall be used.
- B. Waterstop shall be a chemically modified natural rubber product with a hydrophilic agent.
- C. Waterstop has a stainless steel mesh or coextrusion of non-hydrophilic rubber to direct expansion in the thickness direction and restrict the expansion in the longitudinal direction.

## 2.06 WATERSTOP ADHESIVE

- A. Adhesive between waterstops and existing concrete shall be 20+F Contact Cement by Miracle Adhesives Corporation, Neoprene Adhesive 77-198 by JGF Adhesives, Sikadur 31 Hi-Mod Gel by Sika Corporation, DP-605 NS Urethane Adhesive by 3M Adhesive Systems.
- B. Hydrophilic, non-bentonite water swelling elastic sealant shall be used to bond expanding rubber waterstops to rough surfaces. Hydrophilic elastic sealant shall be P-201 by Adeka Ultra Seal/OCM, Inc., Leakmaster LV-1 by Sika Greenstreak, or approved equal.

## 2.07 JOINT SEALANTS

A. Joint sealants shall comply with Section 07900, Joint Fillers, Sealants, and Caulking.

## 2.08 EXPANSION JOINT MATERIAL

- A. Preformed expansion joint material shall be non-extruding, and shall be of the following types:
  - 1. Type I Sponge rubber, conforming to ASTM D1752, Type I.
  - 2. Type II Cork, conforming to ASTM D1752, Type II.
  - 3. Type III Self-expanding cork, conforming to ASTM D1752, Type III.
  - 4. Type IV Bituminous fiber, conforming to ASTM Designation D1751.

## 2.09 EXPANSION JOINT SEAL

- A. Expansion Joint Seal System shall consist of a preformed neoprene profile, installed using the same dimensions as the joint gap, bonded with a two-component epoxy adhesive and pressurized during the adhesive cure time.
- B. The expansion joint system shall be Hydrozo/Jeene Structural Sealing joint system by Hydrozo/Jeene, Inc.
- 2.10 CONTRACTION JOINT INSERTS

- A. Contraction joint inserts shall be Zip-Cap by Greenstreak Plastic Products, Zip-Joint by BoMetals, Inc. control joint formers.
- 2.11 EPOXY BONDING AGENT
  - A. Epoxy bonding agent shall conform to ASTM C881 and shall be Sikadur 32 Hi-Mod, Sika Corporation, Lyndhurst, N.J.; Euco #452 Epoxy System, Euclid Chemical Company, Cleveland, OH, MasterInject 1500 by BASF Master Builder Solutions (BASF).
- 2.12 EPOXY RESIN BINDER
  - A. Epoxy resin binder shall conform to the requirements of ASTM C-881, Type III, Grade 3, Class B and C for epoxy resin binder and shall be Sikadur 23, Low-Mod-Gel, manufactured by the Sika Corporation, Lyndhurst, N.J., Flexocrete Gel manufactured by DuraJoint Concrete Accessories or Euco #352 Gel, Euclid Chemical Company, MasterEmaco ADH 327 or 327 RS by BASF Master Builder Solutions.

## PART 3 -- EXECUTION

## 3.01 PVC AND CHEMICAL RESISTANT WATERSTOPS

- A. PVC and chemical resistant waterstops shall be provided in all construction and expansion joints in water bearing structures and at other such locations as required by the Drawings.
- B. Waterstops shall be carefully positioned so that they are embedded to an equal depth in concrete on both sides of the joint. They shall be kept free from oil, grease, mortar or other foreign matter. To ensure proper placement, all waterstops shall be secured in correct position at 12" on center along the length of the waterstop on each side, prior to placing concrete. Such method of support shall be submitted to the Engineer for review and approval. Grommets or small pre-punched holes as close to the edges as possible will be acceptable for securing waterstops.
- C. Splices in PVC waterstops and chemical resistant waterstops shall be made with a thermostatically controlled heating element. Only straight butt joint splices will be allowed in the field. Factory fabricated corners and transitions shall be used at all intersections. Splices shall be made in strict accordance with the manufacturer's recommended instructions and procedures. At least three satisfactory sample splices shall be made on the site. The Engineer may require tests on these splices by an approved laboratory. The splices shall exhibit not less than 80 percent of the strength of the unspliced material.
- D. All splices in waterstops will be subject to rigid review for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, discoloration, charring, and other defects which would reduce the potential resistance of the material to water pressure at any point. All defective joints shall be replaced with material which will pass said review and all faulty material shall be removed from the site and disposed of by the Contractor at no additional cost to the Owner.
- E. Retrofit waterstops shall be installed as shown on Contract Drawings using approved waterstop adhesive and Type 316 stainless steel batten bars and expansion anchors.

- F. Waterstop installation and splicing defects which are unacceptable include, but are not limited to the following:
  - 1. Tensile strength not less than 80 percent of parent material.
  - 2. Overlapped (not spliced) Waterstop.
  - 3. Misalignment of Waterstop geometry at any point greater than 1/16 inch.
  - 4. Visible porosity or charred or burnt material in weld area.
  - 5. Visible signs of splice separation when splice (24 hours or greater) is bent by hand at sharp angle.

## 3.02 HYPALON RUBBER AND EXPANDING RUBBER WATERSTOPS

- A. Waterstops shall be installed only where shown on the Drawings.
- B. Waterstops shall be installed in strict accordance with manufacturer's recommendations.

## 3.03 WATERSTOP ADHESIVE

- A. Adhesive shall be applied to both contact surfaces in strict accordance with manufacturer's recommendations.
- B. Adhesive shall be used where waterstops are attached to existing concrete surfaces.

## 3.04 INSTALLATION OF EXPANSION JOINT MATERIAL AND SEALANTS

- A. Type I, II, or III shall be used in all expansion joints in structures and concrete pavements unless specifically shown otherwise on the Drawings. Type IV shall be used in sidewalk and curbing and other locations specifically shown on the Drawings.
- B. All expansion joints exposed in the finish work, exterior and interior, shall be sealed with the specified joint sealant. Expansion joint material and sealants shall be installed in accordance with manufacturer's recommended procedures and as shown on the Drawings.
- C. Expansion joint material that will be exposed after removal of forms shall be cut and trimmed to ensure a neat appearance and shall completely fill the joint except for the space required for the sealant. The material shall be held securely in place and no concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.
- D. A bond breaker shall be used between expansion joint material and sealant. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surfaces shall present a clean and even appearance.

- E. Type 1 joint sealant shall be used in all expansion and contraction joints in concrete, except where Type 7 or Type 8 is required as stated below, and wherever else specified or shown on the Drawings. It shall be furnished in pour grade or gun grade depending on installation requirements. Primers shall be used as required by the manufacturer. The sealant shall be furnished in colors as directed by the Engineer.
- F. Type 8 joint sealant shall be used in all concrete pavements and floors subject to heavy traffic and wherever else specified or shown on the Drawings.
- G. Type 7 joint sealant shall be used for all joints in chlorine contact tanks and wherever specified or shown on the Drawings.
- 3.05 EXPANSION JOINT SEAL
  - A. The expansion joint seal system shall be installed as shown on the Drawings in strict accordance with the manufacturer's recommendations.
- 3.06 CONTRACTION JOINT INSERTS
  - A. For contraction joints in slabs, inserts shall be floated in fresh concrete during finishing.
  - B. For contraction joints in walls, inserts shall be secured in place prior to casting wall.
  - C. Inserts shall be installed true to line at the locations of all contraction joints as shown on the Drawings.
  - D. Inserts shall extend into concrete sufficient depth as indicated on the Drawings or specified in Section 03290, Joints in Concrete.
  - E. Inserts shall not be removed from concrete until concrete has cured sufficiently to prevent chipping or spalling of joint edges due to inadequate concrete strength.
- 3.07 EPOXY BONDING AGENT
  - A. The Contractor shall use an epoxy bonding agent for bonding fresh concrete to existing concrete as shown on the Drawings.
  - B. Bonding surface shall be clean, sound and free of all dust, laitance, grease, form release agents, curing compounds, and any other foreign particles.
  - C. Application of bonding agent shall be in strict accordance with manufacturer's recommendations.
  - D. Fresh concrete shall not be placed against existing concrete if epoxy bonding agent has lost its tackiness.
- 3.08 EPOXY RESIN BINDER

A. Epoxy resin binder shall be used to seal all existing rebar cut and burned off during demolition operations. Exposed rebar shall be burned back 1/2-inch minimum into existing concrete and the resulting void filled with epoxy resin binder.

## **END OF SECTION**

## SECTION 03290

## JOINTS IN CONCRETE

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENTS

- A. Provide all materials, labor and equipment required for the construction of all joints in concrete specified herein and shown on the Drawings.
- B. Types of joints in concrete shall be as follows:
  - 1. Construction Joints Joints between adjacent concrete placements continuously connected with reinforcement.
  - 2. Expansion Joints Joints in concrete which allow thermal expansion and contraction of concrete. Reinforcement terminates within concrete on each side of joint.
  - 3. Contraction Joints Joints formed in concrete to provide a weakened plane in concrete section to control formation of shrinkage cracks.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 Concrete Formwork
- B. Section 03250 Concrete Accessories
- C. Section 03300 Cast-in-Place Concrete
- D. Section 07900 Joint Fillers, Sealants and Caulking

## 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. ACI 301 Specifications for Structural Concrete for Buildings
  - 2. ACI 318 Building Code Requirements for Structural Concrete
  - 3. ACI 350 Code Requirements for Environmental Engineering Concrete Structures
  - 4. ACI 224.3 Joints in Concrete Construction

## 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Layout drawings showing location and type of all joints to be placed in each structure.
  - 2. Details of proposed joints in each structure.
  - 3. For sawcut contraction joints submit documentation indicating the following:
    - a. Proposed method of sawcutting indicating early entry or conventional sawing.
    - b. Description of how work is to be performed including equipment to be utilized, size of crew performing the work and curing methods.
    - c. Description of alternate method in case of time constraint issues or failure of equipment.

## PART 2 -- MATERIALS

## 2.01 MATERIALS

A. All materials required for joint construction shall comply with Section 03250 - Concrete Accessories, and Section 07900 - Joint Fillers, Sealants and Caulking.

## PART 3 -- EXECUTION

#### 3.01 CONSTRUCTION JOINTS

- A. Construction joints shall be as shown on the Drawings. Otherwise, Contractor shall submit description of the joint and its location to Engineer for approval.
- B. Unless noted otherwise on the Drawings, construction joints shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point. In this case, the joints in the girders shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and the top of footings or floor slabs unless noted otherwise on Drawings. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.
- C. Maximum distance between horizontal joints in slabs and vertical joints in walls shall be 45'-0". For exposed walls with fluid or earth on the opposite side, the spacing between vertical and horizontal joints shall be a maximum of 25'-0".

- D. All corners shall be part of a continuous placement, and should a construction joint be required, the joint shall not be located closer than five feet from a corner.
- E. All reinforcing steel and welded wire fabric shall be continued across construction joints. Keys and inclined dowels shall be provided as shown on the Drawings or as directed by the Engineer. Longitudinal keys shall be provided in all joints in walls and between walls and slabs or footings, except as specifically noted otherwise on the Drawings. Size of keys shall be as shown on the Drawings.
- F. All joints in water bearing structures shall have a waterstop. All joints below grade in walls or slabs which enclose an accessible area shall have a waterstop.

# 3.02 EXPANSION JOINTS

- A. Size and location of expansion joints shall be as shown on the Drawings.
- B. All expansion joints in water-bearing structures shall have a center-bulb type waterstop. All expansion joints below grade in walls or slabs which enclose an accessible area shall have a center-bulb type waterstop. Waterstop shall be as shown on Drawings and specified in Section 03250, Concrete Accessories.

# 3.03 CONTRACTION JOINTS

- A. Location of contraction joints shall be as shown on the Drawings.
- B. Contraction joints shall be formed either by sawcutting or with contraction joint inserts as specified in Section 03250, Concrete Accessories. Sawcutting of joints will not be permitted unless specifically approved by the Engineer.
- C. If approved by the Engineer, sawcutting of contraction joints in lieu of forming shall conform to the following requirements:
  - 1. Joints shall be sawed as soon as the concrete can support foot traffic without leaving any impression, normally the same day as concrete is placed and in no case longer than 24 hours after concrete is placed.
  - 2. Curing shall be performed using wet curing methods as indicated in Section 03370 Concrete Curing. Curing mats, fabrics or sheeting materials shall remain in place to the extent possible while cutting of joint is being performed. Curing materials shall only be removed as required and shall be immediately reinstalled once cutting of the joint has been completed.
  - 3. Depth of joint shall be as shown on the drawings or noted in these specifications. At locations where the joint cannot be installed to full depth due to curbs or other stopping points hand tools shall be used to complete joints.
  - 4. Saw cut joints shall meet the requirements of ACI 224.3, Section 2.8, Jointing Practice.

D. Unless noted otherwise on Drawings, depth of contraction joints shall be 1-1/2 inches in reinforced concrete and 1/3 of concrete thickness in unreinforced concrete.

# 3.04 JOINT PREPARATION

- A. No concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.
- B. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed by wire brushing, air or light sand blasting.
- C. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surface shall present a clean and even appearance.
- D. All joints shall be sealed as shown on the Drawings and specified in Section 03250, Concrete Accessories.

# **END OF SECTION**

## SECTION 03300

## CAST-IN-PLACE CONCRETE

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. Provide all labor, equipment, materials and services necessary for the manufacture, transportation and placement of all plain and reinforced concrete work, as shown on the Drawings or as ordered by the Engineer.
- B. The requirements in this section shall apply to the following types of concrete:
  - 1. Class A1 Concrete: Normal weight structural concrete to be used in all structures qualifying as environmental concrete structures that are designed in accordance with ACI 350 including pump stations, tanks, basins, process structures, and any structures containing fluid or process chemicals or other materials used in treatment process.
  - 2. Class C Concrete: Light weight structural concrete used only where specifically noted on Contract Drawings.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 Concrete Formwork
- B. Section 03200 Reinforcing Steel
- C. Section 03250 Concrete Accessories
- D. Section 03290 Joints in Concrete
- E. Section 03350 Concrete Finishes
- F. Section 03370 Concrete Curing
- G. Section 03600 Grout
- H. Section 03732 Concrete Repairs
- I. Section 07591 Preparation for Re-roofing
- J. Section 07553 Modified Bitumen Membrane
- K. Section 07620 Sheet Metal Flashing and Trim

## 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. Philadelphia Building Code
  - 2. ACI 214 Guide to Evaluation of Strength Test Results of Concrete
  - 3. ACI 301 Specifications for Structural Concrete
  - 4. ACI 304 Guide for Measuring, Mixing, Transporting, and Placing Concrete
  - 5. ACI 305 Guide to Hot Weather Concreting
  - 6. ACI 306 Guide to Cold Weather Concreting
  - 7. ACI 309 Guide for Consolidation of Concrete
  - 8. ACI 318 Building Code Requirements for Structural Concrete and Commentary
  - 9. ACI 350 Code Requirements for Environmental Engineering Concrete Structures
  - 10. ASTM C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
  - 11. ASTM C 33 Standard Specification for Concrete Aggregates
  - 12. ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
  - 13. ASTM C42
     Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
  - 14.ASTM C 88Standard Test Method for Soundness of Aggregates by use of Sodium<br/>Sulfate or Magnesium Sulfate
  - 15. ASTM C 94 Standard Specification for Ready-Mixed Concrete
  - 16. ASTM C 114 Standard Test Method for Chemical Analysis of Hydraulic Cement
  - 17. ASTM C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
  - 18. ASTM C 138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

19.	ASTM C 143	Standard Test Method for Slump of Hydraulic Cement Concrete
20.	ASTM C 150	Standard Specification for Portland Cement
21.	ASTM C 172	Standard Practice for Sampling Freshly Mixed Concrete
22.	ASTM C 192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
23.	ASTM C 231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
24.	ASTM C 260	Standard Specification for Air-Entraining Admixtures for Concrete
25.	ASTM C 295	Standard Guide for Petrographic Examination of Aggregates for Concrete
26.	ASTM C 457	Standard Test Method for Microscopical Determination of the Air-Void System in Hardened Concrete
27.	ASTM C 494	Standard Specification for Chemical Admixtures for Concrete
28.	ASTM C 595	Standard Specification for Blended Hydraulic Cements
29.	ASTM C 618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
30.	ASTM C 989	Standard Specification for Slag Cement for Use in Concrete and Mortars
31.	ASTM C 1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
32.	ASTM C 1260	Test Method for Potential Alkali Reactivity of Aggregates (Mortar Bar Method)
33.	ASTM C 1567	Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
34.	ASTM C 1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
35.	ASTM C 1778	Reducing the Risk of Deleterious Alkali – Aggregate Reaction in Concrete

# 1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.

- 1. Sources of all materials and certifications of compliance with specifications for all materials.
- 2. Certified current (less than 1 year old) chemical analysis of the Portland Cement or Blended Cement to be used.
- 3. Certified current (less than 1 year old) chemical analysis of fly ash or slag cement to be used.
- 4. Aggregate test results showing compliance with required standards, i.e., sieve analysis, potential reactivity, aggregate soundness tests, petrographic analysis, mortar bar expansion testing, etc.
- 5. Manufacturer's data on all admixtures stating compliance with required standards.
- 6. Concrete mix design for each class of concrete specified herein.
- 7. Field experience records and/or trial mix data for the proposed concrete mixes for each class of concrete specified herein.

## 1.05 QUALITY ASSURANCE

- A. Tests on materials used in the production of concrete shall be required as specified in PART 2 --PRODUCTS. These tests shall be performed by an independent testing laboratory approved by the Engineer at no additional cost to the Owner.
- B. Trial concrete mixes shall be tested when required in accordance with Article 3.01 at no additional cost to the Owner.
- C. Field quality control tests, as specified in Article 3.10, unless otherwise stated, will be performed by a materials testing consultant <u>employed by the Owner</u>. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field Testing Technician, Grade I, in accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C-1077.
- D. Lightweight concrete roof fill: Prior to performing the work of this Section, prepare a sample panel of not less than 12 sq. ft. of concrete repair work, including a separate mock-up of the surface preparation. Do not proceed further with the work until sample approved Sample shall be a portion of the area to be restored and may be kept if requested.

# PART 2 -- PRODUCTS

- 2.01 HYDRAULIC CEMENT
  - A. Portland Cement

- 1. Portland Cement shall be Type II conforming to ASTM C 150. Type I cement may be used provided either fly ash or slag cement is also included in the mix in accordance with Articles 2.02 or 2.03 respectively.
- 2. When potentially reactive aggregates as defined in Article 2.05 are to be used in concrete mix, cement shall meet the following requirements:
  - a. For concrete mixed with only Portland Cement, the total alkalies in the cement (calculated as the percentage of NA<sub>2</sub>O plus 0.658 times the percentage of K<sub>2</sub>O) shall not exceed 0.40%.
  - b. For concrete mixed with Portland Cement and an appropriate amount of fly ash (Article 2.02) or slag cement (Article 2.03) the total alkalies in the Portland Cement (calculated as the percentage of  $NA_2O$  plus 0.658 times the percentage of  $K_2O$ ) shall not exceed 0.85%.
- 3. When non-reactive aggregates as defined in Article 2.05 are used in concrete mix, total alkalies in the cement shall not exceed 1.0%.
- 4. The proposed Portland Cement shall not contain more than 8% tricalcium aluminate and more than 12% tetracalcium aluminoferrite.
- B. Blended Cement
  - 1. Blended cements shall be Type IP (Portland Fly Ash Cement) or Type IS (Portland Slag Cement) conforming to ASTM C 595.
  - 2. Type IP cement shall be an interground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.
  - 3. Type IS cement shall be an interground blend of Portland Cement and slag cement in which the slag constituent is between 35% and 50% of the weight of the total blend.
  - 4. Fly ash and slag cement used in the production of blended cements shall meet the requirements of Articles 2.02 and 2.03, respectively.
  - 5. When reactive aggregates as defined in Article 2.05 are used in concrete mix, the total alkalies in the Portland Cement (calculated as the percentage of  $Na_2O$  plus 0.658 times the percentage of  $K_2O$ ) shall not exceed 0.85%. The percentage of fly ash or slag cement shall be set to meet provisions of Article 2.05.G.3.
- C. Different types of cement shall not be mixed nor shall they be used alternately except when authorized in writing by the Engineer. Different brands of cement or the same brand from different mills may be used alternately. A resubmittal will be required if different cements are proposed during the Project.
- D. Cement shall be stored in a suitable weather-tight building so as to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.

## 2.02 FLY ASH

- A. Fly ash shall meet the requirements of ASTM C 618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C 618.
- B. For fly ash to be used in the production of type IP cement, the Pozzolan Activity Index shall be greater than 75% as specified in Table 3 of ASTM C 595.
- C. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the fly ash constituent shall be between 15% and 25% of the total weight of the combined Portland Cement and fly ash. The percentage of fly ash shall be set to meet the mean mortar bar expansion requirements in provisions of Article 2.05.G.2.
- D. For Type A1 concrete as required for use in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.
- E. Additional fly ash shall not be included in concrete mixed with Type IS or IP cement.

## 2.03 SLAG CEMENT

- A. Slag cement shall meet the requirements of ASTM C 989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C 989.
- B. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the slag cement constituent shall be between 35% and 40% of the total weight of the combined Portland Cement and slag. The percentage of slag cement shall be set to meet the mean mortar bar expansion requirements in provisions of Article 2.05.G.2.
- C. For Type A1 concrete as required for use in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.
- D. Additional slag cement shall not be included in concrete mixed with type IS or IP cement.

## 2.04 WATER

- A. Water used for mixing concrete shall be clear, potable and free from deleterious substances such as objectionable quantities of silty organic matter, alkali, salts and other impurities.
- B. Water shall not contain more than 100 PPM chloride.
- C. Water shall not contain more than 500 PPM dissolved solids.
- D. Water shall have a pH in the range of 4.5 to 8.5.
- E. Water shall meet requirements of ASTM C 1602.
- 2.05 AGGREGATES

- A. All aggregates used in normal weight concrete shall conform to ASTM C 33.
- B. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C 33.
- C. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C 33 unless otherwise specified.
- D. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C 136.
- E. Aggregates shall be tested for soundness in accordance with ASTM C 88. The loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using either magnesium sulfate or sodium sulfate.
- F. All aggregates shall be evaluated in accordance with ASTM C 1778 to determine potential reactivity. All aggregates shall be considered reactive unless they meet the requirements below for non-reactive aggregates. Aggregates with a lithology essentially similar to sources in the same region found to be reactive in service shall be considered reactive regardless of the results of the tests above.
  - 1. Non-reactive aggregates shall meet the following requirements:

A petrographic analysis in accordance with ASTM C295 shall be performed to identify the constituents of the fine and coarse aggregate. Non-reactive aggregates shall meet the following limitations:

- (a) Optically strained, microfractured, or microcrystalline quartz, 5.0%, maximum.
- (b) Chert or chalcedony, 3.0%, maximum.
- (c) Tridymite or cristobalite, 1.0%, maximum.
- (d) Opal, 0.5%, maximum.
- e) Natural volcanic glass in volcanic rocks, 3.0%, maximum.
- 3. Concrete mix with reactive aggregate shall meet the following requirements:
  - If aggregates are deemed potentially reactive as per ASTM C-1778 and fly ash or slag cement is included in proposed concrete mix design, proposed concrete mix including proposed aggregates shall be evaluated by ASTM C-1567. Mean mortar bar expansions at 16 days shall be less than 0.08%. Tests shall be made using exact proportion of all materials proposed for use on the job in design mix submitted.
  - If aggregates are deemed potentially reactive as per ASTM C-1778 and a straight cement mix without fly ash or slag cement is proposed for concrete mix design, aggregates shall be evaluated by ASTM C-1260. Mean mortar bar expansions at 16 days shall be less than 0.08%.

- G. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed.
- H. Lightweight aggregate for Class C concrete shall conform to ASTM C330 and shall be Stalite by Carolina Stalite Company or equivalent approved expanded slate produced by the rotary kiln method. Maximum aggregate size shall be 1/2 inch.

# 2.07 ADMIXTURES

- A. Air entraining agent shall be added to all concrete unless noted otherwise. The agent shall consist of a neutralized vinsol resin solution or a purified hydrocarbon with a cement catalyst which will provide entrained air in the concrete in accordance with ASTM C 260. The admixture proposed shall be selected in advance so that adequate samples may be obtained and the required tests made. Air content of concrete, when placed, shall be within the ranges given in the concrete mix design.
- B. The following admixtures are required or used for water reduction, slump increase, and/or adjustment of initial set. Admixtures permitted shall confirm to the requirements of ASTM C 494. Admixtures shall be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air-entraining admixtures.
  - 1. Water reducing admixture shall conform to ASTM C 494, Type A and shall contain no more than 0.05% chloride ions. Acceptable products are "Eucon Series" by the Euclid Chemical Company, "Master Pozzolith Series" by BASF, and "Plastocrete Series" by Sika Corporation.
  - 2. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G. The high range water reducer shall be added to the concrete at either the batch plant or at the job site and may be used in conjunction with a water reducing admixture. The high range water reducer shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system. Concrete shall be mixed at mixing speed for a minimum of 100 mixer revolutions after the addition of the high range water reducer. Acceptable products are "Eucon 37" or Plastol 5000 by the Euclid Chemical Company, "Master Rheobuild 1000 or Master Glenium Series" by BASF, and "Daracem 100 or Advaflow Series" by W.R. Grace.
  - 3. A non-chloride, non-corrosive accelerating admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C 494, Type C or E, and shall not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Acceptable products are "Accelguard 80/90 or NCA" by the Euclid Chemical Company and "Daraset" by W.R. Grace.
  - 4. A water reducing retarding admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C494, Type D and shall not contain more than 0.05% chloride ions. Acceptable products are "Eucon NR or Eucon Retarder 100" by the Euclid Chemical Company, "Pozzolith Retarder" by BASF, and "Plastiment" by Sika Corporation.

- C. Admixtures containing calcium chloride, thiocyanate or more than 0.05 percent chloride ions are not permitted. The addition of admixtures to prevent freezing is not permitted.
- D. The Contractor shall submit manufacturer's data including the chloride ion content of each admixture and certification from the admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned prior to mix design review.

#### 2.08 CONCRETE MIX DESIGN

- The proportions of cement, aggregates, admixtures and water used in the concrete mixes shall be A. based on the results of field experience or preferably laboratory trial mixes in conformance with Section 5.3. "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350. When trial mixes are used they shall also conform to Article 3.01 of this Section of the Specifications. If field experience records are used, concrete strength results shall be from concrete mixed with all of the ingredients proposed for use on job used in similar proportions to mix proposed for use on job. Contractor shall submit verification confirming this stipulation has been followed. Field experience records and/or trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.
- Structural concrete shall conform to the following requirements. Cementitious materials refer to the Β. total combined weight of all cement, fly ash, and slag cement contained in the mix.

1.	Comp	ressive Strength (28-Day)		
	a. (	Concrete Class A1	4,500 psi (mi	nimum)
2.	Water/ by wei	cementitious materials ratio,		
	•		Maximum	Minimum
	a. (	Concrete Class A1	0.42	0.39
3.	Slump	range	is used.	nless high range water reducing admixture h range water reducing admixture is used.
4.	Air Co	ontent		
	a.	Class A1	6% ±1.5%	

C. Lightweight concrete (Class C) shall be composed of cement, lightweight aggregate, sand, water, and admixtures, and shall conform to the following requirements:

1.	Compressive Strength (28-Day)	4,000 psi (minimum)
2.	Minimum Cementitious Materials Content	550 lb/cy
3.	Air Content	6% ±1.5%
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4.	Maximum Slump	4"-8" after addition of high range water reducer
5.	Maximum Unit Weight	115 PCF

6. Lightweight aggregate shall be presoaked for 48 hours prior to mixing concrete.

# PART 3 -- EXECUTION

## 3.01 TRIAL MIXES

- A. When trial mixes are used to confirm the quality of a proposed concrete mix in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350, an independent qualified testing laboratory designated and retained by the Contractor shall test a trial batch of each of the preliminary concrete mixes submitted by the Contractor. The trial batches shall be prepared using the aggregates, cement and admixtures proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain enough samples to satisfy requirements stated below. Tests on individual materials stated in PART 2 -- PRODUCTS should already be performed before any trial mix is done. The cost of laboratory trial batch tests for each specified concrete mix will be borne by the Contractor and the Contractor shall furnish and deliver the materials to the testing laboratory at no cost to the Owner.
- B. The independent testing laboratory shall prepare a minimum of fifteen (15) standard test cylinders in accordance with ASTM C 31 in addition to conducting slump (ASTM C 143), air content (C 231) and unit weight (C 138) tests. Compressive strength test on the cylinders shall subsequently be performed by the same laboratory in accordance with ASTM C 39 as follows: Test 3 cylinders at age 7 days; test 3 cylinders at age 21 days; test 3 cylinders at age 28 days and test 3 cylinders at 56 days. The cylinders shall be carefully identified as "Trial Mix, Contract No. \_\_\_\_\_\_, Product \_\_\_\_\_\_." If the average 28-day compressive strength of the trial mix is less than that specified, or if any single cylinder falls below the required strength by more than 500 psi, the mix shall be corrected, another trial batch prepared, test cylinders taken, and new tests performed as before. Any such additional trial batch testing required shall be performed at no additional cost to the Owner. Adjustments to the mix shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor.

## 3.02 PRODUCTION OF CONCRETE

- A. All concrete shall be machine mixed. Hand mixing of concrete will not be permitted. The Contractor may supply concrete from a ready mix plant or from a site mixed plant. In selecting the source for concrete production the Contractor shall carefully consider its capability for providing quality concrete at a rate commensurate with the requirements of the placements so that well bonded, homogenous concrete, free of cold joints, is assured.
- B. Ready-Mixed Concrete

- 1. At the Contractor's option, ready-mixed concrete may be used meeting the requirements for materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.
- 2. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.
- 3. Each batch of concrete shall be mixed in a truck mixer for not less than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.
- 4. Truck mixers and their operation shall be such that the concrete throughout the mixed batch, as discharged, is within acceptable limits of uniformity with respect to consistency, mix and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than one inch when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.
- 5. Ready-mixed concrete shall be delivered to the site for the work and discharge shall be completed before the drum has been revolved 300 revolutions and within the time requirements stated in Article 3.03 of this Section.
- 6. Each and every concrete delivery shall be accompanied by a delivery ticket containing at least the following information:
  - a. Date and truck number
  - b. Ticket number
  - c. Mix designation of concrete
  - d. Cubic yards of concrete
  - e. Cement brand, type and weight in pounds
  - f. Weight in pounds of fine aggregate (sand)
  - g. Weight in pounds of coarse aggregate (stone)
  - h. Air entraining agent, brand, and weight in pounds and ounces
  - i. Other admixtures, brand, and weight in pounds and ounces
  - j. Water, in gallons, stored in attached tank
  - k. Water, in gallons, maximum that can be added without exceeding design water/cementitious materials ratio
  - 1. Water, in gallons, actually used (by truck driver)
  - m. Time of loading
  - n. Time of delivery to job (by truck driver)

- 7. Any truck delivering concrete to the job site, which is not accompanied by a delivery ticket showing the above information will be rejected and such truck shall immediately depart from the job site.
- 8. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Engineer.
- C. Site Mixed Concrete
  - 1. Scales for weighing concrete ingredients shall be accurate when in use within  $\pm 0.4$  percent of their total capacities. Standard test weights shall be available to permit checking scale accuracy.
  - 2. Operation of batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances:

a.	Cement, fly ash, or slag cement	$\pm 1$ percent
b.	Water	$\pm 1$ percent
c.	Aggregates	$\pm 2$ percent
d.	Admixtures	$\pm 3$ percent

- 3. Each batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to prevent batched ingredients from entering the mixer before the previous batch has been completely discharged.
- 4. The concrete shall be mixed in a batch mixer capable of thoroughly combining the aggregates, cement, and water into a uniform mass within the specified mixing time, and of discharging the concrete without harmful segregation. The mixer shall bear a manufacturer's rating plate indicating the rate capacity and the recommended revolutions per minute and shall be operated in accordance therewith.
- 5. Mixers with a rate capacity of 1 cu.yd. or larger shall conform to the requirements of the Plant Mixer Manufacturers' Division of the Concrete Plant Manufacturers' Bureau.
- 6. Except as provided below, batches of 1 cu. yd. or less shall be mixed for not less than 1 minute. The mixing time shall be increased 15 seconds for each cubic yard or fraction thereof of additional capacity.
- 7. Shorter mixing time may be permitted provided performance tests made in accordance with of ASTM C 94 indicate that the time is sufficient to produce uniform concrete.

- 8. Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed. At least three-quarters of the required mixing time shall take place after the last of the mixing water has been added.
- 9. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Mixer blades shall be replaced when they have lost 10 percent of their original height.
- 10. Air-entraining admixtures and other chemical admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured by volume if so recommended by the manufacturer.
- 11. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.
- 12. Addition of retarding admixtures shall be completed within 1 minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Retarding admixtures shall not be used unless approved by the Engineer.
- 13. Concrete shall be mixed only in quantities for immediate use and within the time and mixing requirements of ASTM C 94.

## 3.03 CONCRETE PLACEMENT

- A. No concrete shall be placed prior to approval of the concrete mix design. Concrete placement shall conform to the recommendations of ACI 304.
- B. Prior to concrete placement, all reinforcement shall be securely and properly fastened in its correct position. Formwork shall be clean, oiled and form ties at construction joints shall be retightened. All bucks, sleeves, castings, hangers, pipe, conduits, bolts, anchors, wire, and any other fixtures required to be embedded therein shall be in place. Forms for openings to be left in the concrete shall be in place and anchored by the Contractor. All loose debris in bottoms of forms or in keyways shall be removed and all debris, water, snow, ice and foreign matter shall be removed from the space to be occupied by the concrete. The Contractor shall notify the Engineer in advance of placement, allowing sufficient time for a concurrent inspection and for any corrective measures which are subsequently required.
- C. On horizontal joints where concrete is to be placed on hardened concrete, flowing concrete containing a high range water reducing admixture or cement grout shall be placed with a slump not less than 8 inches for the initial placement at the base of the wall. Concrete or cement grout shall meet all strength and service requirements specified herein for applicable class of concrete. This concrete shall be worked well into the irregularities of the hard surface.
- D. All concrete shall be placed during the daylight hours except with the consent of the Engineer. If special permission is obtained to carry on work during the night, adequate lighting must be provided.

- E. When concrete arrives at the project with slump below that suitable for placing, as indicated by the Specifications, water may be added to bring the concrete within the specified slump range provided that the design water-cementitious materials ratio is not exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Water may be added only to full trucks. On-site tempering shall not relieve the Contractor from furnishing a concrete mix that meets all specified requirements.
- F. Concrete shall be conveyed as rapidly as practicable to the point of deposit by methods which prevent the separation or loss of the ingredients. It shall be so deposited that rehandling will be unnecessary. Discharge of the concrete to its point of deposit shall be completed within 90 minutes after the addition of the cement to the aggregates. In hot weather, or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed the requirements stated in Article 3.09 of this Section.
- G. Where concrete is conveyed to position by chutes, a practically continuous flow in the chute shall be maintained. The angle and discharge arrangement of the chute shall be such as to prevent segregation of the concrete ingredients. The delivery end of the chute shall be as close as possible to the point of deposit and in no case shall the free pour from the delivery end of the chute exceed five feet, unless approved otherwise.
- H. Special care must be exercised to prevent splashing of forms or reinforcement with concrete, and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the general level of the concrete already in place must be removed before the work proceeds. Concrete shall be placed in all forms in such way as to prevent any segregation.
- I. Placing of concrete shall be so regulated that the pressure caused by the wet concrete shall not exceed that used in the design of the forms.
- J. All concrete for walls shall be placed through openings in the form spaced at frequent intervals or through tremies (heavy duct canvas, rubber, etc.), equipped with suitable hopper heads. Tremies shall be of variable lengths so the free fall shall not exceed five (5) feet and a sufficient number shall be placed in the form to ensure the concrete is kept level at all times.
- K. When placing concrete which is to be exposed, sufficient illumination shall be provided in the interior of the forms so the concrete, at places of deposit, is visible from deck and runways.
- L. Concrete shall be placed so as to thoroughly embed all reinforcement, inserts, and fixtures.
- M. When forms are removed, surfaces shall be even and dense, free from aggregate pockets or honeycomb. To achieve this, concrete shall be consolidated using mechanical vibration, supplemented by forking and spading by hand in the corners and angle of forms and along form surfaces while the concrete is plastic under the vibratory action. Consolidation shall conform to ACI 309.
- N. Mechanical vibration shall be applied directly to the concrete, unless otherwise approved by the Engineer. The bottom of vibrators used on floor slabs must not be permitted to ride the form supporting the slab. Vibration shall be applied at the point of deposit and in the area of freshly placed concrete by a vertical penetration of the vibrator. Vibrators shall not be used to move concrete laterally within the forms.

- O. The intensity of vibration shall be sufficient to cause settlement of the concrete into place and to produce monolithic joining with the preceding layer. It shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures with a vibrator transmitting not less than 7,500 impulses per minute. Since the duration of vibration per square foot of surface is dependent on the frequency (impulses per minute), size of vibrator, and slump of concrete, the length of time must therefore be determined in the field. Vibration, however, shall not be continued in any one location to the extent that pools of grout are formed.
- P. Care shall be taken to prevent cold joints when placing concrete in any portion of the work. The concrete placing rate shall be such as to ensure that each layer is placed while the previous layer is soft or plastic, so that the two layers can be made monolithic by penetration of the vibrators. Maximum thickness of concrete layers shall be 18 inches. The surface of the concrete shall be level whenever a run of concrete is stopped.
- Q. To prevent featheredges, construction joints located at the tops of horizontal lifts near sloping exposed concrete surfaces shall be inclined near the exposed surface, so the angle between such inclined surface and the exposed concrete surface will be not less than 50°.
- R. In placing unformed concrete on slopes, the concrete shall be placed ahead of a non-vibrated slip-form screed extending approximately 2-1/2 feet back from its leading edge. The method of placement shall provide a uniform finished surface with the deviation from the straight line less than 1/8 inch in any concrete placement. Concrete ahead of the slip-form screed shall be consolidated by internal vibrators so as to ensure complete filling under the slip-form. Prior to placement of concrete on sloped walls or slabs, the Contractor shall submit a plan specifically detailing methods and sequence of placements, proposed concrete screed equipment, location of construction joints and waterstops, and/or any proposed deviations from the aforementioned to the Engineer for review and approval.
- S. Concrete shall not be placed during rains sufficiently heavy or prolonged to wash mortar from coarse aggregate on the forward slopes of the placement. Once placement of concrete has commenced in a block, placement shall not be interrupted by diverting the placing equipment to other uses.
- T. Roof lightweight concrete fill: Protect adjacent surfaces not to be restored. Protect sills, ledges, and projections from material droppings.
- U. Roof lightweight concrete fill: Remove damaged and weak existing concrete fill and screed as well as all loose and foreign material. Obtain a minimum surface profile of ICRI CSP 5. At fill repair areas, remove immediately loose material on the surface. Thickness of material and perimeter of repair shall be a minimum of 1/2" in depth and up to the depth as specified on contract drawings. Feather edging is not permitted. Clean surface in accordance with manufacturer's instructions.
- V. Roof lightweight concrete fill: Do not damage the existing structure during removal of the existing material. Any damage to the slab or areas below shall be repaired/replaced at no cost to the owner.
- W. Roof lightweight concrete fill: Concrete shall be placed to specified roof pitch to drains and leave surfaces free from depressions, bulges, rough spots and other defects.
- X. Roof lightweight concrete fill: Wet cure concrete fill until dry and acceptable to roofing manufacturer. Fully cured concrete fill shall be free from release or curing agents that prevent proper vapor barrier adhesion. Protect concrete fill during curing from the elements.

- Y. Roof lightweight concrete fill: Clean all adjacent areas of excess material and clean all floors and walls of powder and droppings. Remove misplaced materials from surfaces immediately.
- Z. Roof lightweight concrete fill: Protect material from freezing and from rainfall prior to final set.

## 3.04 PLACING CONCRETE UNDER PRESSURE

- A. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall have the capacity for the operation. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. To obtain the least line resistance, the layout of the pipeline system shall contain a minimum number of bends with no change in pipe size. If two sizes of pipe must be used, the smaller diameter should be used at the pump end and the larger at the discharge end. When pumping is completed, the concrete remaining in the pipelines, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.
- B. Priming of the concrete pumping equipment shall be with cement grout only. Use of specialty mix pump primers or pumping aids will not be allowed.
- C. No aluminum parts shall be in contact with the concrete during the entire placing of concrete under pressure at any time.
- D. Prior to placing concrete under pressure, the Contractor shall submit the concrete mix design together with test results from a materials testing consultant proving the proposed mix meets all requirements. In addition, an actual pumping test under field conditions is required prior to acceptance of the mix. This test requires a duplication of anticipated site conditions from beginning to end. The batching and truck mixing shall be the same as will be used; the same pump and operator shall be present and the pipe and pipe layouts will reflect the maximum height and distance contemplated. All submissions shall be subject to approval by the Engineer.
- E. If the pumped concrete does not produce satisfactory end results, the Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- F. The pumping equipment must have two cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor may have a standby pump on the site during pumping.
- G. The minimum diameter of the hose (conduits) shall be four inches.
- H. Pumping equipment and hoses (conduits) that are not functioning properly shall be replaced.
- I. Concrete samples for quality control in accordance with Article 3.10 will be taken at the placement (discharge) end of the line.
- 3.05 ORDER OF PLACING CONCRETE

A. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. Where required on the Drawings and wherever else practical, the placing of such units shall be done in a strip pattern in accordance with ACI 302.1. A minimum of 72 hours shall pass prior to placing concrete directly adjacent to previously placed concrete.

## 3.06 CONCRETE WORK IN COLD WEATHER

- A. Cold weather concreting procedures shall conform to the requirements of ACI 306.
- B. The Engineer may prohibit the placing of concrete at any time when air temperature is 40°F. or lower. If concrete work is permitted, the concrete shall have a minimum temperature, as placed, of 55°F. for placements less than 12" thick, 50°F. for placements 12" to 36" thick, and 45°F. for placements greater than 36" thick. The temperature of the concrete as placed shall not exceed the aforementioned minimum values by more than 20°F, unless otherwise approved by the Engineer.
- C. All aggregate and water shall be preheated. Precautions shall be taken to avoid the possibility of flash set when aggregate or water are heated to a temperature in excess of 100°F. in order to meet concrete temperature requirements. The addition of admixtures to the concrete to prevent freezing is not permitted. All reinforcement, forms, and concrete accessories with which the concrete is to come in contact shall be defrosted by an approved method. No concrete shall be placed on frozen ground.

## 3.07 CONCRETE WORK IN HOT WEATHER

- A. Hot weather concreting procedures shall conform to the requirements of ACI 305.
- B. When air temperatures exceed 85°F., or when extremely dry conditions exist even at lower temperatures, particularly if accompanied by high winds, the Contractor and his concrete supplier shall exercise special and precautionary measures in preparing, delivering, placing, finishing, curing and protecting the concrete mix. The Contractor shall consult with the Engineer regarding such measures prior to each day's placing operation and the Engineer reserves the right to modify the proposed measures consistent with the requirements of this Section of the Specifications. All necessary materials and equipment shall be on hand an in position prior to each placing operation.
- C. Preparatory work at the job site shall include thorough wetting of all forms, reinforcing steel and, in the case of slab pours on ground or subgrade, spraying the ground surface on the preceding evening and again just prior to placing. No standing puddles of water shall be permitted in those areas which are to receive the concrete.
- D. The temperature of the concrete mix when placed shall not exceed 90°F.
- E. Temperature of mixing water and aggregates shall be carefully controlled and monitored at the supplier's plant, with haul distance to the job site being taken into account. Stockpiled aggregates shall, if necessary, be shaded from the sun and sprinkled intermittently with water. If ice is used in the mixing water for cooling purposes, it must be entirely melted prior to addition of the water to the dry mix.
- F. Delivery schedules shall be carefully planned in advance so that concrete is placed as soon as practical after it is properly mixed. For hot weather concrete work (air temperature greater than 85°F),

discharge of the concrete to its point of deposit shall be completed within 60 minutes from the time the concrete is batched.

- G. The Contractor shall arrange for an ample work force to be on hand to accomplish transporting, vibrating, finishing, and covering of the fresh concrete as rapidly as possible.
- 3.08 QUALITY CONTROL
  - A. Field Testing of Concrete
    - 1. The Contractor shall coordinate with the Engineer's project representative the on-site scheduling of the materials testing consultant personnel as required for concrete testing.
    - 2. Concrete for testing shall be supplied by the Contractor at no additional cost to the Owner, and the Contractor shall provide assistance to the materials testing consultant in obtaining samples. The Contractor shall dispose of and clean up all excess material.
  - B. Consistency
    - 1. The consistency of the concrete will be checked by the materials testing consultant by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Engineer and/or the materials testing consultant may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for any delays, material or labor costs due to such eventualities.
    - 2. Slump tests shall be made in accordance with ASTM C 143. Slump tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.
    - 3. Concrete with a specified nominal slump shall be placed having a slump within 1" (higher or lower) of the specified slump. Concrete with a specified maximum slump shall be placed having a slump less than the specified slump.
  - C. Unit Weight
    - 1. Samples of freshly mixed concrete shall be tested for unit weight by the materials testing consultant in accordance with ASTM C 138.
    - 2. Unit weight tests will be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.
  - D. Air Content
    - 1. Samples of freshly mixed concrete will be tested for entrained air content by the materials testing consultant in accordance with ASTM C 231.
    - 2. Air content tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

- 3. In the event test results are outside the limits specified, additional testing shall occur. Admixture quantity adjustments shall be made immediately upon discovery of incorrect air entrainment.
- E. Compressive Strength
  - 1. Samples of freshly mixed concrete will be taken by the materials testing consultant and tested for compressive strength in accordance with ASTM C 172, C 31 and C 39, except as modified herein.
  - 2. In general, one sampling shall be taken for each placement in excess of five (5) cubic yards, with a minimum of one (1) sampling for each day of concrete placement operations, or for each one hundred (100) cubic yards of concrete, or for each 5,000 square feet of surface area for slabs or walls, whichever is greater.
  - 3. Each sampling shall consist of at least five (5) 6x12 cylinders or (8) 4x8 cylinders. Each cylinder shall be identified by a tag, which shall be hooked or wired to the side of the container. The materials testing consultant will fill out the required information on the tag, and the Contractor shall satisfy himself that such information shown is correct.
  - 4. The Contractor shall be required to furnish labor to the Owner for assisting in preparing test cylinders for testing. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the Contractor. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C 31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds and such that all specimen are shielded from direct sunlight and/or radiant heating sources. No concrete requiring inspection shall be delivered to the site until such storage curing box has been provided. Specimens shall remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours.
  - 5. The Contractor shall be responsible for maintaining the temperatures of the curing box during the initial curing of test specimens with the temperature preserved between 60°F and 80°F as measured by a maximum-minimum thermometer. The Contractor shall maintain a written record of curing box temperatures for each day curing box contains test specimens. Temperature shall be recorded a minimum of three times a day with one recording at the start of the work day and one recording at the end of the work day.
  - 6. When transported, the cylinders shall not be thrown, dropped, allowed to roll, or be damaged in any way.
  - 7. Compression tests shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at seven days and two at 28 days. For 4x8 cylinders, three test cylinders will be tested at seven days, three at 28 days. The remaining cylinders will be held to verify test results, if needed.

- F. Evaluation and Acceptance of Concrete
  - 1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 214, ACI 318, and ACI 350.
  - 2. The strength level of concrete will be considered satisfactory if all of the following conditions are satisfied.
    - a. Every arithmetic average of any three consecutive strength tests equals or exceeds the minimum specified 28-day compressive strength for the mix (see Article 2.08).
    - b. No individual compressive strength test results falls below the minimum specified strength by more than 500 psi.
  - 3. In the event any of the conditions listed above are not met, the mix proportions shall be corrected for the next concrete placing operation.
  - 4. In the event that condition 2B is not met, additional tests in accordance with Article 3.10, paragraph H shall be performed.
  - 5. When a ratio between 7-day and 28-day strengths has been established by these tests, the 7day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths. Should the 7-day test strength from any sampling be more than 10% below the established minimum strength, the Contractor shall:
    - a. Immediately provide additional periods of curing in the affected area from which the deficient test cylinders were taken.
    - b. Maintain or add temporary structural support as required.
    - c. Correct the mix for the next concrete placement operation, if required to remedy the situation.
  - 6. All concrete which fails to meet the ACI requirements and these specifications is subject to removal and replacement at no additional cost to the Owner.
- G. When non-compliant concrete is identified, test reports shall be sent immediately to the Engineer for review.
- H. Additional Tests
  - 1. When ordered by the Engineer, additional tests on in-place concrete shall be provided and paid for by the Contractor.
  - 2. In the event the 28-day test cylinders fail to meet the minimum strength requirements as outlined in Article 3.10, paragraph F, the Contractor shall have concrete core specimens obtained and tested from the affected area immediately.

- a. Three cores shall be taken for each sample in which the strength requirements were not met.
- b. The drilled cores shall be obtained and tested in conformance with ASTM C 42. The tests shall be conducted by a materials testing consultant approved by the Engineer.
- c. The location from which each core is taken shall be approved by the Engineer. Each core specimen shall be located, when possible, so its axis is perpendicular to the concrete surface and not near formed joints or obvious edges of a unit of deposit.
- d. The core specimens shall be taken, if possible, so no reinforcing steel is within the confines of the core.
- e. The diameter of core specimens should be at least 3 times the maximum nominal size of the course aggregate used in the concrete, but must be at least 2-inches in diameter.
- f. The length of specimen, when capped, shall be at least twice the diameter of the specimen.
- g. The core specimens shall be taken to the laboratory and when transported, shall not be thrown, dropped, allowed to roll, or damaged in any way.
- h. Two (2) copies of test results shall be mailed directly to the Engineer. The concrete in question will be considered acceptable if the average compressive strength of a minimum of three test core specimens taken from a given area equal or exceed 85% of the specified 28-day strength and if the lowest core strength is greater than 75% of the specified 28-day strength.
- 3. In the event that concrete placed by the Contractor is suspected of not having proper air content, the Contractor shall engage a materials testing consultant approved by the Engineer, to obtain and test samples for air content in accordance with ASTM Specification C 457.

#### 3.09 CARE AND REPAIR OF CONCRETE

- A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Care shall be exercised to avoid jarring forms or placing any strain on the ends of projecting reinforcing bars. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at no additional cost to the Owner.
- B. Areas of honeycomb shall be chipped back to sound concrete and repaired as directed.

- C. Concrete formwork blowouts or unacceptable deviations in tolerances for formed surfaces due to improperly constructed or misaligned formwork shall be repaired as directed. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and redressed as directed.
- D. Areas of concrete in which cracking, spalling, or other signs of deterioration develop prior to final acceptance shall be removed and replaced, or repaired as directed. This stipulation includes concrete that has experienced cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an approved epoxy injection system. Non-structural cracks shall be repaired using an approved hydrophilic resin pressure injected grout system, unless other means of repair are deemed necessary and approved. All repair work shall be performed at no additional cost to the Owner.
- E. Concrete which fails to meet the strength requirements as outlined in Article 3.10, paragraph F, will be analyzed as to its adequacy based upon loading conditions, resultant stresses and exposure conditions for the particular area of concrete in question. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at no additional cost to the Owner. The method of strengthening or extent of replacement shall be as directed by the Engineer.

## **END OF SECTION**

## SECTION 03350

#### CONCRETE FINISHES

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

A. Furnish all materials, labor, and equipment required to provide finishes of all concrete surfaces specified herein and shown on the Drawings.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 Concrete Formwork
- B. Section 03300 Cast-in-Place Concrete
- C. Section 03600 Grout

## 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. ACI 301 Specifications for Structural Concrete for Buildings
  - 2. ACI 318 Building Code Requirements for Structural Concrete

## 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300 Submittals.
  - 1. Manufacturer's literature on all products specified herein.

#### PART 2 -- PRODUCTS

- 2.01 CONCRETE FLOOR SEALER
  - A. Floor sealer shall be Diamond Clear VOX or Super Diamond Clear VOX by the Euclid Chemical Company, MasterKure CC 300 SB by BASF Master Builder Solutions.
- 2.02 CONCRETE LIQUID DENSIFIER AND SEALANT

A. Concrete liquid densifier and sealant shall be a high performance, deeply penetrating concrete densifier and sealant. Product shall be odorless, colorless, VOC-compliant, non-yellowing siliconate based solution designed to harden, dustproof and protect concrete floors subjected to heavy vehicular traffic and to resist black rubber tire marks on concrete surfaces. The product must contain a minimum solids content of 20% of which 50% is siliconate. Acceptable products are Diamond Hard by the Euclid Chemical Company, Seal Hard by L&M Construction Chemicals and MasterKure HD 210 WB by BASF Master Builder Solutions.

## 2.03 NON-METALLIC FLOOR HARDENER

A. The specified non-metallic mineral aggregate hardener shall be formulated, processed, and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a factory-blended mixture of specifically processed graded mineral aggregate, selected Portland cement, and necessary plasticizing agents. Acceptable products shall be "Surflex" by the Euclid Chemical Company, "Harcol" by Sonneborn, "Maximent" by BASF, and "Mastercon" by BASF.

# 2.04 NON-OXIDIZING HEAVY DUTY METALLIC FLOOR HARDENER

A. Non-oxidizing heavy duty metallic floor hardener shall be formulated, processed, and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specifically processed non-rusting aggregate, selected Portland cement, and necessary plasticizing agents. Product shall be "Diamond-Plate" by the Euclid Chemical Company, or Masterplate by BASF Construction Chemicals.

## 2.05 NON-SLIP FLOORING ADDITIVE

A. Non-slip flooring additives for slip resistant floors shall be non-metallic. Non-slip flooring additives shall be Frictex NS by BASF Construction Chemicals, A-H Alox by Anti-Hydro, or Euco Grip by the Euclid Chemical Company.

## PART 3 -- EXECUTION

## 3.01 FINISHES ON FORMED CONCRETE SURFACES

- A. After removal of forms, the finishes described below shall be applied in accordance with Article 3.05 Concrete Finish Schedule. Unless the finish schedule specifies otherwise, all surfaces shall receive at least a Type I finish. The Engineer shall be the sole judge of acceptability of all concrete finish work.
  - Type I Rough: All fins, burrs, offsets, marks and all other projections left by the forms shall be removed. Projections, depressions, etc. below finished grade required to be removed will only be those greater than ¼-inch. All holes left by removal of ends of ties, and all other holes, depressions, bugholes, air/blow holes or voids shall be filled solid with cement grout after first being thoroughly wetted and then struck off flush. The only holes below grade to be filled will be tie holes and any other holes larger than ¼-inch in any dimension. Honeycombs shall be chipped back to solid concrete and repaired as directed by the Engineer. All holes shall be filled with tools, such as sponge floats and trowels, that will permit packing the hole solidly with cement grout. Cement grout shall consist of one part cement to three

parts sand, epoxy bonding agent (for tie holes only) and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of cement grout shall match the adjacent wall surface.

- 2. Type II Grout Cleaned: Where this finish is required, it shall be applied after completion of Type I finish. After the concrete has been predampened, a slurry consisting of one part cement (including an appropriate quantity of white cement in order to produce a color matching the surrounding concrete) and 1-1/2 parts sand passing the No. 16 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats. Mix proportions shall be submitted to the Engineer after a sample of the work is established and accepted. Any surplus shall be removed by scraping and then rubbing with clean burlap.
- 3. Type III Smooth Rubbed: Where this finish is required, it shall be applied after the completion of the Type II finish. No rubbing shall be done before the concrete is thoroughly hardened and the mortar used for patching is firmly set. A smooth, uniform surface shall be obtained by wetting the surface and rubbing it with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities requires it, the general surface of the concrete shall not be cut into. Corners and edges shall be slightly rounded by the use of the carborundum stone. Brush finishing or painting with grout or neat cement will not be permitted. A 100 square foot example shall be established at the beginning of the project to establish acceptability.

## 3.02 SLAB AND FLOOR FINISHES

- A. The finishes described below shall be applied to floors, slabs, flow channels and top of walls in accordance with Article 3.05 Concrete Finish Schedule. The Engineer shall be the sole judge of acceptability of all such finish work.
  - 1. Type "A" Screeded: This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required. When a Type "F" finish is subsequently to be applied, the surface of the screeded concrete shall be roughened with a concrete rake to 1/2" minimum deep grooves prior to final set.
  - 2. Type "B" Wood or Magnesium Floated: This finish shall be obtained after completion of a Type "A" finish by working a previously screeded surface with a wood or magnesium float or until the desired texture is reached. Floating shall begin when the water sheen has disappeared and when the concrete has sufficiently hardened so that a person's foot leaves only a slight imprint. If wet spots occur, water shall be removed with a squeegee. Care shall be taken to prevent the formation of laitance and excess water on the finished surface. All edges shall be edged with an 1/8-inch tool as directed by the Engineer. The finished surface shall be true, even, and free from blemishes and any other irregularities.
  - 3. Type "C" Cork Floated: This finish shall be similar to Type "B" but slightly smoother than that obtained with a wood float. It shall be obtained by power or band floating with cork floats.

- 4. Type "D" Steel Troweled: This finish shall be obtained after completion of a Type "B" finish. When the concrete has hardened sufficiently to prevent excess fine material from working to the surface, the surface shall be compacted and smoothed with not less than two thorough and complete steel troweling operations. In areas which are to receive a floor covering such as tile, resilient flooring, or carpeting, the applicable Specification Sections and Contract Drawings shall be reviewed for the required finishes and degree of flatness. In areas that are intermittently wet such as pump rooms, only one troweling operation is required to provide some trowel marks for slip resistance. All edges shall be edged with an 1/8-inch tool as directed by the Engineer. The finish shall be brought to a smooth, dense surface, free from defects and blemishes.
- 5. Type "E" Broom or Belt: This finish shall provide the surface with a transverse scored texture by drawing a broom or burlap belt across the surface immediately after completion of a Type "B" finish. All edges shall be edged with an 1/8-inch tool as directed by the Engineer.
- 6. Type "F" Swept in Grout Topping: This finish shall be applied after a completion of a Type "A" finish. The concrete surface shall be properly cleaned, washed, and coated with a mixture of water and Portland Cement. Cement grout in accordance with Section 03600 shall then be plowed and swept into neat conformance with the blades or arms of the apparatus by turning or rotating the previously positioned mechanical equipment. Special attention shall be paid to true grades, shapes and tolerances as specified by the manufacturer of the equipment. Before beginning this finish, the Contractor shall notify the Engineer and the equipment manufacturer of the details of the operation and obtain approval and recommendations.
- 7. Type "G" Hardened Finish: This finish shall be applied after completion of a Type "B" or Type "C" finish and prior to application of a Type "D" finish. Hardeners shall be applied in strict accordance with the manufacturer's requirements. Hardeners shall be applied using a mechanical spreader. The hardener shall be applied in two shakes with the first shake comprising 2/3 of the total amount. Type "D" finish shall be applied following completion of application of the hardener.
  - a. Non-metallic floor hardener shall be applied where specifically required on the Contract Drawings at the rate of 1.0 pounds/ft.<sup>2</sup>.
  - b. Non-oxidizing heavy duty metallic floor hardener shall be applied at the loading docks and where specifically required on the Contract Drawings or specified herein at the rate of 1.5 pounds/ft.<sup>2</sup>.
- 8. Type "H" Non-Slip Finish: This finish shall be provided by applying a non-slip flooring additive concurrently with the application of a Type "D" finish and/or installation of floor sealants. Application procedure shall be in accordance with manufacturer's instructions. Finish shall be applied where specifically required on the Contract Drawings or specified herein.
- 9. Type "J" Raked Finish: This finish shall be provided by raking the surface as soon as the condition of the concrete permits by making depressions of  $\pm 1/4$  inch.

## 3.03 CONCRETE SEALERS

- A. Concrete sealers shall be applied where specifically required on the Contract Drawings or specified herein.
- B. Sealers shall be applied after installation of all equipment, piping, etc. and after completion of any other related construction activities. Application of sealers shall be in strict accordance with manufacturer's requirements.
- C. Sealers shall be applied to all floor slabs not painted and not intended to be immersed.
- D. Floor slabs subjected to vehicular traffic shall be sealed with the concrete liquid densifier and sealer.
- E. All other floor slabs to receive sealer shall be sealed with concrete floor sealer.

## 3.04 FINISHES ON EQUIPMENT PADS

- A. Formed surfaces of equipment pads shall receive a Type III finish.
- B. Top surfaces of equipment pads, except those surfaces subsequently required to receive grout and support equipment bases, shall receive a Type "D" finish, unless otherwise noted. Surfaces which will later receive grout shall, before the concrete takes its final set, be made rough by removing the sand and cement that accumulates on the top to the extent that the aggregate will be exposed with irregular indentations in the surface up to 1/2 inch deep.

## 3.05 CONCRETE FINISH SCHEDULE

Item	Type of Finish
Concrete surfaces indicated to receive textured coating (as noted on Drawings and in Section 09800, Special Coatings)	Ι
Exterior exposed concrete walls, ceilings, beams, manholes, hand holes, miscellaneous structures and columns (including top of wall) to one foot below grade. All other exposed concrete surfaces not specified elsewhere	П
All interior exposed concrete walls and vertical surfaces	III
Interior exposed ceiling, including beams	III
All interior finish floors of buildings and structures and walking surfaces which will be continuously or intermittently wet	D
All interior finish floors of buildings and structures which are not continuously or intermittently wet	D
Exterior concrete sidewalks, steps, ramps, decks, slabs on grade and landings exposed to weather	E

## **END OF SECTION**

## SECTION 03370

#### CONCRETE CURING

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

A. Protect all freshly deposited concrete from premature drying and from the weather elements. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 Concrete Formwork
- B. Section 03300 Cast-In-Place Concrete
- C. Section 03350 Concrete Finishes
- D. Section 03732 Concrete Repairs

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. ACI 301 Specifications for Structural Concrete for Buildings
  - 2. ACI 304 Guide for Measuring, Mixing, Transporting, and Placing Concrete
  - 3. ACI 305 Hot Weather Concreting
  - 4. ACI 306 Cold Weather Concreting
  - 5. ACI 308 Standard Practice for Curing Concrete
  - 6. ASTM C171 Standard Specifications for Sheet Materials for Curing Concrete
  - 7. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
  - 8. ASTM C1315 Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

## 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Proposed procedures for protection of concrete under wet weather placement conditions.
  - 2. Proposed normal procedures for protection and curing of concrete.
  - 3. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.
  - 4. Proposed method of measuring concrete surface temperature changes.
  - 5. Manufacturer's literature and material certification for proposed curing compounds.

## PART 2 -- PRODUCTS

## 2.01 LIQUID MEMBRANE-FORMING CURING COMPOUND

- A. Clear curing and sealing compound shall be a clear styrene acrylate type complying with ASTM C 1315, Type 1, Class A with a minimum solids content of 30%. Moisture loss shall not be greater than 0.40 kg/m<sup>2</sup> when applied at 300 sq.ft./gal. Manufacturer's certification is required. Acceptable products are Super Diamond Clear VOX by the Euclid Chemical Company, MasteKure CC 300 SB by BASF Master Builder Solutions, and Cure & Seal 30 Plus by Symons Corporation.
- B. Where specifically approved by Engineer, on slabs to receive subsequent applied finishes, compound shall conform to ASTM C 309. Acceptable products are "Kurez DR VOX" or "Kurez W VOX" by the Euclid Chemical Company. Install in strict accordance with manufacturer's requirements.

## 2.02 EVAPORATION REDUCER

A. Evaporation reducer shall be BASF, "MasterKure ER 50", or Euclid Chemical "Euco-Bar".

## PART 3 -- EXECUTION

#### 3.01 PROTECTION AND CURING

- A. All freshly placed concrete shall be protected from the elements, flowing water and from defacement of any nature during construction operations.
- B. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a 5-day period thereafter except for high early strength concrete, for which the period shall be at least the first three days after placement. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted.

- C. Walls that will be exposed on one side with either fluid or earth backfill on the opposite side shall be continuously wet cured for a minimum of five days. Use of a curing compound will not be acceptable for applications of this type.
- D. The Contractor shall use one of the following methods to insure that the concrete remains in a moist condition for the minimum period stated above.
  - 1. Ponding or continuous fogging or sprinkling.
  - 2. Application of mats or fabric kept continuously wet.
  - 3. Continuous application of steam (under 150°F).
  - 4. Application of sheet materials conforming to ASTM C171.
  - 5. If approved by the Engineer, application of a curing compound in accordance with Article 3.04.
- E. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in paragraph D.
- F. Any of the curing procedures used in Paragraph 3.01-D may be replaced by one of the other curing procedures listed in Paragraph 3.01-D after the concrete is one-day old. However, the concrete surface shall not be permitted to become dry at any time.

## 3.02 CURING CONCRETE UNDER COLD WEATHER CONDITIONS

- A. Suitable means shall be provided for a minimum of 72 hours after placing concrete to maintain it at or above the minimum as placed temperatures specified in Section 03300, Cast-In-Place Concrete, for concrete work in cold weather. During the 72-hour period, the concrete surface shall not be exposed to air more than 20°F above the minimum as placed temperatures.
- B. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures. This retardation is magnified when using concrete made with blended cements or containing fly ash or ground granulated blast furnace slag. Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete.
- C. The methods of protecting the concrete shall be approved by the Engineer and shall be such as will prevent local drying. Equipment and materials approved for this purpose shall be on the site in sufficient quantity before the work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection. All such thermometers shall be furnished by the Contractor in quantity and type which the Engineer directs.
- D. Curing procedures during cold weather conditions shall conform to the requirements of ACI 306.

## 3.03 CURING CONCRETE UNDER HOT WEATHER CONDITIONS

- A. When air temperatures exceed 85°F, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. If ordered by the Engineer, temporary sun shades and/or windbreakers shall be erected to guard against such developments, including generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.
- B. Immediately after screeding, horizontal surfaces shall receive an application of evaporation reducer. Apply in accordance with manufacturer's instructions. Final finish work shall begin as soon as the mix has stiffened sufficiently to support the workmen.
- C. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing consisting of method 1 or 2 listed in paragraph 3.01D is mandatory for at least the first 24 hours. Method 2 may be used only if the finished surface is not marred or blemished during contact with the coverings.
- D. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least six (6) additional days using one of the methods listed in paragraph 3.01D.
- E. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305.

## 3.04 USE OF CURING COMPOUND

- A. Curing compound shall be used only where specifically approved by the Engineer. Curing compound shall never be used for curing exposed walls with fluid or earth backfill on the opposite side. A continuous wet cure for a minimum of five days is required for these applications. Curing compound shall not be used on surfaces exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.
- B. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.
- C. The compound shall be applied in accordance with the manufacturer's recommendations after water sheen has disappeared from the concrete surface and after finishing operations. Maximum coverage for the curing and sealing compound shall be 300 square feet per gallon for trowel finishes and 200 square feet per gallon for floated or broom surfaces. Maximum coverage for compounds placed where subsequent finishes will be applied shall be 200 square feet per gallon. For rough surfaces, apply in two directions at right angles to each other.

# 3.05 EARLY TERMINATION OF CURING

- A. Moisture retention measures may be terminated earlier than the specified times only when at least one of the following conditions is met:
  - 1. The strength of the concrete reaches 85 percent of the specified 28-day compressive strength in laboratory-cured cylinders representative of the concrete in place, and the temperature of the in-place concrete has been constantly maintained at 50 degrees Fahrenheit or higher.

2. The strength of concrete reaches the specified 28-day compressive strength as determined by accepted nondestructive methods or laboratory-cured cylinder test results.

# **END OF SECTION**

#### SECTION 03600

## GROUT

## PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. Furnish all materials, labor, and equipment required to provide all grout used in concrete work and as bearing surfaces for base plates, in accordance with the Contract Documents.
- 1.02 RELATED WORK SPECIFIED ELSEWHERE
  - A. Requirements of related work are included in Division 1 and Division 2 of these Specifications.
- 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS
  - A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1.	CRD-C 621	Corps of Engineers Specification for Non-Shrink Grout
2.	ASTM C 109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm cube Specimens)
3.	ASTM C 531	Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacings
4.	ASTM C 579	Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings
5.	ASTM C 827	Standard Test Method for Early Volume Change of Cementitious Mixtures
б.	ASTM C 144	Standard Specification for Aggregate for Masonry Mortar
7.	ASTM C 1107	Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)

#### 1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 - Submittals.

- 1. Certified test results verifying the compressive strength and shrinkage and expansion requirements specified herein.
- 2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

## 1.05 QUALITY ASSURANCE

#### A. Field Tests

- 1. Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications. The specimens will be made by the Engineer or its representative.
  - a. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days, 28 days and any additional time period as appropriate.
  - b. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C 579, Method B, at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days and any other time period as appropriate.
- 2. The cost of all laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Engineer in obtaining specimens for testing. The Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The Contractor shall supply all materials necessary for fabricating the test specimens, at no additional cost to the Owner.
- 3. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

## PART 2 -- PRODUCTS

## 2.01 MATERIALS

- A. Cement Grout
  - 1. Cement grout shall be composed of Portland Cement and sand in the proportion specified in the Contract Documents and the minimum amount of water necessary to obtain the desired consistency. If no proportion is indicated, cement grout shall consist of one part Portland Cement to three parts sand. Water amount shall be as required to achieve desired consistency without compromising strength requirements. White Portland Cement shall be mixed with the Portland Cement as required to match color of adjacent concrete.

- 2. The minimum compressive strength at 28 days shall be 4000 psi.
- 3. For beds thicker than 1-1/2 inch and/or where free passage of grout will not be obstructed by coarse aggregate, 1-1/2 parts of coarse aggregate having a top size of 3/8 inch should be added. This stipulation does not apply for grout being swept in by a mechanism. These applications shall use a plain cement grout without coarse aggregate regardless of bed thickness.
- 4. Sand shall conform to the requirements of ASTM C144.
- B. Non-Shrink Grout
  - Non-shrink grout shall conform to CRD-C 621 and ASTM C 1107, Grade B or C when tested at a max. fluid consistency of 30 seconds per CDC 611/ASTM C939 at temperature extremes of 45°F and 90°F and an extended working time of 15 minutes. Grout shall have a min. 28day strength of 7,000 psi. Non-shrink grout shall be, "Euco N-S" by the Euclid Chemical Company, "Sikagrout 212" by Sika Corporation, "Conspec 100 Non-Shrink Non-Metallic Grout" by Conspec, "Masterflow 555 Grout" by BASF Master Builder Solutions.
- C. Epoxy Grout
  - 1. Epoxy grout shall be "Sikadur 32 Hi-Mod" by Sika Corporation, "Duralcrete LV" by Tamms Industries, or "Euco #452 Series" by Euclid Chemical, "MasterEmaco ADH 1090 RS" by BASF Master Builder Solutions.
  - 2. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer's instructions.
- D. Epoxy Base Plate Grout
  - 1. Epoxy base plate grout shall be "Sikadur 42, Grout-Pak" by Sika Corporation, or "Masterflow 648" by BASF Master Builder Solutions.

## 2.02 CURING MATERIALS

A. Curing materials shall be as specified in Section 03370, Concrete Curing for cement grout and as recommended by the manufacturer for prepackaged grouts.

## PART 3 -- EXECUTION

- 3.01 GENERAL
  - A. The different types of grout shall be used for the applications stated below unless noted otherwise in the Contract Documents. Where grout is called for in the Contract Documents which does not fall under any of the applications stated below, non-shrink grout shall be used unless another type is specifically referenced.

- 1. Cement grout shall be used for grout toppings and for patching of fresh concrete.
- 2. Non-shrink grout shall be used for grouting beneath base plates of structural metal framing.
- 3. Epoxy grout shall be used for bonding new concrete to hardened concrete.
- 4. Epoxy base plate grout shall be used for precision seating of base plates including base plates for all equipment such as engines, mixers, pumps, vibratory and heavy impact machinery, etc.
- B. New concrete surfaces to receive cement grout shall be as specified in Section 03350, Concrete Finishes, and shall be cleaned of all dirt, grease and oil-like films. Existing concrete surfaces shall likewise be cleaned of all similar contamination and debris, including chipping or roughening the surface if a laitance or poor concrete is evident. The finish of the grout surface shall match that of the adjacent concrete. Curing and protection of cement grout shall be as specified in Section 03370, Concrete Curing.
- C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- D. The Contractor, through the manufacturer of a non-shrink grout and epoxy grout, shall provide on-site technical assistance upon request, at no additional cost to the Owner.

## 3.02 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow.
- 3.03 MEASUREMENT OF INGREDIENTS
  - A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.
  - B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

## 3.04 GROUT INSTALLATION

A. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted and be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer. For grouting beneath base plates, grout shall be poured from one side only and thence flow across to the open side to avoid air-entrapment.

# **END OF SECTION**

#### SECTION 03732

#### CONCRETE REPAIRS

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials, labor, equipment, tools, etc., required for the repair, renovation, and replacement of concrete and/or reinforcing steel as indicated on the Drawings, specified herein, and determined by field survey.

The Contractor, in conjunction with the Engineer, shall determine the extent of cracked or deteriorated concrete to be rehabilitated and/or resurfaced. A summary of the work to be performed shall be submitted to the Engineer for review, and such summary shall be approved by the Engineer prior to commencement of the Work.

- B. Concrete repairs include the following:
  - 1. Repair spalled concrete along the building canopies, stairways, and walkways.
  - 2. Repair cracks along the building canopies, stairways, and walkways.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 1 General Requirements
- B. Division 3 Concrete
- C. Section 01025 Measurement and Payment

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Shall be as specified in Section 01090, Reference Standards.

### 1.04 SUBCONTRACTOR/APPLICATOR QUALIFICATIONS

The Contractor shall furnish the name of all subcontractors/applicators which he proposes to use for this work, including necessary evidence and/or experience records to ascertain their qualifications in the application of epoxy, urethane, and polymer-modified repair materials. Approved applicator qualifications shall include:

- A. A minimum of 5 years experience in applying epoxy, urethane, and polymer-modified and cementbased repair materials similar to those specified in this Section.
- B. A letter from the manufacturer of the specified materials, on the manufacturer's letterhead, signed by an officer of the company, stating that the subcontractor/applicator has been trained in the proper

techniques for applying the product, including surface preparation and mixing, placing, curing, and caring for the manufacturer's products. This letter shall further state that the subcontractor/applicator is on the manufacturer's approved list of contractors.

## 1.05 SUBMITTALS

- A. Material certifications and technical data sheets on all grouts, mortars, epoxy resins, aggregates and repair products specified in this Section.
- B. Subcontractor/Applicator qualifications as specified in Section 1.04.
- C. Shop Drawings detailing any planned deviation from the proposed construction sequence and/or method of repair.
- D. The Contractor, based on their experience in their profession, and/or recommendation from product manufacturers, may submit to the Engineer for approval, alternative materials and/or methods of work to assure the durability and watertight integrity of the repair work performed.
- E. Detailed repair procedures for each repair type.
- F. Letter from repair material manufacturer(s) certifying that all repair materials to be used to create single repairs are compatible for use together.
- 1.06 ADDITIONAL GUARANTEE
  - A. The Contractor shall guarantee all repair work performed under this Contract against defects in workmanship resulting in leakage and/or failure of concrete bond for a period of three (3) years from the date of the Certificate of Substantial Completion.

# PART 2 -- MATERIALS

## 2.01 GENERAL

- A, All concrete repair materials, when used in combination to create a single repair, shall be compatible.
- 2.02 WATER
  - A. The water used for mixing concrete repair products shall be clear, potable, and free of deleterious substances.

## 2.03 AGGREGATE

A. All aggregate shall conform to ASTM C-33. The aggregate supplier shall submit to the Engineer documentation that the proposed aggregates comply with ASTM C-33 and the requirements listed below:

B. Pea Gravel - Pea gravel shall meet the gradation and material requirements of Standard Size 14 as defined by ASTM C-33. Pea gravel shall be clean and free from deleterious matter and shall contain no limestone.

## 2.04 EPOXY BONDING AGENT

A. Epoxy bonding agent shall conform to ASTM C-881 Type I, II, IV or V; Grade 2 for epoxy resin adhesives, depending on the application. The class of epoxy bonding agent shall be suitable for all ambient and substrate temperatures. The epoxy resin shall be "Sikadur Hi-Mod Series" as manufactured by the Sika Corp, Lyndhurst, NJ, "Duralbond" as manufactured by Euclid Chemical Company, Cleveland, OH, "Euco #452 Series" by the Euclid Chemical Company, or "MasterEmaco ADH series" by BASF Master Builder Solutions.

## 2.05 ANTI-CORROSION REBAR COATING

A. Anti-corrosive coating shall be a two-component, polymer-modified cementitious material such as "Sika Armatec 110 EpoCem" manufactured by Sika Corp., Lyndhurst, NJ, "Duralprep A.C." by the Euclid Chemical Company, or "MasterEmaco P 124" by BASF Master Builder Solutions.

#### 2.06 TYPE I CRACK REPAIR - CEMENTITIOUS SURFACE SEAL

A. Type I Crack Repair - Cementitious Surface Seal shall be a one- or two-component, polymer-modified or silica fume enhanced trowel grade cementitious mortar. Type I Crack Repair material shall be "Sikatop 123 Plus" manufactured by Sika Corp., Lyndhurst, NJ; "Verticoat" or "Verticoat Supreme" by Euclid Chemical Company; or "Emaco S88 CI" by BASF Master Builder Solutions.

## 2.07 TYPE II CRACK REPAIR – EPOXY INJECTION CRACK REPAIR

A. Type II Crack Repair – Epoxy Injection Crack Repair shall be a two-component, 100% solids, high-modulus, low viscosity, moisture insensitive epoxy adhesive designed for structural repair. The epoxy adhesive shall be "Sikadur 52" manufactured by Sika Corp., Lyndhurst, NJ, "Duralcrete LV" manufactured by Euclid Chemical Company, Cleveland, OH, "Eucopoxy Injection Resin" by the Euclid Chemical Company, or "MasterInject 1500" by BASF Master Builder Solutions.

# 2.08 SPALL REPAIR PATCHING MATERIAL

- A. All spall repairs not requiring formwork shall be repaired using a one- or two-component, polymermodified non-shrink cementitious mortar and shall have a minimum 28-day compressive strength of 7,000 psi. Spall repair mortar for use in horizontal applications shall be "Sikatop 122 Plus" manufactured by Sika Corp., Lyndhurst, NJ, "Eucocrete Supreme" or "Duraltop Flowable Mortar" by the Euclid Chemical Company, or "MasterEmaco T-302" or Emaco R310 by BASF Construction Chemicals. Spall repair mortar for use in vertical and overhead applications shall be "Sikatop 123 Plus" manufactured by Sika Corp., Lyndhurst, NJ, "Verticoat or Verticoat Supreme" by the Euclid Chemical Company, or "MasterEmaco N 425" or "MasterEmaco N 400" by BASF Master Builder Solutions.
- B. All spall repairs requiring formwork shall be repaired using a two-component, polymer-modified cementitious mortar/pea gravel mixture and shall have a minimum 28-day compressive strength of

7,000 psi. Spall repair mortar shall be "SikaTop 111 PLUS" manufactured by Sika Corp., Lyndhurst, NJ, "Eucocrete Supreme" manufactured by Euclid Chemical Company, Cleveland, OH, or "MasterEmaco T 310 CI" by BASF Master Builder Solutions.

## 2.09 STORAGE OF MATERIALS

A. The Contractor shall provide an area for repair material storage free from exposure to moisture in any form, before, during, and after delivery to the site. Manufactured materials shall be delivered in unbroken containers labeled with the manufacturer's name and product type. All mortar products shall be stored on raised platforms. Materials susceptible to damage by freezing shall be stored in a dry, heated, insulated area. Any material that has hardened, partially set, become caked and/or has been contaminated or deteriorated shall be rejected. All aggregates shall be stored in clean bins, scows or platforms.

#### PART 3 -- INSTALLATION

#### 3.01 GENERAL REQUIREMENTS

- A. No repair work shall be undertaken when ambient temperatures are below manufacturer's safe recommendations. No admixtures, except those required by the manufacturer, shall be used in the repairs specified herein.
- B. All products shall be applied in strict accordance with manufacturer's recommendations. The Contractor shall furnish and install safe scaffolding and ladders for the Engineer's prework inspection, the repair work activities, and the Engineer's final inspection
- C. Sandblast or waterblast (3000-5000 psi waterjet) or use low impact hand chipping tools to clean deteriorated areas and remove all loose concrete, existing coatings, unsound material, debris, and laitance. All surfaces shall be clean, free of dirt, grease, loose particles, and deleterious substances and shall be prepared according to manufacturer's requirements

#### 3.02 EPOXY BONDING AGENT

- A. An epoxy bonding agent shall be used when applying fresh concrete to previously placed concrete unless otherwise recommended by the manufacturer.
- B. Existing concrete surfaces shall be roughened (1/16" or CSP 5 minimum profile) unless otherwise recommended by the manufacturer prior to application of bonding agent. Concrete surface shall be clean and sound, free of all foreign particles and laitance. Repair material shall be placed while bonding agent is still tacky. If bonding agent cures prior to placement of repair material, bonding agent shall be reapplied.
- C. Repairing concrete with epoxy mortars shall conform to all the requirements of ACI 503.4 "Standard Specification for Repairing Concrete with Epoxy Mortars" (latest edition), except as modified herein.
- 3.03 ANTI-CORROSION REBAR COATING

A. Reinforcing steel cut or exposed during demolition and/or repair operations shall be sandblasted and cleaned prior to coating with an anti-corrosive coating. Anti-corrosive coating shall be applied as soon as the reinforcement is exposed and cleaned. Coating shall thoroughly cover all exposed parts of the steel and shall be applied according to manufacturer's recommendations.

## 3.04 TYPE I CRACK REPAIR – CEMENTITIOUS SURFACE SEAL

A. Where indicated on the Drawings, or as directed by the Engineer, existing nonstructural cracks 1/16" and wider in vertical and overhead surfaces or existing cracks between 1/16" and 1/4" wide in horizontal surfaces shall be repaired with Type I Crack Repair material. Rout crack to 3/4" wide by 3/4" deep V-notch to expose sound concrete. Where rebar has deteriorated or where deteriorated concrete extends below the top of rebar, crack shall be routed to expose 3/4" all around rebar. The resulting void in concrete shall be patched flush with the existing concrete surface using Type I Crack Repair material.

#### 3.05 TYPE II CRACK REPAIR – EPOXY INJECTION

- A. Vertical and Overhead Surfaces
  - 1. Where indicated on the Drawings, or as directed by the Engineer, existing structural cracks 1/4" wide or narrower shall be repaired by pressure injecting Type II Crack Repair material into the prepared crack. Seal crack surface using epoxy resin binder and install injection ports per manufacturer's recommendations. Holes drilled for injection ports shall not cut rebar. If rebar is encountered during drilling, the hole shall be abandoned and relocated, and the abandoned hole shall be patched immediately with non-shrink grout flush with the surface of the existing concrete. Once the surface sealing material has fully cured, inject crack with Type II Crack Repair material using standard pressure injection equipment as directed by the manufacturer.
- B. Horizontal Surfaces
  - 1. Where indicated on the Drawings, or as directed by the Engineer, existing structural cracks 1/4" wide or narrower shall be repaired using Type II Crack Repair by pressure injecting Type II Crack Repair material into the prepared crack. Seal crack surface using epoxy resin binder and install injection ports per manufacturer's recommendations. Holes drilled for injection ports shall not cut rebar. If rebar is encountered during drilling, the hole shall be abandoned and relocated, and the abandoned hole shall be patched immediately with non-shrink grout flush with the surface of the existing concrete. Once the surface sealing material has fully cured, inject crack with Type II Crack Repair material using standard pressure injection equipment as directed by the manufacturer.
  - 2. Where indicated on the Drawings, or as directed by the Engineer, existing structural cracks wider than 1/4" shall be repaired by gravity feeding Type II Crack Repair material into the prepared crack. First rout the concrete surface to form a 1/4" wide by 1/4" deep v-notch and clean the crack to remove all loose and foreign particles. Fill the crack with clean, dry sand

and then pour structural crack repair binder into V-notch, completely filling crack. As binder penetrates into crack, additional binder shall be applied to the V-notch.

#### 3.06 SPALL REPAIR PATCHING MATERIAL

- A. All voids or spalled areas to be repaired shall be chipped back to sound concrete a minimum 1/8" deep, with a minimum surface profile of CSP-5, cleaned and repaired with spall repair patching material according to manufacturer's recommendations. All patching shall provide a final finished surface which is flat, level and even with the existing concrete surface. Repair mortar shall not be feathered to meet existing concrete surface. Prior to commencing repair surface preparation, saw cut or grind a 1/2" deep groove around the perimeter around the repair area, perpendicular to the finished concrete surface to provide a square shoulder to the repair area. Repair areas shall be formed using clean, straight rectangular edges where possible. Final patching on horizontal surfaces shall receive a broom finish consistent with the finish on the existing structure.
- 3.07 CURING
  - A. All repair products shall be cured in strict accordance with manufacturer recommendations. Wet curing is preferred where possible.

#### 3.08 WORK IN CONFINED SPACES

A. The Contractor shall provide and maintain safe working conditions for all employees and subcontractors. Fresh air shall be supplied continuously to confined spaces through the combined use of existing openings, forced-draft fans and temporary ducts to the outside, or by direct air supply to individual workers. Fumes shall be exhausted to the outside from the lowest level of the confined space. Electrical fan motors shall be explosion-proof if in contact with fumes. No smoking or open fires shall be permitted in or near areas where volatile fumes may accumulate.

## **END OF SECTION**

#### SECTION 04051

# MORTAR AND MASONRY GROUT

# PART 1 GENERAL

## 1.01 SECTION INCLUDES

- A. Mortar and masonry grout as specified herein shall include, but not be limited to, portland cement, lime, sand, coarse aggregate, admixtures for use in mortar and masonry grout, and appurtenances.
- B. Mortar and masonry grout shall be provided where shown on the Contract Drawings, specified in the Specifications, or as required for a complete installation.

# 1.02 RELATED SECTIONS

А.	Section 04200		- Unit Masonry
В.	Section 04901		- Masonry and Stonework Restoration
C.	Section 07620		- Sheet Metal Flashing and Trim
D.	Section 07900		- Caulking and Sealants.
1.03	REFERENCES		
А.	ANSI A118.3	-	Specifications for Chemical Resistant, Water Cleanable Tile- Setting and -Grouting Epoxy and Water Cleanable Tile- Setting Epoxy Adhesive
В.	ASTM C144	-	Standard Specification for Aggregate for Masonry Mortar
C.	ASTM C150	-	Standard Specification for Portland Cement
D.	ASTM C207	-	Standard Specification for Hydrated Lime for Masonry Purposes
E.	ASTM C270	-	Standard Specification for Mortar for Unit Masonry
F.	ASTM C404	-	Standard Specification for Aggregates for Masonry Grout
G.	ASTM C476	-	Standard Specification for Grout for Masonry

- H. ASTM C780 Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
- I. ASTM C1019 Standard Test Method for Sampling and Testing Grout

## 1.04 DESIGN REQUIREMENTS

- A. Do not change brands of mortar materials during the course of the work.
- B. Where questions of compliance with the requirements of this Section arise, the specifications for mortar properties shall take precedence over the specification for mortar proportions.
- C. No change shall be made in the proportions established for mortar approved under the specifications for mortar properties nor shall material with different physical characteristics be utilized in mortar used in the work unless compliance with the specifications for mortar properties are re-established by Working Drawing data submission to Engineer.
- D. Two different air-entraining materials shall not be combined in mortar or grout.

# 1.05 SUBMITTALS

- A. The Contractor shall submit the following in accordance with the requirements of the General Conditions, and Division 1:
  - 1. Product Data: Manufacturer's specifications and installation instructions for proprietary materials.
  - 2. Certificates: Notarized certificates that the following comply with the specified requirements:
    - a. Portland cement
    - b. Hydrated lime
    - c. Mortar and grout aggregates
    - Certificates should be submitted stating that all Installers of the restoration repair mortar have successfully completed the training workshop for installation of the mortar. (Three day workshops for Installers of Jahn Restoration Mortars are offered by Cathedral Stone ® Products, Inc. and held at 7266 Park Circle Drive, Hanover, MD 21076; tel. (410) 782-9150; fax. (410) 782-9155.) or equivalent.

- e. Samples of all specified materials and Material Safety Data Sheets (MSDS) as appropriate
- 3. Design Mix: Certified design mix for mortar and grout.
- 4. Test Results: Results of mortar and grout tests as specified herein and as specified in referenced standards.
- 5. Samples:
  - a. Each type of colored mortar in metal channels at least 6-inches long, showing the range of color that can be expected in the finished work.
  - b. Complete selection of standard and custom colors of epoxy grout used for pointing mortar, for final selection by Engineer.
  - c. Label samples to indicate type and amount of colorant used. Engineer's review will be for color only. Compliance with all other requirements is the responsibility of Contractor.
- 6. Construction: Weight slips for grout materials at time of delivery.
- 7. Additional requirements for restoration repair mortar as follows:
  - a. In addition to the requirements above samples of restoration mortar shall be installed on the building. Do not make samples in cups or apply to plywood or other non-masonry surfaces. Restoration mortar samples shall be applied to an adjoining joint to be matched. Cast Stone, or Brick crack shall be applied directly to an existing material. All matches shall be established after cleaning of masonry is complete and accepted by the Engineer.
  - b. A match of custom color with the proper sand and aggregate to match existing materials shall be submitted to the engineer, and approved via mock-up in the field for each material repaired and or patched such as limestone, stone, brick and mortar.
  - c. Written verification from the Contractor that all specified items would be used. Provide purchase orders, shipping tickets, receipts, etc. to prove that the specified materials were ordered and received.
  - d. Provide a schedule of locations where each mortar and grout type will be used in the work prior to the commencement of the work for approval by the Engineer.

- e. Restoration Mortar Samples: Prepare a sample of each type of repair as indicated on the contract documents, using masonry removed from the building where designated by the Engineer. Prepare, install, and finish each sample repair according to the specifications. All samples must be applied to masonry. Prepare samples in an area where they will be exposed to the same conditions as will be present on the building during curing. Allow samples to cure at least five business days before obtaining Engineer's approval for color match. Samples should be viewed from a minimum distance of 6-feet.
- 8. Prior to installation, the Contractor shall submit layout drawings for approval, showing the extent of the crack remediation installations that are proposed to ensure that all construction and control joints, will be watertight. The drawings shall include elevations, sections, etc., and all details to show that a continuous watertight installation is provided.

## 1.06 QUALITY ASSURANCE

- A. The Contractor shall engage an independent testing agency to conduct tests specified herein and as follows:
  - 1. Mortar: Mortar tests shall be performed in accordance with ASTM C270.
  - 2. Grout: Grout tests shall be performed in accordance with ASTM C1019.
- B. Requirements of Regulatory Agencies: Wherever a fire-resistance classification is shown or scheduled for unit masonry construction (4-hour, 3-hour and similar designations), proportion mortar and masonry grouts to comply with the requirements established by UL and other governing authorities having jurisdiction at the Project Site.
- C. Installer certification: All restoration mortar repairs should be performed by a trained installer holding a Training Workshop Certificate from Cathedral Stone Products, Inc. or equivalent. Contractor shall maintain proof of this credential for each installer at the site at all times.

## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials:
  - 1. Materials shall not be delivered to the Site before the time of installation.
  - 2. Materials delivered and stored at the Site shall be from approved manufacturers and sources only.

- 3. Materials shall be delivered in sufficient quantities to allow continuity of the work.
- B. Storage of Materials:
  - 1. Materials shall be stored in original, undamaged containers with manufacturer's labels and seals intact.
  - 2. Cement shall be stored in weathertight containers that exclude moisture and contaminants.
  - 3. Hydrated lime shall be stored in weathertight containers that exclude moisture and contaminants.
  - 4. Aggregates shall be kept clean and free from other materials during transportation and handling. Aggregate shall be stockpiled in a manner to prevent segregation.
  - 5. Damage to materials during storage shall be prevented primarily by minimizing the amount of time they are stored at the Site before being incorporated into construction systems.
  - 6. Cold Weather Requirements for restoration mortar: Do not work in temperatures below 40° F, when the substrate is colder than 40° F, or when the temperature is expected to fall below 40° F for 48 hours after installation of repair mortars. Building an enclosure and heating areas to maintain this temperature may only be done with the written approval of the Engineer.
  - 7. Hot Weather Requirements for restoration mortar: Protect repair mortar from direct sunlight and wind. Do not use or prepare mortar when ambient air temperature is above 90° F.
- C. Handling of Materials:
  - 1. Materials shall be handled in such a manner to avoid damage or breakage.
  - 2. Materials shall not be exposed to detrimental conditions or physical damage. Materials which are so exposed shall be removed from the Site and shall not be incorporated into the work.
  - 3. Materials shall be handled in such a manner to prevent inclusion of contaminants.

- 4. Packages or containers shall not be opened until all preparatory work is complete and installation is to begin immediately. Materials shall not be allowed to become wet or soiled or covered with ice or snow.
- Non-shrink Grout: Shall be non-staining grout, "Euco N-S" by the Euclid Chemical Company, or "Masterflow 713" by Master Builders, or approved equal. All grout shall be mixed and placed in strict accordance with the directions of the manufacturer.

#### PART 2 PRODUCTS

## 2.01 MATERIALS

- A. Portland Cement:
  - 1. Provide Type I or III portland cement that conforms to the requirements of ASTM C150.
  - 2. Provide nonstaining portland cement of natural color or of the color required to be compatible with the required colored mortar pigment selected by Engineer.
- B. Hydrated Lime: Provide Type S hydrated lime that conforms to the requirements of ASTM C207.
- C. Sand for Mortar: Provide natural sand that conforms to the requirements of the following:
  - 1. ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.
  - 2. White Mortar Aggregates: Provide natural white sand or ground white stone for Portland cement-lime mortars, as required for compatibility with mortar colors selected by Engineer.
  - 3. Colored Mortar Aggregates: Provide ground marble, granite or other sound stone, as required to match the sample approved by Engineer for portland cement-lime mortars.
- D. Aggregates for Grout: Provide fine and coarse aggregates that conform to the requirements of ASTM C404.
- E. Coloring Additive: A mineral-oxide pigment, harmless to mortar set and strength shall be provided. Colors shall be as selected by the Engineer.
- F. Water: Provide clean and potable water from approved sources.

- G. Provide Restoration Mortar as distributed by the following or approved equal:
  - Jahn Mortars are distributed by Cathedral Stone® Products, Inc., 7266 Park Circle Drive, Hanover, MD 21076; tel. (410) 782-9150; fax. (410) 782-9155. Jahn Mortars are premixed cementitious repair materials formulated to match the color and texture of the existing masonry, and do not contain any acrylic, latex, or other synthetic polymer additives. The following are Jahn Mortars restoration products based on use:
    - a. M70 Limestone (custom color match)
    - b. M90 Precast (custom color match)
    - c. M100 Brick (custom color match)
    - d. M110 Pointing Mortar (custom color match)
    - e. M160 Bluestone, Granite (custom color match)
- H. Staining: One hundred per cent (100%) of pointed brick surface to be stained with the following product to provide weather appearance to match existing finish and color.
  - a. Liquidirt 94 by Edison Coatings,Inc
  - b. Approved equal

# I. CRACK INJECTION GROUT<sup>`</sup>

1. Crack injection grout shall be a high-solids, hydrophobic, polyurethane, liquid chemical grout. The material is pumped into cracks of masonry and voids to stop water infiltration. In the cured state, it shall form a solid material which is resistant to permanent water pressure and shall not attack bitumen, joint sealants, masonry or concrete.

- 2. Acceptable manufacturers shall be as listed below:
  - a. Sikafix HH by Sika Corporation.
  - b. Or approved equal

#### 2.02 MIXES

- A. Mortar: Provide mortar that conforms to the requirements of ASTM C270, except as modified herein, and of the type and color specified in the Contract Drawings.
  - 1. Provide a cement-lime mortar; masonry cement mortars are not acceptable.
  - 2. Calcium chlorides are not permitted.
  - 3. Admixtures shall not be used unless specifically directed otherwise in another section of this specification.
- B. Grout: Provide grout that conforms to the requirements of ASTM C476 for fine or coarse grout.
  - 1. Fine grout shall be used for filling spaces with openings less than 2 inches.
  - 2. Course grout shall be used for filling spaces with openings greater than 2 inches.
- C. Non-shrink Grout: Shall be non-staining grout, "Euco N-S" by the Euclid Chemical Company, or "Masterflow 713" by Master Builders, or approved equal. All grout shall be mixed and placed in strict accordance with the directions of the manufacturer.
- D. Proportions for Concrete Masonry Units (CMU): Type "S" as per ASTM C270 and shall have a flow suction greater than 70% of the flow after mixing and tested in accordance with ASTM C91.
  - 1. Proportions by volume: 1 part Portland cement to <sup>3</sup>/<sub>4</sub> part hydrated lime and 2<sup>1</sup>/<sub>2</sub> times the sum of the volumes of cement and lime for the aggregate.

- E. Masonry Cement: Shall be permitted for use providing the specified test results are met. Any masonry cement proposed for use shall also comply with the requirements of ASTM C91 and shall be type S, of a color selected by the Engineer.
  - 1. Prepackaged masonry cement shall contain Portland Cement, hydrated lime and with either plasticizing admixtures or hydraulic hydrated lime. Masonry cements which contain other materials, including ground limestone, ground slag, or other cementitious and non-cementitious materials, are not acceptable.
  - 2. Water shall be clean and free from injurious amounts of oil, acid, alkali, salt, organic matter or other deleterious substances.
- F. Masonry Grout: Shall conform to the requirements of ASTM C476. Strength of grout, tested in accordance with ASTM C1019 shall be at least approved equal to f'm but not less than 2000 psi.
  - Grout shall be tested for every 5000 square feet of masonry, with a minimum of one test per structure. Grout shall meet all requirements of ACI/ASCE 530, Section 4.
- G. Perlite aggregate and cement for light weight insulating concrete. Use a 24 lb. per cu. Ft. density perlite concrete for cornice fills in accordance with the mix design table for lightweight Perlite insulating concrete by the Perlite Institute, Inc.
  - 1. Cement shall be Type I, Type IT or Type III Portland cement meeting the requirements of ASTM Specification C-150.
  - Aggregate shall meet the sieve analysis of Perlite Institute specifications for lightweight Type "A" concrete aggregate and shall have a loose density of 7<sup>1</sup>/<sub>2</sub> to 12 lb. per cu. ft. when measured by the Shoveling Procedure of ASTM C-29.

- 3. Air entraining admixture shall be a standard solution recommended by Perlite Institute aggregate manufacturers.
- 4. Water shall be potable, clear and free from oil, acid, alkali, organic matter or other deleterious substances.

#### 2.03 MIXING

- A. Measurement of Materials:
  - 1. Cement and Hydrated Lime: Batched by the bag.
  - 2. Sand: Batched by volume in suitably calibrated containers. Make allowance for bulking and consolidation, and for weight per cubic foot of contained moisture.
  - 3. Proportion of Volumetric Mixtures: One 94-pound sack of Portland cement and one 50-pound sack of hydrated lime constitute nominal one cubic foot.
  - 4. Shovel measurement: Not permitted.
  - 5. Limit batch size to do not temper mortar.
- B. Proportions for Concrete Masonry Units: Type "S" as per ASTM C270 and shall have a flow suction greater than 79% of the flow immediately after mixing when tested in accordance with ASTM C91.
  - 1. Proportions by volume: 1 part Portland cement to 1/4 1/2 parts hydrated lime and not less than 2-1/4 or more than 3 times the sum of the volumes of cement and lime for the aggregate.
- C. Proportions for restoration pointing mortar.
  - 1. Ratio: Approximately 4 parts dry material to 1 part water: This ratio is approximate. Adjustments to the amount of water must be made according to local weather conditions. Excessive water will lighten the final color. Pointing mortar should be drier than setting mortar to help control color.
  - 2. Add water to dry ingredients and mix well. Adjust amount of water according to the weather and the porosity of the substrate.

- 3. A dust mask be worn during mixing. Do not mix more material than can be used within 30 minutes. Discard any mixed material that has been unused for 30 minutes or more.
- 4. Refer to Detailed Specification 04901G Masonry & Stonework Restoration & Cleaning for preparation prior to matching of joint and material colors.
- 5. Follow all manufacturer's recommendations
- D. Proportions for restoration brick repair mortar.
  - 1. Ratio: The mixing ratio is approximately 4 1/2 to 5 parts powder to 1 part water by volume, depending on temperature and humidity. More water may be required as ambient temperature rises. The mixing may be done by hand, stirring until the mortar is thoroughly mixed. The mortar should be the consistency of stiff putty, without lumps. M100 may also be mixed using a slow speed drill (400 - 600 rpm) equipped with a Jiffler-type mixing paddle. For best results, add the powder to the water slowly. The working time will vary, depending upon wind, temperature, and humidity. Using excessive water in the mixture may affect the color of the repair.
  - 2. A dust mask be worn during mixing. Do not mix more material than can be used within 30 minutes. Discard any mixed material that has been unused for 30 minutes or more.
  - 3. Refer to Detailed Specification 04901G Masonry & Stonework Restoration & Cleaning for preparation prior to matching of joint and material colors.
  - 4. Follow all manufacturer's recommendations
- E. Proportions for restoration limestone repair mortar.
  - Ratio: The mixing ratio is approximately 5 to 5 1/2 parts powder to 1 part water by volume, depending on temperature and humidity. More water may be required as ambient temperature rises. The mixing may be done by hand, stirring until the mortar is thoroughly mixed. The mortar should be the consistency of damp sand. M70 may also be mixed using a slow speed drill (400 - 600 rpm) equipped with a Jiffler-type mixing paddle. For best results, add the powder to the water slowly. The working time will vary, depending upon wind, temperature, and humidity. Using excessive water in the mixture may affect the color of the repair.

- 2. A dust mask be worn during mixing. Do not mix more material than can be used within 30 minutes. Discard any mixed material that has been unused for 30 minutes or more.
- 3. Refer to Detailed Specification 04901G Masonry & Stonework Restoration & Cleaning for preparation prior to matching of joint and material colors.
- 4. Follow all manufacturer's recommendations as required for the specified warranty

## F. Mortar:

- 1. All cementitious materials and aggregates shall be mixed between three and five minutes in a mechanical batch mixer with a sufficient amount of water to produce a workable consistency. Mortar shall not be hand mixed.
- 2. When required, cement and pigment shall be mixed for colored mortar prior to mixing in mortar. The maximum percentage by weight of cement for pigment shall be limited to 10 percent.
- 3. Limit batch size to avoid re-tempering.
- 4. Mortar that has begun to stiffen or is not used within two hours after initial mixing shall not be used.
- 5. The mixer drum shall be completely emptied before recharging the next batch.
- G. Mortar Temperature:
  - 1. For temperatures below 40 degrees F mortar materials shall be heated to protect both mortar and completed work from freezing.
  - 2. When outside air temperature is:
    - a. 25 to 40 degrees F: Mixing water and sand shall be heated to produce mortar temperature between 40 and 120 degrees F. Temperatures of mortar on boards shall be maintained above freezing.
    - b. Below 25 degrees F: Masonry shall not be installed.
  - 3. Ideal mortar temperature is 70 degrees  $F \pm 10$  degrees F. Mixing temperature selected shall be maintained within 10 degrees F.

- 4. Antifreeze compounds or calcium chloride in mortars shall not be used to lower the freezing point or accelerate setting.
- H. Grout: Grout shall be mixed in accordance with the requirements of ASTM C476.
- I. Perlite Concrete Mixing, Placing and Curing:
  - 1. Perlite concrete shall be mixed in a paddle type plaster or a drum type concrete mixer. The required amounts of water, air entraining admixture and Portland cement shall be placed in the mixer and shall be mixed until a slurry is formed. The proper quantity of perlite concrete aggregate shall then be added to the slurry and all materials mixed until design wet density is reached.
  - 2. Perlite concrete may also be transit mixed according to the procedure outlined by the Perlite Institute, Inc.. The perlite aggregate manufacturer shall be consulted for transit-mix recommendations.
  - Perlite concrete shall be carefully deposited and screeded in a continuous operation until a panel or section is completed. Steel troweling shall be avoided. Rodding, tamping and vibrating shall not be used unless so specified by the architect.
  - 4. One transverse highly compressible expansion joint one-inch thick shall be installed for every 100 lineal ft. of concrete and at all junctures of walls arid concrete. A highly compressible expansion joint shall consist of any suitable material which will compress to at least half of its thickness under a compressive load of 25 lb. per sq. in.
  - 5. Perlite concrete shall be protected for at least the first three days in accordance with good job practice to keep it from drying too rapidly or freezing. Freshly poured concrete shall be given adequate protection against damage by heavy rain. No traffic shall be allowed until concrete can sustain a man's weight without indentation. For roof deck use, concrete shall cure at least 5 to 7 days before placing of the built-ip roof. If rain occurs at the end. of the curing period, 1 to 2 additional days must be allowed before the built-up roof is placed.
  - 6. Perlite concrete shall not be placed in temperatures under 40° F, or on frosted surfaces. When it is anticipated that temperatures will be near or below 40°F. after the placing of the concrete, the mixing water shall be heated to a temperature of 75°F to 100°F. Provision also shall be made to protect the concrete from freezing until adequate strength is developed.

#### PART 3 EXECUTION

## 3.01 PREPARATION

A. Prior to placing mortar or grout, remove laitance, loose aggregate and any substance that may prevent mortar or grout from bonding to the foundation.

## 3.02 INSTALLATION

- A. Installation of mortar and grout shall be in accordance with the requirements of Section 04200 Unit Masonry.
- B. Installation of epoxy grout shall be in accordance with the manufacturer's instructions and recommendations.
- C. All unit masonry repair to comprise of replace except as indicated otherwise the follow are requirements for Restoration mortar for repair where expressly indicated:
  - Limestone/Stone or Brick Repair: Apply the mortar mix using a trowel in a series lifts with no waiting period or scratch coat necessary between layers, up to a total maximum thickness of 3". For repairs thicker than 3", apply mortar in two layers, allowing the first layer to cure for a while before applying the second layer. If applied in layers, scrape off any cement skin that has formed and continue application. Dampen the surface before applying the next layer. Work mortar firmly into the surface of the masonry, including the corners, and under and around all mechanical anchors.
  - 2. Limestone/Stone or Brick Body Repair: Build up repair material so that it is slightly above the adjacent masonry surface. Allow mortar 15 to 30 minutes to set slightly (wait time will vary with temperature and humidity–longer in cool weather), then scrape off excess material using a straight edge (a plasterer's miter rod is good for this). Do not press down or "float" the repair. Where repairs occur at panel edges or corners, form mortar to match the profile of the surrounding masonry. In all cases, finish repair so that it is as indistinguishable as possible from the adjacent masonry.
  - 3. Limestone/Stone Body Repair: To obtain a matching finish, the finished repair can be trowelled or "floated" to leave a smooth surface. This may cause the repair to lighten and may need to be stained or painted to match.
  - 4. Clean any mortar residues from area surrounding the repair by sponging as many times as necessary with clean water. This should be done before repair material sets.

- 5. After the repair has been cured and allowed to dry for at least one week, if the appearance of a repair does not meet with the approval of the Engineer, the surface color of the repair may be enhanced by applying a vapor permeable, mineral based pigmented stain. (Silin Lasur, a mineral based pigmented stain is available from Cathedral Stone® Products, Inc., 7266 Park Circle Drive, Hanover, MD 21076; tel. (410) 782-9150; fax. (410) 782-9155.) or approved equal at no additional cost to the City.
- D. Finishing techniques for Restoration Pointing Mortars:
  - 1. After mortar joint has "set" (the time for this will vary depending on the depth of the application, dampness of the masonry, and local weather conditions). The joint should then be tooled to the desired finish. Do not allow mortar to harden before tooling, to prevent "burning" the joint.
  - 2. Clean up should be done by brushing with a clean dry brush across the joint. If any mortar residue remains on the surface of the masonry unit, cleaning with clean water and a sponge is sufficient if done before the mortar dries. Cleaning with acids and/or power washers should be not necessary if good pointing practices are followed.
  - 3. Do not allow pointing mortar beyond the face of the masonry unit. All edges of masonry shall remain visible. Pointing mortar should be applied to ensure this, or can be "raked" back slightly to expose edges of masonry, giving historic appearance.
  - 4. Pointing (Restoration) Mortar can be applied in a single lift. Successive lifts with waiting periods between lifts are not necessary.
  - 5. Apply pointing mortar to a dampened surface, packing the mortar into the joint to ensure full depth compaction. The mortar should be brought flush with the face of the masonry unit, and left to set for final tooling.
- E. Crack Injection Grout General: Clean cracks or crevices with air pressure. Apply material into damped crack to inure good adhesion of material. Install packer ports a required for vertical installation of material. Follow manufactures instruction for all procedures. The following are standard procedures for Crack Injection Grout:
  - 1. Cracks to be injected of 1/2 in. or greater at surface, pack an open cell polyurethane foam saturated with the mixed SikaFix into the crack. Spray the

saturated foam with a small amount of water to activate the grout and create a surface seal flush with face of material being bonded.

- 2. Pump Crack Injection Grout >250 psi into or behind fissures or into voids which are allowing water to infiltrate into unwanted areas. If masonry being injected contains insufficient moisture to activate the grout, inject the crack with a small amount of water prior to injecting the chemical grout. Pump Crack Injection Grout for 45 seconds and then pause to allow the material to flow into all of the cracks and crevices. Watch for material flow and water movement to appear on the surface. When movement stops, begin injecting into the next packer. When sealing vertical cracks, begin injecting at the bottom of the crack and work vertically. If faster reaction time is needed, or if grout is being pumped at cold temperature, additional Accelerator can be added to base resin. Consult Technical Service or Technical Data Sheet for additional application information. Reinject to assure that all voids are properly sealed off.
- 3. Expanding Crack Injection Grout is exerting outward pressures of up to 450 psi. A review of drawings of the area to be repaired is desirable.
- 4. Limitations:
  - a. Minimum substrate temperature 40°F.
  - b. Minimum material temperature 60°F.
  - c. Cured material should be protected from sunlight.
  - d. All equipment in contact with material must be dry.
  - e. Confined, reacting Crack Injection Grout can produce up to 450 psi. Caution must be used.
  - f. Protect Crack Injection Grout Components from freezing. If frozen, discard.

## 3.03 FIELD QUALITY CONTROL

A. Mortar shall be prepared and tested for preconstruction and construction evaluation in accordance with the requirements of ASTM C780. Specimens for construction evaluation shall be prepared a minimum of every 500 square feet of masonry construction.

- B. Grout shall be prepared and tested for construction evaluation in accordance with the requirements specified in ASTM C1019. Specimens shall be prepared a minimum of every 100 cubic feet of grout placed.
- C. Mixing: By mechanically operated batch mixer with a water control device having an indicator. Drum shall be entirely discharged before recharging. Mix sand, lime, cement and admixtures dry for two (2) minutes minimum, add water and mix for an additional three (3) minutes minimum. Mix mortar with slightly less water than the maximum amount consistent with workability, to provide near maximum tensile bond strength. Mix only amount that can be used before initial set takes place, or within the first one-half hour, and then only replace water lost by evaporation.
- D. Mixers, wheel barrows, mortar boards, etc., shall be kept clean.
- E. Retempering of mortar will not be permitted and mortar that has been allowed to stand more than one (1) hour shall not be used.
- F. Mortar shall be mixed and tempered on the mortar boards so to contain as much water as necessary at all times.
- G. Mortar specified under this Section to be used for installation of Unit Masonry work specified under Section 04200.

# **END OF SECTION**

#### SECTION 04200

#### UNIT MASONRY

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Unit masonry as specified herein shall include, but not be limited to, face brick, glazed masonry unit, concrete masonry units, ground face concrete masonry units, reinforcement, anchorage, and all accessories and appurtenances.
- B. Unit masonry items shall be provided where shown on the Contract Drawings, specified in the Detailed Specifications, or as required for a complete installation.

## 1.02 RELATED SPECIFICATIONS

- A. Section 04051 Mortar and Masonry Grout
- B. Section 04700 Cast Stone
- C. Section 04901 Masonry and Stonework Restoration and Cleaning
- D. Section 07620 Sheet Metal Flashing and Trim

## 1.03 REFERENCES

- A. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- B. ASTM A615/A615M Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- C. ASTM C90 Specification for Load-Bearing Concrete Masonry Units
- D. ASTM C744 Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units
- E. Masonry Standards Joint Committee (MSJC):
- F. ACI 530/ASCE 5/TMS 402 Building Code Requirements for Masonry Structures
- G. ACI 530.1/ASCE 6/TMS 602 Specification for Masonry Structures
- H. Pennsylvania State Building Code
- I. OSHA Occupational Safety and Health Administration

## 1.04 DESIGN REQUIREMENTS

- A. Provide masonry accessories of sizes, dimensions and configurations coordinated with unit masonry construction system component sizes, dimensions and configurations.
- B. Where structural steel will be provided with fireproofing do not use welded-on channel slots. Coordinate required offset of welded-on wire ties with depth of fireproofing.
- C. Concrete Masonry Units: Limit total moisture absorption until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the United States Weather Bureau Station nearest the Site and the corresponding percentage of total linear drying shrinkage of the concrete masonry units.
- D. Comply with ASTM C90 Climatic Map establishing criteria for percent annual mean relative humidity.
- E. Structural elements of masonry shall conform to the requirements of ACI 530/ASCE 5/TMS 402 for materials and installation.
- F. Masonry materials and installation shall conform to the requirements of ACI 530.1/ASCE 6/TMS 602.

### 1.05 SUBMITTALS

- A. The Contractor shall prepare and submit for approval catalog cuts, drawings, and reference materials in accordance with Section 01300 submittals. Submittals shall include the following:
  - 1. Samples: The Contractor shall submit three samples each of face brick, structural glazed brick, glazed structural tile and decorative concrete masonry units that are representative of the full range of color, shading and texture of the material to be provided.
  - 2. Test Reports: The Contractor shall submit material test reports or manufacturer's certificate of compliance for face brick, structural glazed brick, concrete masonry units, and glazed structural tile.
- B. Working Drawings: Submit for approval the following:
  - 1. Copies of manufacturer's specifications and installation instructions for each masonry accessory required. Include data substantiating that materials comply with specified requirements.
  - 2. Provide drawings and material schedules showing all dimensions and sizes of masonry accessories coordinated with unit masonry construction work, and other work in which masonry accessories will be embedded, be supported from, or restrain.

- 3. Indicate methods for identifying and coordinating, at the site, the location and accurate placement of each masonry accessory in unit masonry construction as the work progresses. Indicate by letter of transmittal that items which must be installed in the shop have been received in time for proper sequencing of the work to avoid delays.
- 4. Explanation of where each masonry accessory will be used in the work, quantities purchased and intended spacings indicating compliance with code requirements.
- 5. Masonry control joint locations and details.
- 6. Drawings showing the location, extent and accurate configuration and profile of all items shown, specified and required by this and other Sections to be built into the unit masonry construction as the work progresses. Provide elevations drawn at 1/4-inch scale and all details drawn at 1-1/2-inch scale.
- 7. Drawings for fabrication, bending, and placement of reinforcing bars. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcing for unit masonry construction.

### 1.06 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Wherever a fire-resistance classification is shown or scheduled for unit masonry construction (4-hour, 3-hour and similar designations), provide masonry accessories, masonry units and unit masonry construction complying with the requirements established by UL and other governing authorities having jurisdiction at the Project Site.
- B. Source Quality Control: Provide all metal sheet, wire, plate and bar stock masonry accessories from the same manufacturer.
- C. Sample Panel: The Contractor shall erect a sample panel where designated by the Architect:
  - 1. The sample panel shall include facing brick, bond pattern, restoration mortar, tooled joints, control joint, reinforcing and backup.
  - 2. Upon approval, the sample panel shall remain in place for the duration of masonry construction and shall be used as a basis of comparison for all masonry work. The sample panel shall be placed no further than 50-feet from the building
  - 3. After final approval of finished masonry work by the Engineer, the Contractor shall demolish the sample panel, and shall perform all site restoration work.
- D. Performance Criteria:

- 1. Provide masonry accessories of sizes, dimensions and configurations coordinated with unit masonry construction system component sizes, dimensions and configurations.
  - a. Where continuous horizontal wall reinforcement is specified. Coordinate dimensions with thickness of existing walls for proper clearances.
  - b. Where structural steel will be provided with fireproofing do not use weldedon channel slots. Coordinate required offset of welded-on wire ties with depth of fireproofing.

## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. General: All products and materials shall be delivered, stored, and handled as follows.
- B. Delivery and Storage: Masonry materials delivered and stored at the site shall be from approved manufacturers and sources only.
- C. Masonry Units:
  - 1. Masonry units shall be handled in a manner which prevents undue breakage or chipping.
  - 2. Masonry units shall be unloaded using brick clamps.
  - 3. All masonry units shall be stored on platforms under shelter or in another approved manner so as to protect these materials from soil and weather.
- D. Rejection: masonry unit, and architectural terra cotta units that are warped, cracked or of inferior quality will be rejected. Such items shall be removed from the site and not offered again for inspection.
- PART 2 PRODUCTS
- 2.01 MANUFACTURERS
  - A. Face Brick shall be Brick to match existing Color and Size as manufactured by the following:
    - 1. Ragland Clay Products as distributed by Consolidated brick Company match existing brick and submit for approval.
    - 2. Or approved equal as a complete match of existing brick.
  - B. Model numbers and description of placement for masonry accessories are in table "04200 Masonry Accessories Listing" at the end of this Section. Acceptable manufacturers are listed as follows:

- 1. Masonry Accessories
  - a. Holman and Barnard, Inc.
  - b. Or approved equal.

#### 2.02 MATERIALS

- A. Brick: brick shall conform to ASTM C216, Grade SW, Type FBS.
  - 1. Face Sizes:
    - a. Face Brick: 2-1/4-inches by 7-5/8-inches by 3-5/8-inches (Modular Size), match existing.
  - 2. Special Shapes: Special shapes, such as closures, header units, and jamb units shall be provided as necessary to complete the work. Special shape units shall conform to the applicable provisions for the units with which they are used.
  - 3. Cure units by autoclave treatment at minimum temperature of 350 F, and a minimum pressure of 125 pounds per square inch.
- B. Rebar Positioners: The Contractor shall provide vertical and horizontal rebar positioners spaced at in accordance with space of reinforcing bars in unit masonry walls.
- C. Metal Accessories:
  - 1. For interior walls and partitions, and as required to secure masonry to adjoining construction, the Contractor shall provide hot-dipped galvanized metal anchors, ties and reinforcements conforming to ASTM A153/A153M, Class B2 that are galvanized after cutting.
  - 2. For exterior walls, the Contractor shall provide Type 316 stainless steel for anchors, anchor slots, ties and horizontal reinforcement.
  - 3. Deformed reinforcing bars shall conform to ASTM A615/A615M Grade 60. Horizontal Joint Reinforcement: Horizontal reinforcing shall be 2 inches less in width than the actual thickness of the wall or partition in which it is to be placed.
  - 4. Solid interior or exterior masonry walls: Walls shall be reinforced horizontally with truss type, standard 9 gauge (.148-inch) by 9 gauge (.148-inch). Reinforcing shall be spaced at 8-inch centers vertically.
  - 5. Corners: Corners shall be reinforced with the same type as wall reinforcing, standard 9 gauge (.148 inch) by 9 gauge (.148-inch), spaced in the same course as the wall reinforcing.
  - 6. Intersections: Intersections between walls and partitions shall be reinforced horizontally with same type as wall reinforcing, standard 9 gauge (.148-inch) by 9

gauge (.148-inch), spaced in the same course as the wall reinforcing.

- D. Rigid Anchors: Rigid steel anchors shall be 1 inch wide (minimum), 3/16 inch thick, and 18 inches long between bent ends. Each end shall be bent down 3 inches (minimum) into mortar filled masonry cells.
- E. Column Anchors: Masonry shall be anchored to columns at 24-inch centers with stainless steel anchors.
- F. Metal Fastenings: Bolts, metal wall plugs or other approved metal fastenings for securing items to masonry and elsewhere shall be provided and installed in accordance with Specification 05092 Metal Fastening.
- G. Mortar Materials: Mortar materials shall be in accordance with Section 04051 Mortar and Masonry Grout.
- PART 3 EXECUTION
- 3.01 GENERAL
  - A. Build chases and recesses as shown or required by others. Provide not less than 8 inches of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.
  - B. Leave openings for equipment, piping, ducts, and other items to be installed subsequent to starting of unit masonry construction. After installation of said items, complete unit masonry construction to match work immediately adjacent to openings.
  - C. Use full size units without cutting wherever possible. Provide special unit masonry shapes for all transitions and intersections. Do not field-cut special shapes from regular unit masonry shapes or substitute other alternatives for the use of special unit masonry shapes.
  - D. Build interior masonry walls, visible from both sides in the finished work, using two wythes of masonry. Masonry units shall be continuous over the entire plan of the wall including walls which continue behind fixtures, equipment, furniture, lockers and similar items.
  - E. Environmental Conditions: Materials and surrounding air temperature shall be maintained at a minimum 40 degrees F prior to, during, and 72 hours after completion of masonry work. Masonry shall not be erected when the ambient temperature is below 32 degrees F with a rising or falling temperature, or when there is a probability of such a condition existing within 48 hours, unless special provisions are made for heating the materials and protecting the work from freezing. Work will not be permitted with or on frozen materials. Use of masonry units having a film of frost on their surfaces will not be permitted.
  - F. Sample Panel: Masonry work shall not be started until the specified sample panel has

been approved. The sample panel shall be used as a standard for comparison of masonry work. Sample panel shall be destroyed only after all masonry work has been completed and approved by the Engineer.

- G. Protection: At all times, surfaces of masonry on which work is not being performed shall be protected. When rain or snow is imminent and work is discontinued, tops of exposed masonry walls and similar surfaces shall be covered with a strong waterproof membrane, well secured in place.
- H. Coursing: Masonry walls shall be carried up level and plumb all around. Do not carry up one section of the walls in advance of the others, unless specifically approved. Heights of masonry shall be checked with an instrument at each floor, and at sills and heads of openings, to maintain the level of walls. Masonry courses shall be maintained to a uniform dimension. Vertical and horizontal joints shall be formed to a uniform thickness. Concrete masonry units shall be laid in running bond. One unit and one mortar joint shall be coursed to equal 8 inches. Mortar joints shall be tooled to be concave.
- I. Placing and Bonding: Solid masonry units shall be placed in a full bed of mortar, with full head joints, and shall be uniformly jointed with other work.
  - 1. Mortar Removal: Excess mortar shall be removed as the installation progresses.
  - 2. Corners and Intersections: Intersections and external corners shall be interlocked. Horizontal reinforcing shall be spliced at intersections and corners with a 6-inch overlap of side rods.
  - 3. Adjustment: Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, mortar shall be removed and replaced with new mortar.
  - 4. Cutting: Job site cutting of exposed masonry units shall be performed with power masonry saws to provide straight, clean, unchipped edges. Cutting work shall utilize a continuous rim wet cutting diamond blade suitable for cutting these material types. Broken masonry unit corners or edges shall not be allowed.
  - 5. Flush Joints: Mortar joints shall be cut flush where ceramic wall tile is to be installed.
  - 6. Control Joints: Nonload-bearing masonry partitions shall be isolated from vertical and horizontal structural framing members with control joints.
  - 7. Placing Metalwork: Structural steelwork, bolts, anchors, inserts, plugs, ties, lintels and miscellaneous metalwork specified in other Sections, shall be placed and built into position as the installation progresses.
  - 8. Extent of Masonry: Masonry partitions and walls shall extend from the floor to the bottom of floor or roof construction above, unless otherwise indicated.

- 9. Bonding and Anchoring: Walls and partitions shall be structurally bonded or anchored to each other and to concrete walls, beams, columns, and wall and roof diaphragms. Nonload-bearing walls and partitions shall be anchored to construction above in a manner that provides appropriate lateral stability and vertical movement of floor and roof construction above.
- 10. Preparation for New Work: Unfinished masonry shall be stepped back for joining with matching masonry bond pattern. Toothing will be permitted.
- J. Horizontal Joint Reinforcement and Anchorages: Horizontal joint reinforcement and anchorages shall be constructed as follows:
  - 1. Reinforcement Spacing: Horizontal joint reinforcement for wall conditions shall be spaced at a minimum of 16 inches on center, measured vertically. Horizontal reinforcement at parapets shall be spaced not more than 3 brick courses (8inches) on center, measured vertically.
  - 2. Reinforcement Placing: Masonry joint reinforcement shall be placed in the first horizontal joint above and below openings. Reinforcement shall be extended a minimum of 16 inches on each side of openings. Joint reinforcement shall be placed continuously in the first joint below the top of all walls. Joint reinforcement ends shall be lapped a minimum of 6 inches. Joints at corners and intersections shall be reinforced with strap anchors at 16-inch centers.
  - 3. Veneer Anchorage: Dovetail anchorage shall be provided in concrete for bonding veneer at a maximum of 16-inch centers vertically and horizontally. Anchors shall be placed within 8 inches of all openings.
- K. Waterproofing Course: A waterproofing course of flashing as specified in Section 07620 shall be provided where shown, and at the following locations: at the bottom of masonry walls, at points where roofs adjoin exterior masonry walls, at lintels, below louver sills and window sills, and at other locations shown on the Contract Drawings.
  - 1. Surface Condition: Surfaces to receive waterproofing course shall be smooth, dry, and free from loose material before applying the waterproofing course.
  - 2. Application: Flashing shall project 2 inch from the outside face of the wall and shall be built into the walls as indicated. Flashing shall extend a minimum of 8 inches beyond the line of the jamb, with the ends turned up 2 inches to form a pan at the heads and sills of louver and window openings, and at the heads of door openings.
- L. Control Joints: Preformed control joint material shall be installed in continuous lengths. Butt and corner joints shall be sealed in accordance with manufacturer's instructions. Control joints shall be sized as indicated on the Contract Drawings. Horizontal joint reinforcement shall not continue through control joints.
- M. Built-In Work: Metal door and window frames, fabricated metal frames, louvered openings, anchor bolts, pipes, ducts, conduits, plates and items specified in other sections shall be built in as the work progresses. Items shall be built in plumb and level. Frame

voids shall be filled solid with grout. Adjacent masonry cores shall be filled with grout for a minimum of 12 inches beyond the framed openings. Do not build in organic materials subject to deterioration.

- N. Tolerances: Masonry work shall meet the tolerances specified in ACI 530.1/ASCE 6-95/TMS 602.
- O. Cutting and Fitting: Masonry shall be cut and fit for chases, pipes, conduit, sleeves, grounds, and other items specified elsewhere. The work shall be coordinated to provide correct size, shape, and location.
- P. OSHA Silica Rules: General contractor is to comply with OSHA's Occupational Exposure to Respirable Crystalline Silica rule.

#### 3.02 LAYING MASONRY WALLS, GENERAL

- A. Mortar Types: Unless otherwise indicated, use mortar as specified in Detailed Specification 04051, and as follows:
  - 1. Use Type S mortar for interior bearing walls. All exterior walls (both interior and exterior wythes) and parapets.
  - 2. Use Type N mortar for all interior non-load-bearing walls.
  - 3. Use grout fill for structural requirements and for grouting reinforcing steel in unit masonry construction.
  - 4. Do not use mortar which has begun to set or if more than 1/2 hour has elapsed since initial mixing. Retemper mortar during the 1/2-hour period only as required to restore workability.
- B. Lay out walls in advance for accurate spacing of surface pattern bond with uniform joint widths and to properly locate openings, masonry control joints, returns and offsets. Avoid the use of less than half size units at corners, jambs and wherever possible at other locations.
- C. Lay up walls plumb and true to comply with specified tolerances, with courses level, accurately spaced and coordinated with other work.
- D. Mortar Color and Texture:
  - 1. Lay all concrete unit masonry using mortar color and texture to match existing.
  - 2. Lay all structural glazed brick using mortar colors selected by Engineer at time of sample panel erection.

- E. Hand select masonry units to assure uniform continuity of finished surfaces from unit to unit. Masonry units with misaligned face Architectural Terra Cotta shall be permanently removed from the Site.
- F. Site Facilities: Supplemental heat sources, as may be required should the Contractor wish to continue unit masonry construction in cold weather, are not available at the site. The provision and expense of all supplemental heat energy sources, fuel and equipment is the responsibility of the Contractor.
- G. Horizontal Joint Reinforcement and Anchorages:
  - 1. Reinforcement Spacing: Continuous horizontal joint reinforcement shall be spaced as follows:
    - a. For multi-wythe walls, solid or cavity, where continuous horizontal reinforcing also acts as structural bond or tie between wythes, space reinforcing as required by governing authorities having jurisdiction at the Project Site, but not more than 16 inches on centers vertically.
    - b. For single wythe walls, space reinforcing at 16 inches on centers vertically.
    - c. For parapets, space reinforcing at 8 inches on centers vertically
    - d. Reinforce all walls with continuous horizontal joint reinforcement unless specifically noted or specified to be omitted.
- H. Lintels and Bond Beams:
  - 1. Provide stainless steel lintels where shown and as specified in Section 05500.
  - 2. Provide masonry lintels and bond beams where shown and wherever openings of 16 inches or more are shown. Provide formed-in-place masonry lintels and bond beams. Temporarily support formed-in-place lintels and bond beams.
    - a. Unless otherwise shown, provide one horizontal No. 6 deformed reinforcing bar for each 4 inches of wall thickness.
    - b. Bond beams shall be provided above and below all wall openings. Where lintels beams are required provide bond beam directly above the lintel.
  - 4. Provide minimum bearing at each jamb, of 4 inches for openings less than 6 feet 0 inches wide, and 8 inches for wider openings.
  - 5. On concrete and clay unit masonry walls where pattern bond remains

visually exposed, increase minimum bearing of masonry lintels to maintain continuity of joint pattern of wall and install so as to be indistinguishable from surrounding masonry.

- I. Collar Joints:
  - 1. Fill the vertical space between wythes solidly with mortar by parging the in-place wythe and shoving units into the parging, for the locations by not limited to the following:
  - 2. All exterior and interior and or multi-wythe (except do not fill cavity of cavity wall construction), walls and partitions.
  - 3. All pipes and conduit shall be sealed with Penetration Sealing System as specified in Section 07900 Calking and Sealants.

### 3.03 REINFORCED MASONRY

- A. Setting Masonry: Masonry for vertically reinforced masonry units shall be laid with core cells, pockets, holes or voids vertically aligned. Core cells pockets, holes or voids shall be clear of mortar and unobstructed. Mortar shall be placed in masonry unit bed joints and shall be back 1/4 inch from the edge of the unit grout spaces, and beveled back and upward. Mortar shall be cured 7 days before placing grout.
- B. Vertical Reinforcing: Masonry unit pockets, holes or voids shall be reinforced with reinforcement bars shall be grouted in solid. Vertical reinforcement shall be kept in position using rebar positioners at top and bottom of cells and at interior walls and exterior walls: openings, exterior corners, window jambs and door jambs. Reinforcement shall be spliced in accordance with ACI 530/ASCE 5-95/TMS 402, but splice lap shall be not less than 24 bar diameters.
- C. Grouting: Masonry unit surfaces in contact with grout shall be wetted just prior to grout placement. Spaces less than 2 inches in width shall be grouted with fine grout using low lift grouting techniques. Spaces 2 inches or greater in width shall be grouted with coarse grout using high or low lift grouting techniques. When grouting is stopped for more than one hour, grout shall be terminated 1-1/2 inches below top of upper masonry unit to form a positive key for subsequent grout placement.

Low Lift Grouting: The first lift of grout shall be placed to a height of 16 inches and then shall be rodded for grout consolidation. Subsequent lifts shall be placed in 8-inch increments and rodded for grout consolidation

#### 3.05 BRICK MASONRY UNITS

- A. Bond: brick masonry units shall be laid in a header bond every 6<sup>th</sup> course pattern to match existing. Bond patter for header course shall align with alternating pattered to match existing joints in courses above and below.
- 3.06 PROTECTION

A. Protection of Finished Work: Protective boards shall be provided at exposed external corners susceptible to damage by construction activities, without damaging completed work.

#### 3.07 REPAIR

- A. Remove and replace masonry units that are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of sealant compounds.

#### 3.08 CLEANING

- A. General: Refer to Section 04901 -Masonry & Stonework Restoration & Cleaning for all existing materials for brick work shall be cleaned as follows:
  - 1. All masonry: All excess mortar and mortar smears shall be removed. Any defective mortar shall be removed and replaced, matching adjacent work. Nonmetallic tools shall be used in all cleaning operations.
  - All exterior masonry materials to be cleaned in accordance with Section 04901

     Masonry & Stonework Restoration
- 3.09 The following table is compiled for a concise listing of masonry accessories required for the work of this Section. The model number identified are as manufactured by Hohmann and Barnard, Inc.

# TABLE: 04200 MASONRY ACCESSORIES LISTING

04200 MASONRY ACCESSORIES LISTING		
MATERIALS	LOCATION	DESCRIPTION
Slip-Set Stabilizer	At Control joints in same joint as horizontal joint reinforcing or at a minimum of 3 brick course.	
#345-BLFlexibleTieContinuousWire (11 ga)#120HorizontalJoint	masonry wall Single width composite masonry walls: single wythe	<ol> <li><sup>1</sup>/<sub>4</sub>-inch wide, the lengths to extend to within 1-inch of outside face of outer wythes</li> <li>2-inches less in width than the actual thickness of the brick wall. Corners and intersections shall be reinforced with prefabricated corner same type as wall reinforcing</li> </ol>
Spira-Lok	8mm diameter minimum embedment 3-inches	Repair and Restoration Anchor
WEEP (VENT): QV Quadro-Vent	At locations indicated on Contract Documents	honeycomb design allows passage of moisture to building exterior while restricting ingress of insects and other debris
End dam stainless steel		Pre-fabricated stainless steel end dams. Cut in the field as required.
NS – closed cell joint filler	At locations indicated on Contract Documents	Closed cell joint filler (neoprene)

# **END OF SECTION**

#### SECTION 04720

#### CAST STONE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Replace cast stone units for coping, window headers and miscellaneous limestone units.
- B. Cast stone units shall be provided where shown on the Contract Drawings, specified in the Specifications, or as required for a complete installation.

#### 1.02 RELATED SECTIONS

А.	Section 04200	-	Unit Masonry
B.	Section 07620	-	Sheet Metal Flashing and Trim
C.	Section 07900	-	Caulking and Sealants.

#### 1.03 PAYMENT

A. No direct payment will be made for cast stone, accessories, or appurtenances; the cost shall be included in the prices for the Work.

#### 1.04 REFERENCES

A. MNL 117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products
B. ASTM C 1364 - Standard Specification for Architectural Cast Stone

#### **D.** ASTIN C 1304 Standard Specification for Meintectular Cast

# 1.05 DESIGN REQUIREMENTS

- A. Compliance with MNL 117 Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products
- B. Compliance with ASTM C 1364 Standard Specification for Architectural Cast Stone

# 1.06 SUBMITTALS

- A. The Contractor shall submit the following in accordance with the requirements of the General Conditions, and Division 1:
  - 1. Product Data: Manufacturer's specifications and installation instructions for proprietary materials.
  - 2. Samples and Drawings: Submit samples of the finish material together with drawings and details as required to obtain approval of the Architect for the replacement pieces to be installed. Do not proceed with fabrication of the replacement products prior to completed review and approval of shop drawings and approval of material samples. Samples shall match existing limestone in color, contractor to provide alternative colors for selected closely matching existing
  - 3. Certification of Cast Stone Properties: Obtain from manufacturer written certification of cast stone properties including compressive strength, air content, and absorption for each type and strength of cast stone mixture. Submit no later than fifteen (15) business days prior to manufacturing.

# 1.07 QUALITY ASSURANCE

- A. Compliance required for the following:
  - 1. MNL 117 "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
  - 2. ASTM C 1364 Standard Specification for Architectural Cast Stone

#### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials:
  - 1. Materials shall not be delivered to the Site before the time of installation.
  - 2. Materials delivered and stored at the Site shall be from approved manufacturers and sources only.
  - 3. Materials shall be delivered in sufficient quantities to allow continuity of the work.
- B. Storage of Materials:

- 1. Materials shall be stored in original, undamaged containers with manufacturer's labels and seals intact.
- 2. Damage to materials during storage shall be prevented primarily by minimizing the amount of time they are stored at the Site before being incorporated into construction systems.
- C. Handling of Materials:
  - 1. Materials shall be handled in such a manner to avoid damage or breakage.
  - 2. Materials shall not be exposed to detrimental conditions or physical damage. Materials which are so exposed shall be removed from the Site and shall not be incorporated into the work.
  - 3. Materials shall be handled in such a manner to prevent inclusion of contaminants.

#### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Cast Stone Materials:
  - 1. Portland Cement: ASTM C 150 Type I or III (white).
  - 2. Coarse Aggregate: limestone to match existing.
  - 3. Fine Aggregate: ASTM C 33 manufactured sand unless otherwise specified.
  - 4. Color: Inorganic iron oxides. Non-fading, resistant to lime and other alkalis.
  - 5. Chemical Admixtures: Comply with ASTM C 1364.
  - 6. Water: Potable.
  - 7. Concrete strength (f 'c) per ASTM C 1194 shall be minimum 6,500 psi.
  - 8. Absorption per ASTM C 1195 maximum 6%.
  - 9. Air Content per ASTM C 173 between 4% and 6%.
  - 10. Reinforcement: Reinforce as required for safe handling and structural stress. Minimum coverage 2" for bars 5/8" or larger and 1 1/2" for smaller bars.
- B. Cast Stone Manufacturers:

- 1. Sun Precast Company, Inc.
  - a. Beaver Springs, PA.
  - b. Phone: (579) 658-8000
- 2. Hanover Architectural Products
  - a. 5000 Hanover Road Hanover, PA 17331 Phone: (717) 637-0500
- 3. Or approved equal.

#### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Support and protect remaining construction formerly supported by removed units.
- B. Remove mortar, loose particles and debris from existing masonry surrounding units, in preparation for replacement.

#### 3.02 INSTALLATION

- A. Installation of mortar and grout shall be in accordance with the requirements of Section 04200 Unit Masonry.
- B. Prepare existing construction by installing flashing, and embedded accessories, where indicated on Drawings.
- C. Lift cast stone units with suitable lifting devices at points provided by the manufacturer, and set level, plumb, square and true within the allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability and alignment as units are being permanently connected.
- D. Install and connect cast stone units as shown on Drawings and on approved Shop Drawings
- E. Tool exposed mortar joints to match surrounding mortar joints.
- F. Seal vertical and top horizontal joints. Sealant in accordance with section 07900 shall match color of cast stone, unless otherwise indicated.

#### SECTION 04901

#### MASONRY AND STONEWORK RESTORATION AND CLEANING

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Masonry and stonework restoration and cleaning as specified herein shall include, but not be limited to masonry replacement, stone repair, tuck pointing, hydro-air cleaning, and all accessories and appurtenances.
- B. Masonry and stonework restoration and cleaning shall be provided where shown on the Contract Drawings, or as required for a complete installation.

# 1.02 RELATED SECTIONS

A.	Section 04051	-	Mortar and Masonry Grout
B.	Section 04200	-	Unit Masonry
C.	Section 04720	-	Cast Stone
D.	Section 07620	-	Sheet Metal Flashing and Trim

#### 1.03 PAYMENT

A. No direct payment will be made for masonry and stonework restoration and cleaning, accessories, or appurtenances; the cost shall be included in the prices for the Work.

#### 1.04 REFERENCES

1. National Park Service Technical Preservation Services Division "Keeping It Clean: Removing Exterior Dirt, Paint, Stains, and Graffiti from Historic Masonry Buildings"

#### 1.05 SUBMITTALS

- A. The Contractor shall prepare and submit Shop Drawing and reference materials for approval of the Engineer. Submittals shall include but not be limited to the following:
  - 1. Catalog cuts.
  - 2. Drawings.
  - 3. Literature: The Contractor shall submit literature showing the type of materials and equipment to be used in all masonry and stonework cleaning operations.

- 4. Test Patches: The Contractor shall clean small test areas of all types of surfaces to be cleaned. The test patches shall be approved by the Engineer before beginning full scale cleaning operations on any surface.
- 5. Surface Restoration and Restoration Mortar Mockup Two mock ups each of: coping, sills, brick and concrete of a minimum of two square feet as in-place restorations shall be performed at the job site at location designated by the architect at ground floor level. Refer to Section 04051 Mortar and Masonry Grout for additional information. Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - a. Finish surfaces for verification of products, colors and sheens.
  - b. Manufactures dwell time requirements for the products submitted specific to the materials to be cleaned and temperature limitation. Refer to quality assurance requirements.
  - b. Finish area designated by Architect.
  - c. Provide samples that designate finish coat and application type.
  - d. Prepare samples in an area where they will be exposed to the same conditions as will be present on the building during curing.
  - e. Allow samples to cure at least three days (or longer, if possible) before obtaining approval.
  - f. Samples should be viewed from a minimum distance of 12 feet.
  - g. Do not proceed with remaining work until the Architect approves the mock-up
- B Pre-requisites for Limestone/Stone Restoration:
  - a. Sample warranty
  - b. Pre-installation conference with restoration manufacturer's representative on site and as required for the warranty and certified installers be present. Names of the installers shall match certificate info as submitted by the general contractors.
  - c. Manufacturer Periodic Inspections / Certification submission for progress inspections and Final Inspection as required for warranty.
  - d. Switching of certified restoration mortar installers as submitted and approved for this project is shall not occur, however if required to finish project may be allowed with advanced notice submitted for review and approval. Engineer reserves the right to request new mock-up and new pre-installation meeting if certified restoration mortar installer crew has changed and at no cost to the owner.
  - e. All works should be performed in accordance with manufacturer's recommendations and all warranty requirements including weather requirements.
  - f. Warranty Period: Manufacturer's Extended 5 year warranty.

#### 1.06 QUALITY ASSURANCE

- A. Experience for Brick and Stonework Restoration: Masonry and stonework restoration and cleaning work shall be performed by a company with a minimum of three years documented experience in this type of work.
- B. Surface Restoration Installer Qualifications: Experienced in applying restoration material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance..
- C. The color and finish shall match existing limestone, and stones.
- D. Pre-cleaning meeting with product supplier representative to demonstrate technics and to establish in writing dwell times for each clean product employed for the project.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. General: All products and materials shall be delivered, stored, and handled as specified in Contract Documents and as follows.
- B. Delivery and Storage: Restoration and cleaning materials delivered and stored at the site shall be from approved manufacturers and sources only. Restoration and cleaning materials shall be delivered and stored in manufacturer's packaging, and shall include all instructions for use.
- C. Store products in manufacturer's unopened packaging until ready for installation.
- D. Wherever possible, store materials in a secure, indoor facility.
- E. Keep products away from sparks or open flame.
- F. Keep all water based materials from freezing.
- G. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.08 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Masonry and stonework shall not be repointed, caulked, washed down, or wetted when temperature may drop below 40 degrees F within 24 hours.
- B. Air Quality: Cleaning processes creating dust or dirt shall not be performed when wind is in excess of 10 miles per hour.
- C. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Provide cleaners as manufactured by the following or approved equal:
  - Sure Klean / Enviro Klean as manufactured by Prosoco, Inc. 16E Woodburn Avenue Pinehill, NJ 08021 856 783 4104 www.prosoco.com

#### 2.02 MATERIALS

- A. Cleaning Solutions are described in product terminology of Sure Klean. All products listed below shall be applied in accordance with manufacturers specifications:
  - 1. Masonry Cleaning at Existing Bick:
    - a. Initial application cleaner (BRICK): EK Restoration Cleaner (near -neutral PH carbon)
    - b. Second application cleaner (BRICK):EK Restoration Cleaner (near -neutral PH carbon)
  - 2. Masonry Cleaning at Existing Limestone:
    - a. Initial application cleaner (LIMESTONE): Sure Klean 766 Limestone & Masonry Prewash followed Masonry Afterwash
    - b. Second application cleaner (LIMESTONE): Sure Klean 766 Limestone & Masonry Prewash followed Masonry Afterwash
  - 3. Masonry Cleaning at Granite and Blue Polished Stone:
    - a. Initial application cleaner (GRANITE AND POLISHED STONE): 2010 All Surface Cleaner
  - 4. BIOWASH Masonry Cleaning at Existing Brick:
    - a. Initial application cleaner of: Heavy Duty Restoration Cleaner NE
    - b. Second application Cleaner: Enviro Klean ReKlaim two part Cleaner and Activator
    - c. Final application: Neutralize surfaces with Sure Klean Limestone & 04901 4

Masonry After wash diluted 1:1 with clean water.

- B. Staining: One hundred per cent (100%) of pointed brick surface to be stained with the following product to provide weather appearance to match existing finish and color.
  - a. Liquidirt 94 by Edison Coatings, Inc
  - b. approved equal

#### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Adjacent Elements: Elements surrounding the work of this Section, which shall include, but not be limited to, fixtures, fittings, finishing hardware, roof and roofing materials, and flashing, shall be protected from damage or disfiguration.
- B. Occupied Areas: Occupied areas shall be closed off from the work of this Section by means of dustproof and weatherproof temporary partitions.
- C. Clean surfaces thoroughly prior to installation. Allow surfaces to dry completely before applying coating.
- D. Verify that walls, masonry, , stonework, concrete and mortar that have been treated with any form of chemical/acid wash are neutralized.
- E. Verify that masonry, stonework, concrete and mortar units in existing building are structurally sound and fully intact.
- F. Before application ascertain that the masonry walls have a neutral ph level or all warranties are void.
- G. Alkali or efflorescence should be treated with proper neutralizing compounds as recommended by masonry supplier before application can begin.
- H. Where present, treat alkali or efflorescence with a neutralizing agent recommended for the surface.

#### 3.02 DEMOLITION

- A. Temporary Structural Support: The existing structure shall be needled, shored or supported as necessary prior to cutting out damaged units.
- B. Demolition: Where indicated on the Contract Drawings, damaged and deteriorated masonry and stone shall be cut out in a manner to prevent damage to any adjacent remaining materials. All loose or unsound adjoining masonry, mortar, or stone shall be cut away to provide firm, solid bearing for new work.

#### 3.03 REBUILDING

A. Replacement masonry and stone work shall be built in to match and align with

existing, with all joints and coursing true and level, and faces plumb and in line. All anchors, ties, reinforcing, stone cramps and dowels and flashings shall be correctly located and built in.

#### 3.04 MASONRY REPLACEMENT

A. Masonry replacement shall be in accordance with Section 04200.

# 3.05 HYDRO-AIR RINSING

- A. General: An approved cleaning solution shall be applied to all exterior brick and stone surfaces using fiber brushes. The solution shall be allowed to remain on the masonry surfaces for sufficient time to loosen adhered grime and dirt. The solution shall be removed by the Hydro-Air Rinsing method. A wet blast of air and cold water shall be applied by means of a heavy-duty hose equipped with nozzles adapted to produce nozzle pressures 150 psi and 15-30 degree fan tip in accordance with manufactures specification. The cleaning solution, dust and loose particles of mortar shall be completely neutralized and removed by means of Hydro-Air Rinsing method. All wood, metal, glass and other materials shall be protected during the cleaning operations.
  - 1. Apply second cleaner in accordance with manufactures specifications with a contact time of no less than 30 minutes once the cleaning surface is complete neutralize and rinsed, apply second cleaner in accordance with manufactures specifications with a contact time of no less than 30 minutes.
  - 2. Apply a final cleaner in areas designated on the contract drawings and as directed by the Engineer once samples areas have been approved for third cleaning.

# 3.06 EXISTING BRICK CLEANING

- A. EK Restoration Cleaner (Neutral PH) follow application instructions
  - 1. Prewet surface with fresh water.
  - 2. Apply cleaner using a brush or roller. Gentle scrubbing application will improve results. APPLYING CLEANER WITH PRESSURE SPRAY IS NOT PERMITTED as this method will drive the chemicals deep into the surface, making it difficult to rinse completely. Surface discoloration may result.
  - 3. Leave the cleaning solution on the surface for a minimum of 10-20 minutes and as designated by the product supplier representative in accordance with quality assurance. Heavy soiling or mineral deposits may require longer dwell times. Gently scrub heavily soiled areas.
  - 4. Caution: Do not let cleaning solution "dry in" to the masonry. If drying occurs, lightly wet treated surfaces with fresh water, and reapply the cleaner, gently scrubbing.
  - 5. Rinse thoroughly with fresh water.
- B Repeat above for second application.

### 3.07 EXISTING LIMESTONE CLEANING

- A First Application-766 Limestone and Masonry Pre-Wash, follow application instructions and quality assurance requirements and the following:
  - 1. Always prewet the surface with clean water.
  - 2. Apply a heavy coating to the surface using a brush or roller.
  - 3. Let the product dwell on the surface 30 minutes to 2 hours. Note: Longer dwell times may be required with lower temperatures. DO NOT LET MATERIAL DRY ON SURFACE.
  - 4. Low -pressure rinse, making sure to flush each portion of the masonry surface with concentrated water pressure. If pressure-water rinsing equipment is not available, reapply prewash and scrub vigorously with stiff bristled brush or scrubbing pad. Rinse thoroughly with fresh water.
  - 5. Afterwash: Immediately after rinsing 766 Limestone & Masonry Prewash apply the diluted Afterwash to the wet surface. (Dilute 1 part water to 1 part concentrate)
  - 6. After wash: Let the Afterwash stay on the surface for three to five minutes.
  - 7. After wash: Pressure rinse from the bottom of the treated area to the top. Make sure to cover each portion of the masonry surface with a concentrated stream of water. To avoid streaking, keep wall surfaces immediately below area being cleaned running wet and free of cleaner rundown and residues.
  - 8. Repeat Above for second application.

# 3.08 EXISTING GRANITE AND POLISHED STONE CLEANING

- 1. Working from bottom to top, prewet the surface with clean water.
- 2. Apply the diluted cleaning solution to the masonry surface using a brush or low-pressure spray.
- 3. Let the cleaner stay on the surface 1-10 minutes, based on testing. Gently scrub heavily soiled areas.
- 4. Working from bottom to top, rinse the surface thoroughly with clean water. The best combination of rinsing pressure and water volume is provided by masonry washing equipment generating 400-1000 psi with a water flow rate of 6-8 gallons per minute delivered through a 15-45 degree fan spray tip. Do not let cleaning solution dry on the surface. If drying occurs, lightly wet surfaces with fresh water and reapply the cleaner in a gentle scrubbing manner.

#### 3.09 BOIWASH CLEANING

A Heavy Duty Restoration Cleaner NE:

- 1. Prewet the surface with clean water.
- 2. Apply the cleaner using a brush or low-pressure spray.
- 3. Let the cleaning solution stay on the surface for 3 to 5 minutes. Reapply. Gently scrub heavily soiled areas.
- 4. Rinse with low-pressure flood rinse to remove initial acidic residue with minimum risk of wind drift.
- 5. Rinse thoroughly using high-pressure spray, from the bottom of the treated area to the top covering each section of the surface with a concentrated stream of water. The best combination of rinsing pressure and water volume is provided by masonry washing equipment generating 400-1000 psi with a water flow rate of 6-8 gallons per minute delivered through a 15-45 degree fan spray tip. Equipment should be adjustable to reduce water flow rate and rinsing pressure as required for controlled cleaning of more sensitive surfaces
- B Enviro Klean ReKlaim two part Cleaner and Activator:
  - 1. Working from bottom to top, apply prepared cleaning solution to a dry surface.
  - 2. Leave solution on the surface for 5 to 20 minutes. If solution begins to dry, reapply.
  - 3. Gently scrub heavily soiled areas.
  - 4. Rinse thoroughly with clean water. If using a sponge or string mop to rinse, change rinse water often. Pressure rinse porous surfaces to remove heavy soiling.
  - 5. Immediately after rinsing ReKlaim cleaning solution from masonry surface, apply the prepared Sure Klean® Limestone & Masonry Afterwash to the wet surface.
  - 6. Let the Afterwash stay on the surface for 3 to 5 minutes.
  - 7. Pressure rinse from the bottom of the treated area to the top. Make sure to cover each portion of the masonry surface with a concentrated stream of water. To avoid streaking, keep wall surfaces immediately below area being cleaned wet and free of cleaner rundown and residues.

# 3.10 SURFACE REPAIR WITH RESTORATION MOTAR

- A. All stone and unit masonry in place repair to comprise of replace except as indicated otherwise the follow are requirements for Restoration mortar for repair where expressly indicated:
  - 1. Surface repair: Apply the mortar mix using a trowel in a series lifts to build up material and in accordance with manufacturer's recommendations and using "Peanut Butter" coat. For repairs thicker than 1.5", apply mortar in in multiple layers, allowing the first layer to cure for a while before applying the second layer. If applied in layers, scrape off any cement skin that has formed and continue application. Dampen the surface before applying the next layer. Work mortar firmly into the surface of the masonry, including the corners, and under and around all mechanical anchors.

- 2. Mortar joint repair:
  - a. Fill mortar into joints in 1/4 inch "lifts". Start by filling deeper sections, compacting each layer, packing it into the rear and corners of the joint.
  - b. As soon as the mortar reaches "thumbprint" hardness, apply the next layer at 1/4 inch thickness. A minimum of 2 layers are required.
  - c. When final layer is thumbprint hard, tool to specified profile. Match to adjacent, existing profile or to original profile as instructed.
  - d. To avoid changing the appearance of the building, it may be necessary to slightly recess the mortar from the masonry surface. Do not flush fill joints in worn masonry if this results in a visually wider joint than the original.
  - e. Remove excess mortar and smears using a stiff natural bristle brush and clean water before it has set.
  - f. Allow mortar to fully cure for a minimum of 28 days before final cleaning. Longer cure times are required in cooler weather. Only low pressure should be used to avoid damaging newly repointed joints.
  - g. Clean any mortar residues from area surrounding the repair by sponging as many times as necessary with clean water. This should be done before repair material sets.
  - h. Apply surface restoration for architectural terra cotta to match adjoining coloring. Several hues of color will be required to replicate the mottling of the existing glaze.
- D. Finishing techniques for Restoration Pointing Mortars
  - 1. Repointing: Pre-dampen masonry surfaces to receive repointing mortar for a minimum of 20 minutes prior to mortar placement. Masonry surfaces should be saturated but free of excess or standing water at time of mortar placement.
  - 2. After mortar joint has "set" (the time for this will vary depending on the depth of the application, dampness of the masonry, and local weather conditions). The joint should then be tooled to the desired finish. Do not allow mortar to harden before tooling, to prevent "burning" the joint.
  - 3. After the repair has been cured and allowed to dry for at least one week, if the appearance of a repair does not meet with the approval of the Engineer, the surface color of the repair may be enhanced by applying a vapor permeable, mineral based pigmented stain (Liquid Dirt 94 as manufactured by Edison Coatings, Inc) or approved equal at no additional cost to the City.
  - 4. Wait 28 days (minimum) to clean. Clean up should be done by brushing with a 04901 9

clean dry brush across the joint. If any mortar residue remains on the surface of the masonry unit, cleaning with clean water and a sponge is sufficient if done before the mortar dries. Cleaning with acids and/or power washers should be not necessary if good pointing practices are followed.

5. Do not allow pointing mortar beyond the face of the masonry unit. All edges of masonry shall remain visible. Pointing mortar should be applied to ensure this, or can be "raked" back slightly to expose edges of masonry, giving historic appearance.

# 3.11 TUCK POINTING

- A. General: Brick masonry joints shall be tuck pointed where indicated and as follows:
  - 1. Preparing Joints: Masonry mortar joints shall be raked out by hand cutting or grinding to a depth of 3/4-inch to allow new mortar to bond directly to the masonry units on both sides of the joint. Following the removal of mortar, the joints and edges of masonry units shall be thoroughly cleaned of all dust and loose mortar. Prior to tuck pointing with the mortar specified, the joints shall be thoroughly wetted down, assuring that edges and backup are sufficiently moist. This is particularly important during hot, windy, summer weather. Where special products are specified for pointing mortar, the work shall be prepared and performed in strict compliance with the manufacturer's recommendations. Do not tuck point during freezing weather.

Pointing: The cutout joints shall be completely filled with mortar. Care shall be exercised such that too much mortar is not applied at one time. Small amounts of mortar shall be placed and forced back to the foundation of the joint with a tool narrower than the joint being pointed. All smearing of adjacent surfaces shall be removed upon completion. Under no circumstances will "skinning" over joints be acceptable.

2. Replacement: Damaged or missing brick shall be replaced with new brick to match existing, unless otherwise specified on Contract Drawings.

#### 3.12 PROTECTION

- A. Protect installed products until completion of project.
- B. Protect shrubs, metal, wood trim, glass, asphalt, and other building hardware from overspray during application.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

# **END OF SECTION**

#### SECTION 05010

#### METAL MATERIALS

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

A. Metal materials not otherwise specified shall conform to the requirements of this Section.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Materials for fasteners are included in Section 05050, Metal Fastening.
- B. Requirements for specific products made from the materials specified herein are included in other sections of the Specifications. See the section for the specific item in question.

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. ASTM A36 Standard Specification for Structural Steel
- B. ASTM A47 Standard Specification for Malleable Iron Castings
- C. ASTM A48 Standard Specification for Gray Iron Castings
- D. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- E. ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- F. ASTM A276 Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes
- G. ASTM A307 Standard Specification for Carbon Steel Externally Threaded Standard Fasteners
- H. ASTM A446 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) quality
- I. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- J. ASTM A501 Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

K.	ASTM A529	Standard Specification for Structural Steel with 42 000 psi (290 Mpa) Minimum Yield Point (1/2 in. (12.7 mm) Maximum Thickness)
L.	ASTM A536	Standard Specification for Ductile Iron Castings
М.	ASTM A570	Standard Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality
N.	ASTM A572	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
О.	ASTM A992	Standard Specification for Structural Steel Shapes
Р.	ASTM A666	Standard Specification for Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar for Structural Applications
Q.	ASTM A1085	Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)
R.	ASTM B26	Standard Specification for Aluminum-Alloy Sand Castings
S.	ASTM B85	Standard Specification for Aluminum-Alloy Die Castings
Τ.	ASTM B108	Standard Specification for Aluminum-Alloy Permanent Mold Castings
U.	ASTM B138	Standard Specification for Manganese Bronze Rod, Bar, and Shapes
V.	ASTM B209	Standard Specification for Aluminum-Alloy Sheet and Plate
W.	ASTM B221	Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
X.	ASTM B308	Standard Specification for Aluminum-Alloy Standard Structural Shapes, Rolled or Extruded
Y.	ASTM B574	Standard Specification for Nickel-Molybdenum-Chromium Alloy Rod
Z.	ASTM F468	Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
a.	ASTM F593	Standard Specification for Stainless Steel Fasteners
1.04	SUBMITTALS	

- A. Material certifications shall be submitted along with any shop drawings for metal products and fabrications required by other sections of the Specifications.
- 1.05 QUALITY ASSURANCE

A. Owner may engage the services of a testing agency to test any metal materials for conformance with the material requirements herein. If the material is found to be in conformance with Specifications the cost of testing will be borne by the Owner. If the material does not conform to the Specifications, the cost of testing shall be paid by the Contractor and all materials not in conformance as determined by the Engineer shall be replaced by the Contractor at no additional cost to the Owner. In lieu of replacing materials the Contractor may request further testing to determine conformance, but any such testing shall be paid for by the Contractor regardless of outcome of such testing.

#### PART 2 -- PRODUCTS

#### 2.01 CARBON AND LOW ALLOY STEEL

A. Material types and ASTM designations shall be as listed below:

1.	Steel W Shapes	A992
2.	Steel HP Shapes	A572 Grade 50
3.	Steel M, S, C, and MC shapes and Angles, Bars, and Plates	A36
4.	Rods	F 1554 Grade 36
5.	Pipe - Structural Use	A53 Grade B
6.	Hollow Structural Sections	A500 Grade C or A1085
7.	Cold-Formed Steel Framing	A 653

#### 2.02 STAINLESS STEEL

- A. All stainless steel fabrications exposed to underwater service shall be Type 316. All other stainless steel fabrications shall be Type 304, unless noted otherwise.
- B. Material types and ASTM designations are listed below:

1.	Plates and Sheets	ASTM A167 or A666 Grade A
2.	Structural Shapes	ASTM A276
3.	Fasteners (Bolts, etc.)	ASTM F593

#### 2.03 ALUMINUM

- A. All aluminum shall be alloy 6061-T6, unless otherwise noted or specified herein.
- B. Material types and ASTM designations are listed below:

1.	Structural Shapes	ASTM B308
2.	Castings	ASTM B26, B85, or B108

3.	Extruded Bars	ASTM B221 - Alloy 6061
4.	Extruded Rods, Shapes and Tubes	ASTM B221 - Alloy 6063
5.	Plates	ASTM B209 - Alloy 6061
6.	Sheets	ASTM B221 - Alloy 3003

- C. All aluminum structural members shall conform to the requirements of Section 05140, Structural Aluminum.
- D. All aluminum shall be provided with mill finish unless otherwise noted.
- E. Where bolted connections are indicated, aluminum shall be fastened with stainless steel bolts.
- F. Aluminum in contact with dissimilar materials shall be insulated with an approved dielectric.

#### 2.04 CAST IRON

A. Material types and ASTM designations are listed below:

1.	Gray	ASTM A48 Class 30B
2.	Malleable	ASTM A47
3.	Ductile	ASTM A536 Grade 60-40-18

#### 2.05 BRONZE

- A. Material types and ASTM designations are listed below:
  - 1. Rods, Bars and Sheets ASTM B138 Alloy B Soft

#### 2.06 HASTELLOY

A. All Hastelloy shall be Alloy C-276.

#### PART 3 -- EXECUTION

(NOT USED)

# **END OF SECTION**

#### SECTION 05050

#### METAL FASTENING

### PART 1 -- GENERAL

- 1.01 THE REQUIREMENT
  - A. Furnish all materials, labor, and equipment required to provide all metal welds and fasteners not otherwise specified, in accordance with the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05010 Metal Materials
- B. Section 05035 Galvanizing
- C. Section 05061 Stainless Steel
- D. Section 05120 Structural Steel

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. International Building Code 2009, 13<sup>th</sup> Edition

2.	AC 193	Acceptance Criteria for Mechanical Anchors in Concrete Elements
3.	AC 308	Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements
4.	ACI 318	Building Code Requirements for Structural Concrete
5.	ACI 355.2	Qualifications of Post-Installed Mechanical Anchors in Concrete
6.	ACI 355.4	Qualifications of Post-Installed Adhesive Anchors in Concrete
7.	ICC-ES AC193	Acceptance Criteria for Expansion and Screw Anchors (Concrete)

8.	AISC 348	The 2009 RCSC Specification for Structural Joints
9.	AISC	Code of Standard Practice
10.	AWS D1.1	Structural Welding Code - Steel
11.	AWS D1.2	Structural Welding Code - Aluminum
12.	AWS D1.6	Structural Welding Code – Stainless Steel
13.	Aluminum Association	Specifications for Aluminum Structures
14.	ASTM A572/A572M-94C	Standard Specification for High Strength Low-Alloy Columbium-Vanadium Structural Steel Grade 50
15.	ASTM A36	Standard Specification for Carbon Structural Steel
16.	ASTM A325	Standard Specification for High-Strength Bolts for Structural Steel Joints
17.	ASTM A489	Standard Specification for Eyebolts
18.	ASTM A490	Standard Specification for Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints
19.	ASTM A563	Standard Specifications for Carbon and Alloy Steel Nuts
20.	ASTM D1785	Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe
21.	ASTM E488	Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
22.	ASTM F436	Standard Specification for Hardened Steel Washers
23.	ASTM F467	Standard Specification for Nonferrous Nuts for General Use
24.	ASTM F593	Standard Specification for Stainless Steel Bolts; Hex Cap Screws, and Studs
25.	ASTM F594	Standard Specification for Stainless Steel Nuts
26.	ASTM F1554	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

# 1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.

- 1. Shop Drawings providing the fastener's manufacturer and type and certification of the fastener's material and capacity.
- 2. Anchor design calculations sealed by a Professional Engineer currently registered in the State of Pennsylvania. Only required if design not shown on Contract Drawings.
- 3. A current ICC-ES Evaluation Service Report shall be submitted for all anchors that will be considered for use on this project.
- 4. Manufacturer's installation instructions.
- 5. Copy of valid certification for each person who is to perform field welding.
- 6. Certified weld inspection reports, when required.
- 7. Welding procedures.
- 8. Installer qualifications.
- 9. Certification of Installer Training.
- 10. Inspection Reports.
- 10. Results of Anchor Proof Testing.

#### 1.05 QUALITY ASSURANCE

- A. Fasteners not manufactured in the United States shall be tested and certification provided with respect to specified quality and strength standards. Certifications of origin shall be submitted for all U.S. fasteners supplied on the project.
- B. Installer Qualifications: All concrete anchors shall be installed by an Installer with at least three years of experience performing similar installations. Concrete adhesive anchor installer shall be certified as an Adhesive Anchor Installer in accordance with ACI-CRSI Adhesive Anchor Installation Certification Program.
- C. Installer Training: For concrete adhesive, expansion and screw anchors, conduct a thorough training with the manufacturer or the manufacturer's representative for the Installer on the project. Training shall consist of a review of the complete installation process to include but not be limited to the following:
  - 1. Hole drilling procedure.
  - 2. Hole preparation and cleaning technique.
  - 3. Adhesive injection technique and dispenser training/maintenance.
  - 4. Concrete adhesive anchor preparation and installation.

- 5. Proof loading/torquing.
- 6. Provide a list of names of all installers who are trained by the Manufacturer's Field Representative on this jobsite prior to installation of products. Record must include the installer name, date of training, products included in the training and trainer name and contact information
- 7. Provide a copy of the current ACI/CRSI "Adhesive Anchor Installer" certification cards for all installers who will be installing adhesive anchors in the horizontal to vertically overhead orientation.
- D. All steel welding shall be performed by welders certified in accordance with AWS D1.1. All aluminum welding shall be performed by welders certified in accordance with AWS D1.2. All stainless steel welding shall be performed by welders certified in accordance with AWS D1.6. Certifications of field welders shall be submitted prior to performing any field welds.
- E. Welds and high strength bolts used in connections of structural steel will be visually inspected in accordance with Article 3.04.
- F. The Owner may engage an independent testing agency to perform testing of welded connections and to prepare test reports in accordance with AWS. Inadequate welds shall be corrected or redone and retested to the satisfaction of the Engineer and/or an acceptable independent testing laboratory, at no additional cost to the Owner.
- G. Provide a welding procedure for each type and thickness of weld. For welds that are not prequalified, include a Performance Qualification Report. The welding procedure shall be given to each welder performing the weld. The welding procedure shall follow the format in Annex E of AWS D1.1 with relevant information presented.
- H. Special inspections for concrete adhesive anchors shall be conducted in accordance with the manufacturer's instructions and Specifications Section 01450. Downward installations require periodic inspection and horizontal and overhead installations require continuous inspection.

#### PART 2 -- PRODUCTS

#### 2.01 ANCHOR RODS (ANCHOR BOLTS)

- A. Anchor rods shall conform to ASTM F1554 Grade 36 except where stainless steel or other approved anchor rods are shown on the Drawings. Anchor rods shall have hexagonal heads and shall be supplied with hexagonal nuts meeting the requirements of ASTM A563 Grade A.
- B. Where anchor rods are used to anchor galvanized steel or are otherwise specified to be galvanized, anchor rods and nuts shall be hot-dip galvanized in accordance with ASTM F1554.
- C. Where pipe sleeves around anchor rods are shown on the Drawings, pipe sleeves shall be cut from Schedule 40 PVC plastic piping meeting the requirements of ASTM D1785.
- 2.02 HIGH STRENGTH BOLTS

- A. High strength bolts and associated nuts and washers shall be in accordance with ASTM A325 or ASTM A490. Bolts, nuts and washers shall meet the requirements of AISC 348 "The 2009 RCSC Specification for Structural Joints".
- B. Where high strength bolts are used to connect galvanized steel or are otherwise specified to be galvanized, bolts, nuts, and washers shall be hot-dip galvanized in accordance with ASTM A325.

#### 2.03 STAINLESS STEEL BOLTS

- A. Stainless steel bolts shall conform to ASTM F-593. All underwater fasteners, fasteners in confined areas containing fluid, and fasteners in corrosive environments shall be Type 316 stainless steel unless noted otherwise. Fasteners for aluminum and stainless steel members not subject to the above conditions shall be Type 304 stainless steel unless otherwise noted.
- B. Stainless steel bolts shall have hexagonal heads with a raised letter or symbol on the bolts indicating the manufacturer, and shall be supplied with hexagonal nuts meeting the requirements of ASTM F594. Nuts shall be of the same alloy as the bolts.

#### 2.04 CONCRETE ANCHORS

- A. General
  - 1. Where concrete anchors are called for on the Drawings, one of the types listed below shall be used; except, where one of the types listed below is specifically called for on the Drawings, only that type shall be used. The determination of anchors equivalent to those listed below shall be on the basis of test data performed by an approved independent testing laboratory. There are two types used:
    - a. Expansion anchors shall be mechanical anchors of the wedge, sleeve, drop-in or undercut type.
    - b. Adhesive anchors shall consist of threaded rods or bolts anchored with an adhesive system into hardened concrete. Adhesive anchors shall be two part injection type using the manufacturer's static mixing nozzle and shall be supplied as an entire system.
    - c. Concrete screw anchors shall be one piece, heavy duty screw anchor with a finished hex head
  - 2. Expansion anchors shall not be used to hang items from above or in any other situations where direct tension forces are induced in anchor.
  - 3. Unless otherwise noted, all concrete anchors which are submerged or are used in hanging items or have direct tension induced upon them, or which are subject to vibration from equipment such as pumps and generators, shall be adhesive anchors.

- 4. Adhesive anchors shall conform to the requirements of ACI 355.4 or alternately to AC 308. Expansion, concrete screw or mechanical anchors shall conform to the requirements of ACI 355.2 or alternately to AC 193.
- 5. Fire Resistance: All anchors installed within fire resistant construction shall either be enclosed in a fire resistant envelope, be protected by approved fire-resistive materials, be used to resist wind and earthquake loads only, or anchor non-structural elements.
- 6. Engineer's approval is required for use of concrete anchors in locations other than those shown on the Drawings.
- B. Concrete Anchor Design:

An anchor design consists of specifying anchor size, quantity, spacing, edge distance and embedment to resist all applicable loads. Where an anchor design is indicated on the Drawings, it shall be considered an engineered design and anchors shall be installed to the prescribed size, spacing, embedment depth and edge distance. If all parts of an anchor design are provided on the Drawings except embedment depth, the anchors will be considered an engineered design and the Contractor shall provide the embedment depth as indicated in Paragraph B.3 unless otherwise directed by the Engineer. Where an anchor design is not indicated by the Engineer on the Drawings, the Contractor shall provide the anchor design per the requirements listed below.

- 1. Structural Anchors: All concrete anchors shall be considered structural anchors if they transmit load between structural elements; transmit load between non-structural components that make up a portion of the structure and structural elements; or transmit load between life-safety related attachments and structural elements. Examples of structural concrete anchors include but are not limited to column anchor bolts, anchors supporting non-structural walls, sprinkler piping support anchors, anchors supporting heavy, suspended piping or equipment, anchors supporting barrier rails, etc. For structural anchors, the Contractor shall submit an engineered design with signed and sealed calculations performed by an Engineer currently registered in the State of Pennsylvania. Structural anchors shall be of a type recommended by the anchor manufacturer for use in cracked concrete and shall be designed by the Contractor in accordance with ACI 318 Appendix D.
- 2. Non-Structural Anchors: All other concrete anchors may be considered non-structural concrete anchors. The Contractor shall perform an engineered design for non-structural anchors. The Engineer may request the Contractor provide anchor design details for review, but submission of a signed, sealed design is not required. Non-structural anchors shall be designed by the contractor for use in uncracked concrete.
- 3. Embedment Depth
  - Minimum anchor embedment shall be as indicated on the Drawings or determined by the Contractor's engineered design. Although all manufacturers listed are permitted, the embedment depth indicated on the Drawings is based on ""HIT-HY 500 V3" by Hilti." If the contractor submits one of the other concrete adhesive anchors listed, the Engineer shall evaluate the required embedment and the

Contractor shall provide the required embedment depth stipulated by the Engineer specific to the approved dowel adhesive.

- b. Where the embedment depth is not shown on the Drawings, concrete anchors shall be embedded no less than the manufacturer's standard embedment (expansion or mechanical anchors) or to provide a minimum allowable bond strength equal to the allowable yield capacity of the rod according to the manufacturer (adhesive anchors).
- c. The embedment depth shall be determined using the actual concrete compressive strength, a cracked concrete state, maximum long term temperature of 110 degrees F, and maximum short term temperature of 140 degrees F. In no case shall the embedment depth be less than the minimum or more than the maximum stated in the manufacturer's literature.

#### C. Structural Anchors:

- 1. Mechanical Anchors:
  - a. Wedge Anchors: Wedge anchors shall be "Kwik Bolt TZ" by Hilti, Inc., "TruBolt +" by ITW Redhead, "Strong-Bolt 2" by Simpson Strong-Tie Co. or "Power-Stud+SD1" or "Power-Stud+ SD-2" by DeWalt.
  - b. Screw Anchors: Screw anchors shall be "Kwik HUS-EZ" and "KWIK HUS-EZ-I" by Hilti, Inc., "Titen HD" by Simpson Strong-Tie Co., or "Screw-Bolt+" by DeWalt. Bits specifically provided by manufacturer of chosen system shall be used for installation of anchors.
  - c. Sleeve Anchors: Sleeve anchors shall be "HSL-3 Heavy Duty Sleeve Anchor" by Hilti, Inc. or "Power-Bolt +" by DeWalt.
  - d. Undercut Anchors: Undercut anchors shall be "HDA Undercut Anchor" by Hilti, Inc., "Torq-Cut Undercut Anchor" by Simpson Strong-Tie Co., "Atomic + Undercut Anchor" by DeWalt
  - e. Shallow Embedment Internally Threaded Insert (3/4" max embedment): "Mini-Undercut +Anchor" by DeWalt, "HSC-A" by Hilti, Inc. or approved equal.
- 2. Adhesive Anchors:
  - a. Adhesive anchors shall be "Epcon C6+ Adhesive Anchoring System" by ITW Redhead, "HIT HY-200 Adhesive Anchoring System" by Hilti, Inc., "SET-XP Epoxy Adhesive Anchors" by Simpson Strong-Tie Co., or "Pure 110+ Epoxy Adhesive Anchor System" by DeWalt.
  - b. Structural adhesive anchor systems shall be IBC compliant and capable of resisting short term wind and seismic loads (Seismic Design Categories A through F) as

well as long term and short term sustained static loads in both cracked and uncracked concrete in all Seismic Design Categories. Structural adhesive anchor systems shall comply with the latest revision of ICC-ES Acceptance Criteria AC308, and shall have a valid ICC-ES report in accordance with the applicable building code. No or equal products will be considered unless prequalified and approved by the Engineer and Owner.

- D. Non-Structural Anchors: In addition to the acceptable non-structural anchors listed below, all structural anchors listed above may also be used as non-structural anchors.
  - 1. Mechanical Anchors:
    - a. Wedge Anchors: Wedge anchors shall be "Kwik Bolt 3" by Hilti, Inc., "Power-Stud+ SD1" by DeWalt, "Wedge-All" by Simpson Strong-Tie Co. or "TruBolt" by ITW Redhead.
    - b. Screw Anchors: Screw anchors shall be "Kwik HUS" by Hilti, Inc., "Screw Bolt+" or 316 Stainless Steel Wedge-Bolt" by DeWalt, "Large Diameter Tapcon (LDT) Anchor" by ITW Redhead, or "Titen HD" by Simpson Strong-Tie Co. Bits specifically provided by manufacturer of chosen system shall be used for installation of anchors.
    - c. Sleeve Anchors: Sleeve anchors shall be "HSL Heavy Duty Sleeve Anchors" by Hilti, Inc. "Power-Bolt+" by DeWalt "Dynabolt Sleeve Anchor" by ITW Redhead, or "Sleeve-All" by Simpson Strong-Tie Co.
    - d. Drop-In Anchors: Drop-in anchors shall be "Drop-In" by Simpson Strong-Tie Co., "HDI Drop-In Anchor" by Hilti, Inc., "Smart DI" by DeWalt or "Multi-Set II Drop-In Anchor" by ITW Redhead.
    - e. Undercut Anchors: Undercut anchors shall be "HDA Undercut Anchor" by Hilti, Inc., "Atomic Undercut+" by DeWalt or "Torq-Cut" by Simpson Strong-Tie Co.
  - 2. Adhesive Anchors:
    - a. Adhesive anchors shall be "Epcon A7" or "Epcon C6+ Adhesive Anchoring System" by ITW Redhead, "HIT HY-200 Adhesive Anchoring System" by Hilti, Inc., "SET Epoxy Tie High Strength Anchoring Adhesive" or "AT High Strength Anchoring Adhesive" by Simpson Strong-Tie Co., or AC100+ Gold" Adhesive Anchoring System" by DeWalt
    - b. Non-structural adhesive anchors systems shall be IBC compliant and capable of resisting short term wind and seismic (Seismic Design Categories A and B) as well as long term and short term sustained static loads in uncracked concrete.
    - c. Non-structural adhesive anchor embedment depth of the rod shall provide a minimum allowable bond strength that is equal to the allowable yield capacity of the rod unless noted otherwise on the Drawings.

# d. No or equal products will be considered unless prequalified and approved by the Engineer and Owner.

- E. Concrete Anchor Rod Materials:
  - 1. Concrete anchors used to anchor structural steel shall be a threaded steel rod per manufacturer's recommendations for proposed adhesive system, but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted otherwise. Where steel to be anchored is galvanized, concrete anchors shall also be galvanized unless otherwise indicated on the Drawings.
  - 2. Concrete anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater concrete anchors shall be Type 316 stainless steel.
  - 3. Nuts, washers, and other hardware shall be of a material to match the anchors.

### 2.05 MASONRY ANCHORS

- A. Anchors for fastening to solid or grout-filled masonry shall be adhesive anchors as specified above for concrete anchors.
- B. Anchors for fastening to hollow masonry or brick shall be adhesive anchors consisting of threaded rods or bolts anchored with an adhesive system dispensed into a screen tube inserted into the masonry. The adhesive system shall use a two-component adhesive mix and shall inject into the screen tube with a static mixing nozzle. Thoroughly clean drill holes of all debris and drill dust prior to installation of adhesive and anchor. Contractor shall follow manufacturer's installation instructions. The adhesive system shall be "HIT HY-70 System" as manufactured by Hilti, Inc., or "AC100+ Acrylic Adhesive" by DeWalt, "SET-XP" as manufactured by Simpson Strong-Tie Co.
- C. Masonry anchors used to anchor steel shall be a threaded steel rod per manufacturer's recommendations for proposed adhesive system, but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted otherwise. Where steel to be anchored is galvanized, masonry anchors shall also be galvanized.
- D. Masonry anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater anchors shall be Type 316 stainless steel.
- E. Although all manufacturers listed are permitted, the masonry anchor design is based on "SET-XP by Simpson Strong-Tie ER 265 Revised 1-31-2017. If the contractor submits one of the other concrete adhesive anchors listed, the Engineer shall evaluate the proposed product and the Contractor shall provide the conditions stipulated by the Engineer specific to the approved adhesive anchor.
- 2.06 WELDS

- A. Electrodes for welding structural steel and all ferrous steel shall comply with AWS Code, using E70 series electrodes for shielded metal arc welding (SMAW), or F7 series electrodes for submerged arc welding (SAW).
- B. Electrodes for welding aluminum shall comply with the Aluminum Association Specifications and AWS D1.2.
- C. Electrodes for welding stainless steel and other metals shall comply with AWS D1.6.
- 2.07 WELDED STUD CONNECTORS
  - A. Welded stud connectors shall conform to the requirements of AWS D1.1 Type C.

#### 2.08 EYEBOLTS

- A. Eyebolts shall conform to ASTM A489 unless noted otherwise.
- 2.09 HASTELLOY FASTENERS
  - A. Hastelloy fasteners and nuts shall be constructed of Hastelloy C-276.
- 2.10 ANTISEIZE LUBRICANT
  - A. Antiseize lubricant shall be C5-A Anti-Seize by Loctite Corporation, Molykote P-37 Anti-Seize Paste by Dow Corning, 3M Anti-Seize by 3M, or equal.

#### PART 3 -- EXECUTION

- 3.01 MEASUREMENTS
  - A. The Contractor shall verify all dimensions and review the Drawings and shall report any discrepancies to the Engineer for clarification prior to starting fabrication.
- 3.02 ANCHOR INSTALLATION
  - A. Anchor Rods, Concrete Anchors, and Masonry Anchors
    - 1. Anchor rods shall be installed in accordance with AISC "Code of Standard Practice" by setting in concrete while it is being placed and positioned by means of a rigidly held template. Overhead adhesive anchors, and base plates or elements they are anchoring, shall be shored as required and securely held in place during anchor setting to prevent movement during anchor installation. Movement of anchors during curing is prohibited.
    - 2. The Contractor shall verify that all concrete and masonry anchors have been installed in accordance with the manufacturer's recommendations and that the capacity of the installed anchor meets or exceeds the specified safe holding capacity.
    - 3. Concrete anchors shall not be used in place of anchor rods without Engineer's approval.

- 4. All stainless steel threads shall be coated with antiseize lubricant.
- B. High Strength Bolts
  - 1. All bolted connections for structural steel shall use high strength bolts. High strength bolts shall be installed in accordance with AISC 348 "The 2009 RCSC Specification for Structural Joints". All bolted joints shall be Type N, snug-tight, bearing connections in accordance with AISC Specifications unless noted otherwise on the Drawings.
- C. Concrete Anchors
  - 1. Concrete at time of anchor installation shall be a minimum age of 21 days, have a minimum compressive strength of 2500 psi, and shall be at least 50 degrees F.
  - 2. Concrete anchors designed by the Contractor shall be classified as structural or nonstructural based on the requirements indicated above.
  - 3. Concrete Anchor Testing:
    - a. At all locations where concrete anchors meet the requirements for structural anchors at least 25 percent of all concrete anchors installed shall be proof tested to the value indicated on the Drawings, with a minimum of one tested anchor per anchor group. If no test value is indicated on the Drawings but the installed anchor meets the requirements for structural anchors, the Contractor shall notify the Engineer to allow verification of whether anchor load proof testing is required.
    - b. Contractor shall submit a plan and schedule indicating locations of anchors to be proof tested, load test values and proposed anchor testing procedure (including a diagram of the testing equipment proposed for use) to the Engineer for review prior to conducting any testing. Proof testing of anchors shall be in accordance with ASTM E488 for the static tension test. If additional tests are required, inclusion of these tests shall be as stipulated on Contract Drawings.
    - c. Where Contract Documents indicate anchorage design to be the Contractor's responsibility and the anchors are considered structural per the above criteria, the Contractor shall submit a plan and schedule indicating locations of anchors to be proof tested and load test values, sealed by a Professional Engineer currently registered in the State of Pennsylvania. The Contractor's Engineer shall also submit documentation indicating the Contractor's proof testing procedures have been reviewed and the proposed procedures are acceptable. Proof testing procedures shall be in accordance with ASTM E488.
    - d. Concrete Anchors shall have no visible indications of displacement or damage during or after the proof test. Concrete cracking in the vicinity of the anchor after loading shall be considered a failure. Anchors exhibiting damage shall be removed and replaced. If more than 5 percent of tested anchors fail, then 100 percent of anchors shall be proof tested.

- e. Proof testing of concrete anchors shall be performed by an independent testing laboratory hired directly by the Contractor and approved by the Engineer. The Contractor shall be responsible for costs of all proof testing, including additional testing required due to previously failed tests.
- 4. All concrete anchors shall be installed in strict conformance with the manufacturer's printed installation instructions. A representative of the manufacturer shall be on site when required by the Engineer.
- 5. All holes shall be drilled in accordance with the manufacturer's instructions except that cored holes shall not be allowed unless specifically approved by the Engineer. If cored holes are allowed by the manufacturer and approved by the Engineer, cored holes shall be roughened in accordance with manufacturer requirements. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with the manufacturer's instructions prior to installation of adhesive and threaded rod unless otherwise recommended by the manufacturer. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be either dry or water-saturated. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer. Injection of adhesive into the hole shall be performed to minimize the formation of air pockets in accordance with the manufacturer's instructions. Wipe rod free from oil that may be present from shipping or handling.
- 6. All adhesive anchor installations in the horizontal to vertically overhead orientation shall be conducted by a certified Adhesive Anchor Installer as certified by ACI/CSRI per ACI 318-11 9.2.2. Current AAI Certificate must be submitted to the Engineer of Record prior to commencement of any adhesive anchor installations
- D. Other Bolts
  - 1. All dissimilar metal shall be connected with appropriate fasteners and shall be insulated with a dielectric or approved equal.
  - 2. All stainless steel bolts shall be coated with antiseize lubricant.

#### 3.03 WELDING

- A. All welding shall comply with AWS Code for procedures, appearance, quality of welds, qualifications of welders and methods used in correcting welded work.
- B. Welded stud connectors shall be installed in accordance with AWS D1.1.

#### 3.04 INSPECTION

- A. High strength bolting will be visually inspected in accordance with AISC 348 "The 2009 RCSC Specification for Structural Joints". Rejected bolts shall be either replaced or retightened as required.
- B. Field welds will be visually inspected in accordance with AWS Codes. Inadequate welds shall be corrected or redone as required in accordance with AWS Codes.

C. Post-installed concrete anchors shall be inspected as required by ACI 318.

#### 3.05 CUTTING OF EMBEDDED REBAR

A. The Contractor shall not cut embedded rebar cast into structural concrete during installation of postinstalled fasteners without prior approval of the Engineer.

# **END OF SECTION**

#### SECTION 05061

#### STAINLESS STEEL

#### PART 1 -- GENERAL

#### 1.01 SECTION INCLUDES

- A. The Contractor shall furnish, install and erect the stainless steel work as shown on the Contract Drawings and specified herein.
- B. Stainless steel work shall be furnished complete with all accessories, mountings and appurtenances of the type of stainless steel and finish as specified or required for a satisfactory installation.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300 Submittals
- B. Section 05010 Metal Materials
- C. Section 05050 Metal Fastening
- D. Section 05500 Metal Fabrications

#### 1.03 REFERENCES

A.	ASTM A193	-	Alloy-Steel and Stainless Steel Bolting Materials for High- Temperature Service.
B.	ASTM A194	-	Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
C.	ASTM A262	-	Practice for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steel.
D.	ASTM A276	-	Stainless and Heat-Resisting Steel Bars and Shapes.
E.	ASTM A314	-	Stainless and Heat-Resisting Steel Billets and Bars for Forging.
F.	ASTM A380	-	Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems.
G.	ASTM A473	-	Stainless and Heat-Resisting Steel Forgings.
H.	ASTM A666	-	Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar.

I.	ASTM A774	-	Stainless Steel Pipe Fittings
J.	ASTM A778	-	Stainless Steel Pipe
K.	ASTM F593	-	Stainless Steel Bolts, Hex Cap Screws and Studs.
L.	ASTM F594	-	Stainless Steel Nuts.
M.	ANSI/ASME B1.1	-	Unified Inch Screw Thread (UN and UNR Thread Form).

1.04 TESTS

- A. All stainless steel materials including stainless test welds, shall be checked for compliance with tests for susceptibility to intergranular attack. Such tests shall be Practices A, B and E of ASTM A262. Detailed procedures for the tests shall be submitted to the Engineer for approval prior to start of work. Practice A shall be used only for acceptance of materials but not for rejection of materials, and shall be used for screening material intended for testing in Practice B and Practice E. The maximum acceptable corrosion rate under Practice B shall be 0.004 inch per month, rounded off to the third decimal place. If the certified mill report indicates that such test has been satisfactory performed, the fabricator may not be required to repeat the test. Material passing Practice E shall be acceptable.
- B. Sample selection for the susceptibility to intergranular attack tests shall be as follows:
  - 1. One (1) sample per heat treatment lot for plates and forgings;
  - 2. One (1) sample per each Welding Procedure Qualification regardless of the joint design;
  - 3. If tests indicate a reduction in corrosion resistance, welding procedure shall be adjusted or heat treatment determined as needed to restore required corrosion resistance.
  - 4. The samples so chosen shall have received all the post-weld heat treatments identical to the finished part.

### 1.05 SUBMITTALS

- A. The Contractor shall prepare and submit for approval shop drawings for all stainless steel fabrication in accordance with Section 01300, Submittals.
- B. Submittals shall include, but not be limited to, the following:
  - 1. Certified test reports for susceptibility to intergranular attack.
  - 2. Affidavit of compliance with type of stainless steel shown on the Contract Drawings or specified herein.
  - 3. Certified weld inspection reports.

- 4. Cleaning and handling of stainless steel in accordance with Paragraph 3.04, Cleaning and Handling.
- C. Samples of finish, on each type of stainless steel to be furnished, shall be submitted to the Engineer upon request.
- 1.06 QUALITY ASSURANCE
  - A. Shop inspections may be made by the Engineer. The Contractor shall give ample notice to the Engineer prior to the beginning of any stainless steel fabrication work so that inspection may be provided. The Contractor shall furnish all facilities for the inspection of materials and workmanship in the shop, and the inspectors shall be allowed free access to the necessary parts of the works.
  - B. Inspectors shall have the authority to reject any materials or work which does not meet the requirements of the Contract Drawings or the Specifications.
  - C. Inspection at the shop is intended as a means of facilitating the work and avoiding errors, but is expressly understood that it will in no way relieve the Contractor from his responsibility for furnishing proper materials or workmanship.
- 1.07 HANDLING, STORAGE AND DELIVERY
  - A. Mechanical damage (e.g., scratches and gouges) to the stainless steel material shall not be permitted and is cause for rejection. Care shall be taken in the material handling since such mechanical damage will result in the passive oxide film being "punctured" leading to a possible lower resistance to the initiation of corrosion than the surrounding chemically-passivated surface.
  - B. Stainless steel plates and sheets shall be stored vertically in racks and not be dragged out of the racks or over one another. Racks shall be protected to prevent iron contamination.
  - C. Heavy stainless steel plates shall be carefully separated and chocked with wooden blocks so that the forks of a fork-lift could be inserted between plates without mechanically damaging the surface.
  - D. Stainless steel plates and sheets laid out for use shall be off the floor and be divided by wooden planks to prevent surface damage and to facilitate subsequent handling.
  - E. Plate clamps, if used, shall be used with care as the serrated faces can dig in, indent and gouge the surface.
  - F. Stainless steel fabrications shall be loaded in such a manner that they may be transported and unloaded without being overstressed, deformed or otherwise damaged.
  - G. Stainless steel fabrications and packaged materials shall be protected from corrosion and deterioration and shall be stored in a dry area. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with approved effective and durable covers.

H. Stainless steel fabrications shall not be placed in or on a structure in a manner that might cause distortion or damage to the fabrication. The Contractor shall repair or replace damaged stainless steel fabrications or materials as directed by the Engineer.

### .08 FIELD MEASUREMENTS

- A. The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of the work.
- B. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

# PART 2 -- PRODUCTS

# 2.01 MATERIALS AND FINISHES

- A. Stainless steel shall be Type 304 unless it is used for underwater service. Stainless steel for underwater service shall be Type 316. Minimum mechanical finish shall be No. 4 as stated in Table 2 unless otherwise noted on the Contract Drawings.
- B. The basic mill forms (sheet, strip, plate and bar) are classified by size as shown on Table 1. Tables 2, 3 and 4 identify finishes and conditions in which sheet, bar and plate are available.
- C. Tables 2, 3 and 4 show numbered finishes and conditions for sheet, bar and plate. While there are no specific designations for polished finishes on bar or plate, the sheet finish designations are used to describe the desired effect. This also applies to finishes on ornamental tubing.
- D. There are three standard finishes for strip, which are broadly described by the finishing operations employed:
  - 1. No. 1 Strip Finish

No. 1 strip finish is approximately the same as No. 2D Sheet Finish. It varies in appearance from dull gray matte to a fairly reflective surface, depending largely on alloy composition and amount of cold reduction.

- 2. No. 2 Strip Finish is approximately the same as a No. 2B sheet finish. It is smoother, more reflective than No. 1, and likewise varies with alloy composition.
- 3. Bright annealed finish is a highly reflective finish that is retained by final annealing in a controlled atmosphere furnace.

# **Classification of Stainless Steel Product Form**

			Dimensions	
Item	Description	Thickness	Width	Diameter or Size
Sheet	Coils and cut length:			
	Mill finishes Nos. 1, 2D and 2B	under 3/16"	24" and over	
	Polished finishes Nos. 3, 4, 6, 7 & 8	under 3/16"	all widths	
Strip	Cold finished, coils or cut lengths	under 3/16"	under 24"	
•	Polished finishes Nos. 3, 4, 6,7 & 8	under 3/16"	all widths	
Plate	Flat rolled or forged	3/16" and over	over 10"	
Bar	Hot finished rounds, squares, octagons and hexagons			1/4" and over
	Hot finished flats	1/8" to 8" incl.	1/4" to 10" incl.	
	Cold finished rounds, squares, octagons and hexagons			
	Cold finished flats	1/8" to 4-1/2"	3/8" to 4-1/2"	over 1/8"
Wire	Cold finishes only: (in coil)			
	Round, square, octagon, hexagon and flat wire	under 3/16"	under 3/8"	
Pipe &	Several different classifications, with differing specifications, are available.			
Tubing				
Extrusion	Not considered "standard" shapes. Currently limited in size to approximately 6-1/2" diameter or structurals.			

# **Standard Mechanical Sheet Finishes**

Unpolishe	ed or Rolled Finishes:	No. 4	A polished surface obtained by finishing with a 120-150
No. 1	A rough dull surface which results from hot rolling to the specified thickness followed by annealing and descaling.		mesh abrasive, following initial grinding with coarser abrasives. This is a general purpose bright finish with a visible "grain" which prevents mirror reflection.
No. 2D	A dull finish which results from cold rolling followed by annealing and descaling, and may perhaps get a final light roll pass through unpolished rolls. A 2D finish is used where appearance is of no concern.	No. 6	A dull satin finish having lower reflectivity than No. 4 finish. It is produced by Tampico brushing the No. 4 finish in a medium of abrasive and oil. It is used for architectural applications and ornamentation where a high luster is undesirable, and to contrast with brighter finishes.
No. 2B	A bright cold-rolled finish resulting in the same manner as No. 2D finish, except that the annealed and descaled sheet receives a final light roll pass through polished rolls. This is the general purpose cold-rolled finish that can be used as is, or as a preliminary step to polishing.	No. 7	A high reflective finish that is obtained by buffing finely ground surfaces but not to the extent of completely removing the "grit" lines. It is used chiefly for architectural and ornamental purposes.
Polished Finishes:		No. 8	The most reflective surface, which is obtained by
No. 3	An intermediate polish surface obtained by finishing with a 100 grit abrasive. Generally used where a semi-finished polished surface is required. A No. 3 finish usually receives additional polishing during fabrication.		polishing with successively finer abrasives and buffing extensively until all grit lines from preliminary grinding operations are removed. It is used for applications such as mirrors and reflectors.

# **Conditions and Finishes for Bar**

Conditions	Surface Finishes <sup>1</sup>
Hot worked only	(a) Scale not removed (excluding spot conditioning)
	(b) Rough turned <sup>2</sup>
	(c) Pickled or blast cleaned and pickled.
Annealed or otherwise heat treated.	(a) Scale not removed (excluding spot conditioning)
	(b) Rough turned
	(c) Pickled or blast cleaned and pickled
	(d) Cold drawn or cold rolled
	(e) Centerless ground
	(f) Polished
Annealed and cold worked to high tensile strength <sup>3</sup>	(d) Cold drawn or cold rolled
	(e) Centerless ground
	(f) Polished

<sup>&</sup>lt;sup>1</sup> Surface finishes (b), (e) and (f) are applicable to round bars only.

<sup>&</sup>lt;sup>2</sup> Bars of the 4xx series stainless steels which are highly hardenable, such as Types 414, 420, 420F, 431, 440A, 440B and 440C, are annealed before rough turning. Other hardenable grades, such as Types 403, 410, 416 and 416Se, may also require annealing depending on their composition and size.

<sup>&</sup>lt;sup>3</sup> Produced in Types 302, 303Se, 304 and 316.

### **Conditions and Finishes for Plate**

Condition and Finish	Description and Remarks
Hot rolled	Scale not removed. Not heat treated. Plates not recommended for final use in this condition. <sup>4</sup>
Hot rolled, annealed or heat treated	Scale not removed. Use of plates in this condition is generally confined to heat resisting applications. Scale impairs corrosion resistance. <sup>1</sup>
Hot rolled, annealed or heat treated, blast cleaned or pickled	Condition and finish commonly preferred for corrosion resisting and most heat resisting applications.
Hot rolled, annealed, descaled and temper passed	Smoother finish for specialized applications.
Hot rolled, annealed, descaled cold rolled, annealed, descaled, optionally temper passed	Smooth finish with greater freedom from surface imperfection than the above.
Hot rolled, annealed or heat treated, surface cleaned and polished	Polished finishes refer to Table 2.

<sup>4</sup> Surface inspection is not practicable on plates which have not been pickled or otherwise descaled.

### PART 3 -- EXECUTION

#### 3.01 FABRICATION

- A. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where practicable. Joints exposed to the weather shall be formed to exclude water.
- B. As far as practicable, all fabricated units shall be fitted and assembled in the shop, with all cuts and bends made to precision measurements in accordance with details shown on approved shop drawings.
- C. Work shall be fabricated so that it is installed in a manner that will provide for expansion and contraction, prevent the shearing of bolts, screws and other fastenings, ensure rigidity, and provide close fitting of sections.
- D. All finished and/or machined faces shall be true to line and level. Stainless steel sections shall be well formed to shape and size with sharp lines and angles; curved work shall be sprung evenly to curves.
- E. All work shall be fitted together at the shop as far as possible, and delivered complete and ready for erection. Proper care shall be exercised in handling all work so as not to injure the finished

surfaces.

### 3.02 WELDING

- A. Welding shall be done in a manner that will prevent buckling and in accordance with Specification 05050 Metal Fastening, and as modified hereinafter.
- B. All welds exposed in the work shall be ground smooth and finished to match the finish of the adjacent stainless steel surfaces.
- C. Select weld rods that provide weld filler metal having corrosion resistant properties as nearly identical or better than the base metal to insure preservation of the corrosion-resistant properties. Provide heat treatment at welds where testing of weld procedure indicates it is required to restore the corrosion resistance.
- D. Thermal conductivity of stainless steel is about half that of other steels; and the following methods may be used to accommodate this situation:
  - 1. Use lower weld current setting.
  - 2. Use skip-weld techniques to minimize heat concentration.
  - 3. Use back-up chill bars or other cooling techniques to dissipate heat.
- E. Edges of the stainless steel to be welded shall be cleaned of contaminants.

### 3.03 FASTENERS

- A. Stainless steel fasteners shall be used for joining stainless steel work.
- B. Stainless steel fasteners shall be made of alloys that are equal to or more corrosion resistant than the materials they join.

# 3.04 CLEANING AND HANDLING

- A. All stainless steel surfaces shall be precleaned, descaled, passivated and inspected before, during and after fabrication in accordance with the applicable sections of ASTM A380 and as detailed in the procedures to be submitted to the Engineer for approval prior to start of work. Degreasing and passivation of stainless steel articles shall be conducted as the last step after fabrication.
- B. Measures to protect cleaned surfaces shall be taken as soon as final cleaning is completed and shall be maintained during all subsequent handling, storage and shipping.
  - 1. The Contractor shall submit for approval specific procedures listing all the steps to be followed in detecting contamination and in descaling, cleaning, passivation and protecting of all stainless steel.
  - 2. Area showing clear indications of contamination shall be recleaned, repassivated and reinspected.

- C. At approved stages in the shop operations, contaminants such as scale, embedded iron, rust, dirts, oil, grease and any other foreign matter shall be removed from the metal, as directed or approved by the Engineer. The adequacy of these operations shall be checked by the Engineer. Operations in the shop shall be conducted so as to avoid contamination of the stainless steel and to keep the metal surfaces free from dirt and foreign matter.
- D. In order to prevent incipient corrosion during fabrication, special efforts shall be made at all times to keep all stainless steel surfaces from coming in contact with other metals.
  - 1. Stainless steel and stainless steel welds shall be cleaned with clean sand free of iron, stainless steel wool, stainless steel brushes, or other approved means and shall be protected at all times from contamination by any materials, including carbon steel, that shall impair its resistance to corrosion.
  - 2. Approved methods of cutting, grinding and handling shall be used to prevent contamination. If air-arc, or carbon-arc cutting is used, additional metal shall be removed by approved mechanical means so as to provide clean, weldable edges. All grinding of stainless steel shall be performed with aluminum oxide or silicon carbide grinding wheels bonded with resin or rubber. Grinding wheels used on carbon steel shall not be used on stainless steel.
  - 3. Sand, grinding wheels, brushes and other materials used for cleaning stainless steel shall be checked periodically by the Engineer for contaminants. Cleaning aids found to contain contaminants shall not be used on the work.

### 3.05 INSTALLATION

- A. All stainless steel fabrications shall be erected square, plumb and true, accurately fitted, adequately anchored in place, set at proper elevations and positions.
- B. All inserts, anchor rods and all other miscellaneous work specified in the Detailed Specifications or shown on the Contract Drawings or required for the proper completion of the work, which are embedded in concrete, shall be properly set and securely held in position in the forms before the concrete is placed.
- C. All stainless steel fabrications shall be installed in conformance with details shown on the Contract Drawings or on the approved shop drawings.

# END OF SECTION

#### SECTION 05120

#### STRUCTURAL STEEL

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

A. Furnish all equipment, labor, materials, and services required to provide all structural steel work in accordance with the Contract Documents. The term "structural steel" shall include items as defined in the AISC "Code of Standard Practice".

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05010 Metal Materials
- B. Section 05050 Metal Fastening

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the Specifications, all work specified herein shall conform to the applicable requirements of the following documents.
  - 1. International Building Code 2009, 13<sup>th</sup> Edition
  - 2. AISC "Code of Standard Practice."
  - 3. AISC "Specification for Structural Steel Buildings".
  - 4. AISC 348 "The 2009 RCSC Specification for Structural Joints".
  - 5. AWS "Structural Welding Code".

### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Certified Mill Test Reports
  - 2. Affidavit of Compliance with grade specified
  - 3. Shop Drawings which include the following:
    - a. Layout drawings indicating all structural shapes, sizes, and dimensions.

- b. Beam and column schedules.
- c. Detailed drawings indicating jointing, anchoring and connection details and vent and drain holes where required.

# 1.05 QUALITY ASSURANCE

- A. Shop inspection may be required by the Owner at his own expense. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication work so that inspection may be provided. The Contractor shall furnish all facilities for the inspection of materials and workmanship in the shop, and the inspectors shall be allowed free access to the necessary parts of the work. Inspectors shall have the authority to reject any materials or work which do not meet the requirements of these Specifications. Inspection at the shop is intended as a means of facilitating the work and avoiding errors, but is expressly understood that it will in no way relieve the Contractor from his responsibility for furnishing proper materials or workmanship under this Specification.
- B. The erector shall be a qualified installer who participates in the AISC Certification program and is designated an AISC Certified Erector, Category ACSE.
- C. The fabricator shall be a qualified fabricator who participates in the AISC Certification program and is designated an AISC Certified Plant, Category STD.

# PART 2 -- PRODUCTS

### 2.01 MATERIALS

- A. Structural Steel
  - 1. Structural steel for W shapes shall conform to ASTM A992 unless otherwise indicated.
  - 2. Structural steel for HP shapes shall conform to ASTM A572 Grade 50 unless otherwise indicated.
  - 3. Structural steel for S, M, C, and MC shapes and angles and plates shall conform to ASTM A36 unless otherwise indicated.
  - 4. Steel pipe shall be ASTM A53, Grade B.
  - 5. HSS shall be ASTM A500, Grade C or ASTM A1085. All members shall be furnished full length without splices unless otherwise noted or accepted by the Engineer.
  - 6. All unidentified steel will be rejected and shall be removed from the site and replaced by the Contractor, all at the expense of the Contractor.
  - 7. Fasteners for structural steel shall be in accordance with Section 05050, Metal Fastening.

- B. Welds
  - 1. Electrodes for welding shall be in accordance with Section 05050, Metal Fastening.

# PART 3 -- EXECUTION

### 3.01 MEASUREMENT

A. The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of work. The Contractor shall review the Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

### 3.02 FABRICATION

- A. Fabrication shall be in accordance with the AISC "Specification for Structural Steel Buildings and AISC "Code of Standard Practice". Fabrication shall begin only after Shop Drawing approval.
- B. Except where otherwise noted on the Drawings or in this Specification, all shop connections shall be welded.
- C. All holes in structural steel members required for anchors, anchor rods, bolts, sag rods, vent and drain holes or other members or for attachment of other work shall be provided by the fabricator and detailed on the Shop Drawings.
- D. All materials shall be properly worked and match-marked for field assembly.
- E. Where galvanizing of structural steel is required, it shall be done in accordance with Section 05035, Galvanizing.

### 3.03 DELIVERY, STORAGE AND HANDLING

- A. Structural members shall be loaded in such a manner that they may be transported and unloaded without being over-stressed, deformed or otherwise damaged.
- B. Structural steel members and packaged materials shall be protected from corrosion and deterioration. Material shall be stored in a dry area and shall not be placed in direct contact with the ground. Materials shall not be placed on the structure in a manner that might cause distortion or damage to the members or the supporting structures. The Contractor shall repair or replace damaged materials or structures as directed.

### 3.04 ERECTION

A. The erection of all structural steel shall conform to the applicable requirements of the AISC "Specification for Structural Steel Buildings" and AISC "Code of Standard Practice". All temporary bracing, guys and bolts as may be necessary to ensure the safety of the structure until the permanent connections have been made shall be provided by the Contractor.

- B. Structural members shall be set accurately to the lines and elevations indicated. The various members shall be aligned and adjusted to form a part of a complete frame or structure before permanently fastened.
- C. No cutting of structural steel members in the field will be allowed except by the written approval of the Engineer.
- D. Bearing surfaces and other surfaces which will be in permanent contact shall be cleaned before assembly.
- E. Field welding shall not be permitted unless specifically indicated in the Drawings or approved in writing by the Engineer. All field welding shall comply with Section 05050, Metal Fastening.
- F. All bolted connections shall use high strength bolts in accordance with Section 05050, Metal Fastening. High strength bolts shall be installed in accordance with AISC 348 "The 2009 RCSC Specification for Structural Joints". Bolts specified or noted on the Drawings to be a tension or slip critical "SC" type connection shall be fully pretensioned with proper preparation of the faying surfaces. All other bolts shall be snug tightened unless otherwise noted on the Drawings.
- G. All field connections shall be accurately fitted up before being bolted. Drifting shall be only such as will bring the parts into position and shall not be sufficient to enlarge the holes or to distort the metal. All unfair holes shall be drilled or reamed.
- H. Misfits at Bolted Connections
  - 1. Where misfits in erection bolting are encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misfit for review by the Engineer. The Engineer will determine whether the remedy is acceptable or if the member must be refabricated.
  - 2. Incorrectly sized or misaligned holes in members shall not be enlarged by burning or by the use of drift pins. The Contractor shall notify the Engineer immediately and shall submit a proposed method of remedy for review by the Engineer.
  - 3. Where misalignment between anchor rods and rod holes in steel members are encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misalignment for review by the Engineer.

- I. Grouting of Base Plates and Bearing Plates
  - 1. The bottom surface of the plates shall be cleaned of all foreign materials, and concrete or masonry bearing surface shall be cleaned of all foreign materials and roughened to improve bonding.
  - 2. Accurately set all base and bearing plates to designated levels with steel wedges or leveling plates.
  - 3. Baseplates shall be grouted with non-shrink grout to assure full uniform bearing. Grouting shall be done prior to placing loads on the structure. Non-shrink grout shall conform to Section 03600, Grout.
  - 4. Anchor rods shall be tightened after the supported members have been positioned and plumbed and the non-shrink grout has attained its specified strength.
- J. Where finishing is required, assembly shall be completed including bolting and welding of units before start of finishing operations.

# 3.05 PAINTING

- A. Painting shall be performed according to Section 09900, Painting and the following additional requirements.
  - 1. Concrete Encased Steel: Steel members which will be encased in concrete shall be cleaned but not painted prior to encasement.
  - 2. Contact Surfaces: Contact surfaces such as at field connections, shall be cleaned and primed but not painted.
  - 3. Finished Surfaces: Machine finished surfaces shall be protected against corrosion by a rustinhibiting coating which is easily removed prior to erection or which has characteristics that make removal unnecessary prior to erection.
  - 4. Surfaces Adjacent to Field Welds: Surfaces within 2 inches of any field weld location shall be free of materials that would prevent proper welding or produce objectionable fumes while welding is being done.

# END OF SECTION

#### SECTION 05500

#### METAL FABRICATIONS

#### PART 1 -- GENERAL

#### 1.01 REQUIREMENT

- A. Furnish all materials, labor, and equipment required to provide all metal fabrications not specifically included in other Sections, complete and in accordance with the requirements of the Contract Documents.
- B. Work shall include but may not be limited to lintels.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05010 Metal Materials
- B. Section 05050 Metal Fastening

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. Pennsylvania Building Code 2009, 13<sup>th</sup> Edition
  - 2. AISC Specification for Structural Steel Buildings
  - 3. AISI Specifications for the Design of Cold-Formed Steel Structural Members
  - 4. Aluminum Association Specifications for Aluminum Structures

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Complete fabrication and erection drawings of all metalwork specified herein.
  - 2. Other submittals as required in accordance with Section 05010, Metal Materials, and Section 05050, Metal Fastening.

#### PART 2 -- PRODUCTS

2.01 METAL MATERIALS

A. Metal materials used in metal fabrications shall conform to Section 05010, Metal Materials, unless noted otherwise.

### 2.02 METAL FASTENING

A. All welds and fasteners used in metal fabrication shall conform to Section 05050, Metal Fastening, unless noted otherwise.

# 2.03 LINTELS

- A. Provide lintels as shown on the Drawings and specified herein with 8 inches minimum bearing each side unless noted otherwise.
- B. All lintels shall be steel in accordance with Section 05120, Structural Steel, and shall be galvanized in accordance with Section 05035, Galvanizing, unless noted otherwise.

# 2.04 MESH PANEL SYSEM

- A. Provide custom fabricated mesh panel system as shown on the Drawings and specified herein as completely manufacturer designed and fabricated to meet project design, details and specifications.
- B. All mesh panel components shall be bronze.
- C. Bronze fabric shall be Ellipse 14 as manufactured by GKD-USA Inc. 825 Chesapeake Drive Cambridge MD 21613, Direct: 410.901.8428 or 410.901.8429, Toll Free: 800-453-8616, <u>metalfabrics@gkdusa.com</u> or equal.
- D. All bronze flats, angled bars and rods shall be bronze and design as a complete panel system by single manufacturer.
- F. All edges and surface shall be ground smooth and finish US4 Satin Bronze equivalent. All corner mitered.

# PART 3 -- EXECUTION

### 3.01 FABRICATION

- A. All measurements and dimensions shall be based on field conditions and shall be verified by the Contractor prior to fabrication. Such verification shall include coordination with adjoining work.
- B. All fabricated work shall be shop fitted together as much as practicable, and delivered to the field, complete and ready for erection. All miscellaneous items such as stiffeners, fillets, connections, brackets, and other details necessary for a complete installation shall be provided.

- C. All work shall be fabricated and installed in a manner that will provide for expansion and contraction, prevent shearing of bolts, screws, and other fastenings, ensure rigidity, and provide a close fit of sections.
- D. Finished members shall conform to the lines, angles, and curves shown on the Drawings and shall be free from distortions of any kind.
- E. All shearings shall be neat and accurate, with parts exposed to view neatly finished. Flame cutting is allowed only when performed utilizing a machine.
- F. All shop connections shall be welded unless otherwise indicated on the Drawings or specified herein. Bolts and welds shall conform to Section 05050, Metal Fastening. All fastenings shall be concealed where practicable.
- G. Fabricated items shall be shop painted when specified in Section 09900, Painting.

### 3.02 INSTALLATION

- A. Assembly and installation of fabricated system components shall be performed in strict accordance with manufacturer's recommendations.
- B. All miscellaneous metalwork shall be erected square, plumb and true, accurately fitted, adequately anchored in place, and set at proper elevations and positions
- C. Metal work shall be field painted when as specified in accordance with Section 09900, Painting.
- E. Bronze mesh panel is not to be painted.

# END OF SECTION

#### SECTION 05515

### LADDERS

# PART 1 -- GENERAL

#### 1.1 DESCRIPTION

A. Furnish all materials, labor, and equipment required to provide all ladders in accordance with the requirements of the Contract Documents.

### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05050 Metal Fastening
- B. Section 07221 Roof Hatches

### 1.3 REFERENCES

- A. Without limiting the generality of the Specifications, all work specified herein shall conform to the applicable requirements of the following documents.
  - 1. International Building Code 2009, 13<sup>th</sup> Edition
  - 2. Aluminum Association Specifications for Aluminum Structures
  - 3. Occupational Safety and Health Administration (OSHA) Regulations

### 1.4 SUBMITTALS

A. Complete fabrication and erection drawings of all metalwork specified herein.

### PART 2 -- PRODUCTS

#### 2.1 LADDERS

- A. Ladders shall be furnished with all mounting brackets, baseplates, fasteners, and necessary appurtenances for a complete and rigid installation.
- B. All ladders shall be aluminum alloy 6061-T6 or 6063-T5, with a clear, anodized finish, Aluminum Association M12C22A41.

- C. All ladders shall conform to dimensions indicated on the Drawings and shall comply with OSHA requirements.
- D. Side rails shall be 1-1/2 inch diameter Schedule 80 pipe, minimum.
- E. Rungs shall be serrated 3/4 inch diameter, minimum.
- F. All exposed connections shall be welded and ground smooth.
- G. Ladders shall be as manufactured by Thompson Fabricating Company, or equal.
- H. Grating platform:
  - 1. Provide complete grated aluminum platform to match and align with ladder. All items shall same material and finish as specified above for the ladder.
  - 2. Aluminum grating shall be fabricated of I-shaped bars, alloy 6063-T6, with swaged cross bars spaced on 4" centers. Bearing bars shall be spaced not to exceed 15/16 inches clear openings at standing surface between i-bars. Top surface of bearing bars shall be striated to provide a non-slip surface. Provide factor installed aluminum frame around perimeter of the walking platform of same material and finish as the grating.
  - 3. Grating shall be designed to support a uniform load of 200 pounds per square foot with a maximum deflection of 1/4". The maximum fiber stress shall not exceed that which is allowed by the Aluminum Association.
  - 4. Standard installation clearances and tolerances shall conform to the requirements of the current Metal Bar Grating Manual published by the National Association of Architectural Metal Manufacturers.
  - 5. Install aluminum clamps or clips to anchor the grating securely to supports. A minimum of fasteners per panel shall be provided, unless otherwise shown on the drawings.
  - 6. Top of grating shall be clear of any anchoring / connection bolts and protrusion of any kind that are in the way of walking surface.
- F. All exposed connections shall be welded and ground smooth.
- G. Ladders shall be as manufactured by Thompson Fabricating Company, or equal.

# 2.2 FALL PREVENTION SYSTEM

- A. Ladders shall be installed with a fall prevention system, unless indicated otherwise on the drawings. For all ladders with an uninterrupted length exceeding 20 ft. between landings or floors, fall prevention system is mandatory.
- B. Fall prevention system shall comply with OSHA requirements.
- C. Fall prevention system shall include all necessary components to provide a fully operational system, including one full body safety harness with a 310 lb. weight capacity for each fall prevention system. System shall have a fall locking device, impact attenuator, and rail system.

Rail extension with dismounting system, which allows detachment from the system while not standing on the ladder, shall be provided for ladders accessed thru hatch openings. All components shall be stainless steel with a non-metallic cable guide.

D. Fall Prevention Systems shall be RTC 2000 Climb-Rite System, Research and Trading Corporation, or Saf-T-Climb Fall Prevention System, Norton by Honeywell.

# PART 3 -- EXECUTION

### 3.1 FABRICATION

- A. All measurements and dimensions shall be based on field conditions and shall be verified by the Contractor prior to fabrication. Such verification shall include coordination with adjoining work.
- B. All fabricated work shall be shop fitted together as much as practicable, and delivered to the field, complete and ready for erection.
- C. All work shall be fabricated and installed in a manner that will provide for expansion and contraction, prevent shearing of bolts, screws, and other fastenings, ensure rigidity, and provide a close fit of sections.
- D. Finished members shall conform to the lines, angles, and curves shown on the Drawings and shall be free from distortions of any kind.
- E. All shearings shall be neat and accurate, with parts exposed to view neatly finished. Flame cutting is allowed only when performed utilizing a machine.
- F. All shop connections shall be welded unless otherwise indicated on the Drawings or specified herein. Bolts and welds shall conform to Section 05050, Metal Fastening. All fastenings shall be concealed where practicable.
- G. Fabricated items shall be shop painted when specified in accordance with Section 09900, Painting.

# 3.2 INSTALLATION

- A. Assembly and installation of fabricated system components shall be performed in strict accordance with manufacturer's recommendations.
- B. All miscellaneous metalwork shall be erected square, plumb and true, accurately fitted, adequately anchored in place, and set at proper elevations and positions.
- C. Metalwork shall be field painted when specified in accordance with Section 09900, Painting.

# END OF SECTION

### 05515 - 3

#### SECTION 05520

#### HANDRAILS AND RAILINGS

#### PART 1 - GENERAL

### 1.01 THE REQUIREMENT

A. Furnish all materials, labor, and equipment required to provide all handrails and railings in accordance with the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 04200 Unit Masonry
- B. Section 05092 Metal Fastening
- C. Section 05500 Metal Fabrications
- D. Section 04200 Unit Masonry

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. International Building Code 2009, 13<sup>th</sup> Edition
  - 2. Aluminum Association Specifications for Aluminum Structures
  - 3. Occupational Safety and Health Administration (OSHA) Regulations

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Complete fabrication and erection drawings of all metal work specified herein
  - 2. Other submittals as required in accordance with Section 05010, Metal Materials and Section 05050, Metal Fastening.
  - 3. Calculations for the complete design and engineering analysis of the railing and handrail system, auxiliary system components and anchorages, including calculations showing compliance with performance criteria specified, prepared, signed and stamped with the seal of a registered professional engineer licensed to practice in the State of Pennsylvania and recognized as an expert in the required work.

# 1.05 QUALITY ASSURANCE AND QUALIFICATIONS

- A. Manufacturer Qualifications:
  - 1. Engage a single fabricator, with undivided responsibility for detailing and performance of the aluminum pipe railing systems.
  - 2. Engage a firm which can show minimum of five years previous successful experience in detailing and fabrication of aluminum pipe railing systems of scope and type similar to the required work.
  - 3. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency in compliance with ASTM E329 and ASTM E548. Such inspections and tests shall not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
- B. Installer Qualifications:
  - 1. Engage a single installer skilled, trained and with successful and documented experience in the installation of aluminum pipe railing systems and with specific skill and successful experience in the erection of the types of materials required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of work. Submit names and qualification to Engineer along with the following information on a minimum of three successful projects:
    - a. Names and telephone numbers of owner, architects or engineers responsible for projects.
    - b. Approximate contract cost of the aluminum pipe railing.
    - c. Amount of area installed.
- C. Professional Engineer:
  - 1. Engage a registered professional engineer legally qualified to practice in the State of Pennsylvania and experienced in providing engineering services of the kind indicated.
  - 2. Responsibilities include, but are not necessarily limited to, the following:
    - a. Carefully reviewing system performance and design criteria stated in the Contract Documents.
    - b. Preparing written requests for clarification or interpretation of performance or design criteria for submittal to Engineer by Contractor.
    - c. Preparing, or supervising the preparation of design calculations, and reviewing and approving related Working Drawings prepared by the

aluminum pipe railing system manufacturer prior to submission to Engineer; testing plan development, and test-result interpretations; and providing comprehensive engineering analyses verifying compliance of the system with the requirements of the Contract Documents.

- d. Signing and sealing all calculations and engineering analyses.
- e. Certifying that:
- 1. It has performed the design of the aluminum pipe railing system in accordance with the performance and design criteria stated in the Contract Documents, and
- 2. The said design conforms to all applicable local, state and federal codes, rules and regulations and to the prevailing standards of practice.
- D. Testing Agency Qualifications: To qualify for approval, an independent testing agency shall demonstrate to Engineer's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the work in accordance with ASTM E329 and ASTM E548.
- E. Performance Criteria:
  - 1. Maintain the visual design concept shown, and the technical requirements specified, including modules, profiles, alignment of components and requirements for finish.
  - 2. Contractor shall provide aluminum pipe handrail and railing system that conforms to the State of New York Building Code Chapter 16 and ASTM E985, without exceptions, including the requirement that specific types of occupancies and sizes of contributing protected areas shall incorporate greater design load resistance into aluminum pipe railing system, in compliance with ASTM E985, than that specified herein.
    - a. Completed handrail and railing shall withstand a uniform lateral force of 50 pounds per linear foot and a vertical uniform downward force of 50 pounds per linear foot, both applied simultaneously at the top of the handrail and railing, performance tested in accordance with Test Method A and B of ASTM E935.
    - b. Intermediate and bottom rails shall withstand simultaneously applied lateral uniform forces of 40 pounds per linear foot and a vertical load of 50 pounds per linear foot, however, lateral and vertical loads on intermediate and bottom railings need not be considered in the detailing and fabrication of posts and anchorages.
    - c. For railings having solid panels or picket balusters, the panels or picket balusters shall be detailed and fabricated to withstand a uniform lateral load of 50 pounds distributed over any round or square area of one square foot located anywhere within the infill area or a 50 pound per foot penetration

cone, performance tested in accordance with Test Method C and D of ASTM E935.

- d. Concentrated 200 pound load and uniform force conditions shall not be applied simultaneously.
- e. Other pertinent requirements ceded to ANSI A1264.1 by governing authorities having jurisdiction at the Site.
- f. Bending stresses shall not exceed 60 percent of the yield stress of the material. Applied loads shall not produce permanent residual deformation in the completed work when loads are removed. Load-deformation data shall be determined in accordance with ASTM E935.
- g. Maximum allowable deflections shall be in accordance with ASTM E985.
- h. Where computations make it possible to provide the needed information, testing, in compliance with ASTM E935, shall be performed for verification that aluminum pipe railing system and auxiliary system components comply with specified performance requirements and the requirements of governing authorities having jurisdiction.
- 3. Thermal Control: Provide adequate expansion within the fabricated system that allows for a thermal expansion and contraction caused by a material temperature range of 140 degrees F to -20 degrees F without warp or bow of system components. Distance between expansion joints shall be based on providing a 1/4 inch wide joint at 70 degrees F which accommodates a movement of 150 percent of the calculated amount of movement for the specified temperature range.
- 4. Provide expansion joints in handrail and railing system work where systems cross expansion joints in structure.
- 5. Configuration of all aluminum pipe handrail and railing systems shall be as shown on the Contract Drawings General Railing and Handrail Sheet. All details shown on the Contract Drawings are typical; similar details apply to similar conditions, unless specifically noted otherwise on the Contract Drawings.
- 6. Manufacturer is responsible for structural analysis and detailing of aluminum pipe handrail and railing system. Provide complete structural performance calculations and Working Drawings for all aluminum pipe handrail and railing members, anchors and all other support system components prepared, signed and stamped with the seal of a registered professional engineer licensed to practice in the State of New York and recognized as an expert in the specialty involved.
- F. Anchors and Supports:
  - 1. Anchorage system shall be structurally analyzed based on results of tests in compliance with ASTM E488 and ASTM E894. Anchors shall be tested for static,

seismic, fatigue and shock loadings in series. Static tests shall include tension, shear, flexure and torsion load resistance.

- 2. When the size, length or load carrying capacity of an anchor bolt, concrete anchor or concrete insert is not shown on the Contract Drawings, provide the size, length and capacity required to carry the design load times a minimum safety factor of four when installed in cast-in-place concrete and a minimum safety factor of six when installed in unit masonry construction.
- 3. Sizes shown on the Contract Drawings shall be considered minimum. Increase size to comply with design loadings and minimum safety factors specified.
- 4. All railing system posts shall be provided with a circular profile solid reinforcing bar with outside diameter equal to inside diameter of post. All posts shall receive one reinforcing bar.
- G. Source Quality Control:
  - 1. Obtain all aluminum pipe railing and handrail system components and accessories from the same manufacturer.
  - 2. Provide qualified welding processes and welding operators in accordance with ANSI/AWS "Structural Welding Code" D1.1, Section 5, Qualification.
  - 3. Provide certification that all welders employed on, or to be employed for, the fabrication of the stainless steel welded pipe rail system have satisfactorily passed AWS qualification tests within the previous twelve months. Contractor shall ensure that all certification are kept current.
- H. Allowable Tolerances:
  - 1. Provide "pencil-line" thin butt joints.
  - 2. Limit variation of cast-in-place inserts and sleeves to the following:
    - a. Spacing:  $\pm 3/8$  inch.
    - b. Alignment:  $\pm 1/4$  inch.
    - c. Plumb:  $\pm 1/8$  inch.
  - 3. Minimum Railing System Plumb Criteria:
    - a. Limit variation of completed handrail and railing system alignment to 1/4 inch in 12 feet 0 inches with posts set plumb to within 1/16 inch in 3 foot 0 inches.
    - b. Align rails so variations from level for horizontal members and from parallel with rake of stairs and ramps for sloping members do not exceed 1/4 inch in 12 feet 0 inches.

### 1.07 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
  - 1. Deliver aluminum pipe railing and handrail and all accessories dry and undamaged, with manufacturer's protective coating intact, bearing original intact factory labels.
  - 2. Aluminum pipe railing systems which are damaged during delivery or while being unloaded shall not be stored on Site. Remove such units from Site and replace panels with new, undamaged material.
  - 3. Do not subject aluminum welded pipe railing and accessory materials to bending or stress. Do not carry or transport panels in the horizontal (flat) position. Hold panels upright on edge when handling.
  - 4. Maintain protective covering on railings and handrails. System components which are damaged during installation shall be removed from Site and replaced with new, undamaged material.
- B. Storage of Materials:
  - 1. Store aluminum pipe railing and accessory materials in a dry location and in a manner that will protect strippable coating from exposure to sun and condensation; with good air circulation around each piece and with protection from windblown rain.
  - 2. Store aluminum pipe railing and accessory materials under tarpaulin covers and in an area protected from dirt, damage, weather and from the construction activities of all Contractors. Do not store outside or allow items to become wet or soiled in any way while on Site.
  - 3. Do not store in contact with concrete, earth or other materials that might cause corrosion, staining, scratching or damage to finish. Do not install system components which become dented, scratched or damaged in any way. Remove such components from Site and replace with new, undamaged material.
- C. Handling of Materials:
  - 1. Do not subject aluminum pipe railing and accessory materials to bending or stress.
  - 2. Do not damage edges or handle material in a manner that will cause scratches, warps or dents.
  - 3. Keep on-Site handling to a minimum.
  - 4. Maintain protective covering on railings and handrails. All surface protective coverings such as non-adhesive papers, adhesive papers and strippable plastic films shall be removed after receipt at the Site as soon as there is no longer a need for the protection.

### 1.08 PROJECT CONDITIONS

- A. Protection: Protect cast-in-place sleeves and field-drilled holes from debris and water intrusion by use of temporary covers or removable foam inserts that completely fill the cast-in-place sleeve.
- B. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and installation instructions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in cast-in-place concrete or masonry. Deliver to Site in time for installation.
- C. Verify dimensions by taking measurements at the Site without causing delay in the work. Where measurements cannot be taken at the Site without delaying the work, establish dimensions and proceed with fabrication of handrails and railings without Site measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

# PART 2 - PRODUCTS

- 2.01 Metal Materials
  - A. Metal materials used for handrails and railings shall conform to Section 05010, Metal Materials, unless noted otherwise.
  - B. Extruded Aluminum Architectural and Ornamental Shapes: ASTM B221, Alloy 6063-T52.
  - C. Aluminum Forgings: ASTM B247.
  - D. Extruded or Drawn Aluminum Pipe and Tube:
    - 1. ASTM B429 or ASTM B241, Alloy 6063-T5, 6063-T52 or 6063-T832 as required by loadings, deflections and post spacings specified.
    - 2. Provide all rails and posts with minimum outside diameter of 1.900-inches; nominal size of 1-1/2-inches.
- E. Reinforcing Bars: Solid 24-inch long 6061-T6 circular cross section aluminum reinforcing bars with outside diameter same as inside diameter of post.
- 2.02 Metal Fastening
  - A. All welds and fasteners used in handrails and railings shall conform to Section 05050, Metal Fastening, unless noted otherwise.
- 2.03 <u>Handrails and Railings</u>

- A. General Handrail systems shall consist of all railings, posts, toeboards, baseplates, anchors, and accessories required for a complete and rigid installation.
  - 1. Metal railings shall be fabricated from 1-1/2 inch Schedule 40 pipe. Metal railing support posts shall be fabricated from 1-1/2 inch Schedule 80 pipe.
  - 2. The centerline of the top guard rail shall be 42 inches above the walking surface for level rail. For stair rail, the centerline of the top guard rail shall be 42 inches above the leading edge of the tread nosing. Stair handrail shall be 34 inches above the leading edge of the tread nosing.
  - 3. Posts
    - a. Maximum horizontal spacing between posts for level rail shall be six feet.
    - b. Maximum horizontal spacing between posts for stair rail shall be five feet.
  - 4. All rail joints shall be finished flush and shall occur only at supports. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations. The top surface of the top railing shall be smooth and shall not be interrupted by projecting fittings.
  - 5. Toeboards
    - a. Toeboards shall project 4-inches above the walking surface and shall not infringe on the minimum required walkway width.
    - b. Aluminum toeboards shall be extruded from aluminum alloy 6063-T6 unless otherwise noted.
    - c. Toeboards shall have a minimum thickness of 1/8" at any point. Geometry of toeboard shall closely resemble geometry shown on Drawings.
  - 6. Expansion joint splices shall be provided at 30 foot maximum spacing and at all expansion joints in the structure supporting the handrail.
  - 7. The handrail system shall be designed to resist the design loads specified by both OSHA and the International Building Code 2009, 13<sup>th</sup> Edition.
  - 8. Provide handrail extensions at top and bottom of stairs and ramps in accordance with the International Building Code 2009, 13<sup>th</sup> Edition.
- B. Railings shall have infill railing system as shown on the Drawings. If no type is indicated on Drawings, handrail shall be Type I.
  - 1. Type I railing shall be a three-rail system including the handrail. The centerline of the intermediate rail shall be 21 inches above the walking surface.
  - 2. Type II railing shall have tube posts are indicated on the Drawings

- 3. Type Mesh infill railing system
  - a. Mesh Infill Panels provide type 316 stainless steel bird screens constructed of .5" x .5" x .063" (12.7 mm x 12.7 mm x 1.60 mm) stainless steel wire mesh. Set into type 316 18 gauge stainless steel 1-inch deep closed channel frames sized to fit within a ½-inch between top, bottom rails and posts separated with ½-inch diameter schedule 40, aluminum panel clips that overlap the frame and are secured to the top and bottom rails spaced no more than 24-inches apart. Locations shall be as indicated on the contract document.

# 2.04 <u>Aluminum Coatings</u>

- A. General:
  - 1. Prepare surfaces for finishing in accordance with recommendations of the aluminum producer and the finisher or processor.
  - 2. Adjust and control the direction of mechanical finishes specified to achieve the best overall visual effect in the work.
  - 3. Color and Texture Tolerance: Provide uniform color and continuous smooth texture for all aluminum components of the work. Engineer reserves the right to reject aluminum materials because of color or texture variations, which are visually objectionable, but only where the variation exceeds the range of variations established by the manufacturer prior to the work, by means of range samples which have been accepted by Engineer.
  - 4. Powder coat all exposed aluminum components of the work.
- B. Finish for all aluminum work of this specification: Provide fluorocarbon polymer powder coating for extruded or factory-fabricated material. Provide a minimum dry film thickness of 1.5 mil. coating system finish complying AAAMA specification 2605-5 Voluntary Specification for High Performance Organic Coatings on Architectural exposed extrusion and railings.
  - 1. Powder coating color to be selected from manufactures custom and premium palate.

# PART 3 - EXECUTION

# 3.01 <u>Fabrication</u>

- A. All measurements and dimensions shall be based on field conditions and shall be verified by the Contractor prior to fabrication. Such verification shall include coordination with all adjoining work.
- B. All fabricated work shall be shop fitted together as much as practicable, and delivered to the field, complete and ready for erection.

- C. All work shall be fabricated and installed in a manner that will provide for expansion and contraction, prevent shearing of bolts, screws, and other fastenings, ensure rigidity, and provide a close fit of sections.
- D. Finished members shall conform to the lines, angles, and curves shown on the drawings and shall be free from distortions of any kind.
- E. All shearings shall be neat and accurate, with parts exposed to view neatly finished. Flame cutting is allowed only when performed utilizing a machine.
- F. Concrete anchors and bolts for attachment of handrail baseplates to supporting members shall conform to Section 05050, Metal Fastening.
- G. All fabricated items shall be shop painted in accordance with Section 09900, Painting.

# 3.02 <u>Installation</u>

- A. Assembly and installation of handrails and railings shall be performed in strict accordance with manufacturer's recommendations.
- B. All handrails and railings shall be erected square, plumb and true, accurately fitted, adequately anchored in place, and set at proper elevations and positions.

# END OF SECTION

#### SECTION 05550

#### STAIR TREADS AND NOSINGS

#### PART 1 -- GENERAL

#### 1.01 REQUIREMENT

- A. Furnish all materials, labor, and equipment required to provide all stair treads and nosings in accordance with the requirements of the Contract Documents.
- 1.02 RELATED WORK SPECIFIED ELSEWHERE
  - A. Section 05010 Metal Materials
  - B. Section 05050 Metal Fastening

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
  - 1. International Building Code 2009, 13<sup>th</sup> Edition
  - 2. Aluminum Association Specifications for Aluminum Structures.

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
  - 1. Complete fabrication and erection drawings of all work specified herein.
  - 2. Other submittals as required in accordance with Section 05010, Metal Materials, and Section 05050, Metal Fastening.

#### PART 2 -- PRODUCTS

#### 2.01 METAL MATERIALS

- A. Metal materials used for stair treads and nosings shall conform to Section 05010, Metal Materials, unless noted otherwise.
- 2.02 METAL FASTENING

A. All welds and fasteners used for stair treads and nosings shall conform to Section 05050, Metal Fastening, unless noted otherwise.

### 2.03 SAFETY STAIR NOSINGS

- A. Abrasive cast aluminum, safety stair nosings shall be provided on all concrete or concrete filled steel pan stairs, including the top stair of metal stairs that attach to concrete, and as shown on the Drawings unless noted otherwise.
- B. Nosing shall be 3 inches wide and shall extend the full width of the stairway minus 3 inches on either side. Nosing shall be cast into the concrete and held in place with butterfly type extruded anchors.
- C. The nosing shall be "Style 231-A", by Amstep Products, "Alumogrit Type 101", by Wooster Products, Inc., "Type AX", by Safe-T-Metal Company. For steel pan concrete filled stairs, nosing shall be "Type 101-SP", Wooster Products, Inc., or "Type AXPE", by Safe-T-Metal Company. For pan stairs, nosing shall be continuous over corner of stair treads to fully protect corner of treads from abrasion. All exposed fasteners shall be Type 304 stainless steel.

### 2.04 STAIR TREADS

- A. Stair treads shall be aluminum with an abrasive nosing as shown on the Drawings.
- B. Stair treads shall be designed for the live load specified in Section 05510, Metal Stairs.
- C. Stair treads shall be as manufactured by IKG Industries, or Safe-T-Metal Company.

### PART 3 -- EXECUTION

### 3.01 FABRICATION

- A. All measurements and dimensions shall be based on field conditions and shall be verified by the Contractor prior to fabrication. Such verification shall include coordination with adjoining work.
- B. All fabricated work shall be shop fitted together as much as practicable, and delivered to the field, complete and ready for erection. All miscellaneous items such as stiffeners, connections, brackets, and other details necessary for a complete installation shall be provided.
- C. All work shall be fabricated and installed in a manner that will provide for expansion and contraction, prevent shearing of bolts, screws, and other fastenings, ensure rigidity, and provide a close fit of sections.
- D. All shearings shall be neat and accurate, with parts exposed to view neatly finished. Flame cutting is allowed only when performed utilizing a machine.
- E. All shop connections shall be welded unless otherwise indicated on the Drawings or specified herein. Bolts and welds shall conform to Section 05050, Metal Fastening. All fastenings shall be concealed where practicable.

### 3.02 INSTALLATION

- A. Assembly and installation of stair treads and nosings shall be performed in strict accordance with manufacturer's recommendations.
- B. All stair treads and nosings shall be erected square, plumb and true, accurately fitted, adequately anchored in place, and set at proper elevations and positions.

# **END OF SECTION**

### SECTION 07221

# **ROOF HATCHES**

# PART 1 GENERAL

# 1.01 SECTION INCLUDES

A. This Section describes the general requirements for roof hatches, roof hatch railing system, custom stainless steel hardware and accessories for complete watertight systems. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install and place into satisfactory operation all roof hatch work.

# 1.02 RELATED SPECIFICATIONS

А.	Section 05515	-	Ladders
B.	Section 07553	-	Modified Bitumen Membrane
C.	Section 07620	-	Sheet Metal Flashing and Trim
D.	Section 07900	-	Caulking and Sealants

# 1.03 PAYMENT

A. No direct payment will be made for roof hatches, accessories, or appurtenances; the cost shall be included in the prices for the Work.

### 1.04 REFERENCES

A. PBC	- Philadelphia Building Code
A. ASTM A666	- Annealed or Cold-Worked Austenitic Stainless
	Steel Sheet, Strip, Plate and Flat Bar.
B. ASTM B209	- Aluminum and Aluminum-Alloy Sheet and
	Plate, Standard Specification for.
C. ASTM B221	- Aluminum-Alloy Extruded Bars, Rods, Wire,
	Shapes and Tubes

D.	AMP/NAAMM AMP 501-	Architectural Metal Products Division of The National Association of Architectural
Б		Metal Manufacturers, Finishes for Aluminum
E.	SMACNA -	Sheet Metal and Air Conditioning Contractors National Association, Incorporated,
		Architectural Sheet Metal Manual
F.	OSHA 29 CFR 1910.27-	Occupational Safety and Health Act of 1970, Fixed Ladders

### 1.05 SUBMITTALS

- A. Working Drawings: Submit for approval the following:
  - 1. Copies of manufacturer's proposed fabrication details and material specifications for roof hatches and drawings indicate installation and height above finished roofing membrane.
  - 2. Provide manufacturer's specifications, installation and coordination instructions and other data as may be requested by Engineer substantiating that products comply with the requirements.

# 1.06 QUALITY ASSURANCE

- A. Performance Criteria:
  - 1. Roof hatch Work shall be permanently watertight, and not deteriorate in excess of manufacturers' published limitations.
  - 2. Detail and fabricate roof hatches to withstand a live load of 40 per square foot over the entire horizontal plane of the hatch and a concurrently acting point load of 200 pounds located at the center of the roof hatch. Specified loadings shall not cause any permanent deflections in the roof hatch or support curbs or damage to operating hardware.
- B. Requirements of Regulatory Agencies:

- 1. Comply with applicable requirements of the Philadelphia Building Code, SMACNA Sheet Metal Manual details and the requirements of OSHA 1910.27 for roof hatch minimum sizes, clearances and coordination with fixed ladders.
- C. Source Quality Control:
  - 1. Obtain materials only from manufacturers who will, if requested, send a qualified Technical Representative to the site for the purpose of advising installer of proper procedures and precautions during the installation of the roof hatches.
  - 2. Engage manufacturers who have been successfully providing roof hatches and unit skylights of the type specified and who will submit a list of successful installations along with telephone numbers of owners, architects or engineers responsible for the work.

# 1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials without damage and in manufacturer's original, unopened and undamaged protective wrappings bearing name and model number of approved items.
- B. Storage of Materials:
  - 1. Minimize the amount of time roof hatches are stored on-site. If roof hatches do arrive on-site before they can be incorporated into the orderly assembly of the roofing work, store in a completely protected and secure enclosure, under cover and away from all other construction traffic.
  - 2. Do not store in contact with earth, wood or concrete or in contact with other surfaces that could cause staining or other types of surface marks or blemishes of any kind.
- C. Handling of Materials:
  - 1. Do not subject roof hatches to bending or stress of any kind.

2. Handle and protect units during installation in a manner recommended by the roof hatch manufacturer.

# 1.08 PROJECT CONDITIONS

- A. Do not proceed with roof hatch work until curb and substation construction, blocking, and other construction to receive the work is completed.
- B. Coordinate the installation of roof hatch work with roofing and flashing work in order to provide continuity in the installation of roofing Work in a manner which maintains roofing manufacturer's guaranteed construction.
- C. Schedule the installation of roof hatch work to coincide with the installation of roofing, drains, piping, blocking, nailers, framing at openings, curbs, and other adjoining and substrate work so that the roof hatches may be built into the single-ply roofing system as the work progresses as shown on approved Working Drawings and without the need for field changes to approved installation details or methods of flashing in order to maintain permanently water- and weathertight conditions on the roof.
- D. Proceed with and complete the work only when materials, equipment and knowledgeable tradesmen required for the installation of roof hatches, flashing and trim systems are at the site and are ready to follow and integrate the work of this Section with work requiring the installation of sheet metal flashing and trim and single-ply roofing system.

### 1.09 WARRANTY

- A. Contractor shall furnish a written guarantee obtained from the manufacturer of the roof hatch. Guarantee shall state the following:
  - 1. Roof hatch is to operate properly and be free of defects in material and workmanship for a period of five years from date of purchase.
  - 2. Should any part fail to function, or break in normal use during this period, manufacturer shall furnish a new part at no charge to the Owner.

# PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Roof Hatches: Provide the following
  - 1. Custom fabricated units to meet size indicated on the drawings and using manufacturer's standard details to the extent applicable.
  - 2. Materials and performance characteristics:
  - 1. Cover shall be reinforced to support a minimum live load of 40 psf with a maximum deflection of 1/150th of the span or 20 psf wind uplift.
  - 2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
  - 3. Operation of the cover shall not be affected by temperature.
  - 4. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
    - b. Cover: Shall be 11 gauge with a 3beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
    - c. Cover insulation: Shall be fiberglass of 1" thickness, fully covered and protected by a metal liner 18 gauge aluminum
    - d. Curb: Shall be 11 gauge aluminum and provide minimum 8 inches vertical flashing above roofing membrane
    - e. Curb insulation: Shall be rigid, high-density fiberboard of 1" thickness on outside of curb.
    - f. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube

assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly

- g. Hardware
- 1. Heavy pintle hinges shall be provided
- 2. Cover shall be equipped with a spring latch with interior and exterior turn handles
- 3. Roof hatch shall be equipped with interior and exterior padlock hasps.
- 4. The latch strike shall be a stamped component bolted to the curb assembly.
- 5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25mm) diameter red vinyl grip handle to permit easy release for closing.
- 6. Compression spring tubes shall be type 310 stainless steel
- 7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
  - h. Finishes: Custom finish shall be clear anodized aluminum
- B. Product and Manufacturer:
  - 1. Type E hatch by Bilco Company, P.O. Box 1203, New Haven, CT 06505
  - Maxam Metal Products Limited., Toll Free Phone: 866-446-2926, Toll Free Fax: 866-436-2926, Direct Phone: 604-433-4243, Direct Fax: 604-433-4148, Email: info@maxammetal.com, Internet: www.maxammetal.com
  - Nystrom Equipment Series, 9300 73rd Ave. N., Brooklyn Park, MN 55431, Toll Free Hotline: 800-547-2635, Toll Free Fax: 800-317-8770, Direct Phone: 763-488-9200, Direct Fax: 763-488-9201, Email: support@nystrom.com, Internet: www.nystrom.com

### 2.02 FABRICATION

- A. Shop-fabricate each unit complete with framing, gaskets, structure, curbs, flashing, well-liners, hardware, accessories, anchorage provisions and other components. Disassemble only to the extent necessary for delivery and installation.
- B. Construct units for live loading specified using manufacturer's custom fabrication details. Reinforce as required with aluminum structural sections to order to provide resistance to the loading specified.

# 2.03 ROOF HATCH RAILING SYSTEM

- A. Roof hatch rail system should be provided with the hatch installation and manufactured by same manufacturer as the hatch. Basis of design manufacturer is Bil-Guard 2.0 custom sized railing system by Bilco Company or equal.
  - 1. The hatch rail system shall be field assembled and installed (by others) per the manufacturer's instructions.
  - 2. Performance characteristics:
    - a) High visibility safety yellow powder coat paint finish (*other colors available as a special order*).
    - b) Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
    - c) Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.
    - d) Corrosion resistant construction with a five-year warranty.
    - e) Hinged gate shall ensure continuous barrier around the roof hatch.
    - f) Self-closing gate hinge and positive latching system provided with hatch rail system.
  - 3. Posts and Rails: 1-1/4" 6061 T6 schedule 40 aluminum pipe

4. Hardware: Mounting brackets shall be 3/8" thick extruded aluminum. Pivoting post guides with compression fittings and latching mechanism shall be cast aluminum. Self-closing hinges and all fasteners shall be type 316 stainless steel.

# PART 3 EXECUTION

# 3.01 <u>INSPECTION</u>

A. The Contractor shall examine the substrate and the conditions under which the roof hatch work is to be performed, and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

### 3.01 PREPARATION

- A. Clean the substrate of dust, debris, substances and interferences detrimental to the Work and prepare substrates as recommended by the roof hatch manufacturer.
  - B. Before installing roof hatches, verify shapes, and field dimensions to be covered and include such information as part of the information submitted to Engineer for approval.

# 3.02 <u>INSTALLATION</u>

- C. Separate dissimilar metals from substrates and from each other by painting each metal surface in the area of contact with a 15-mil thick application of bituminous coating, as recommended by the manufacturers of the dissimilar metals.
- D. Bed flanges of set-on accessories in a compound which is compatible with roofing and flashing and which is acceptable to, and consistent with material and detailing

requirements of, the manufacturer of roofing for guaranteed construction. On sloping decks, flash flanges with other work for proper water shed.

- E. Anchor roof hatch permanently to the substrate, by approved methods which are adequate for the sizes and locations of units and which shall provide permanent resistance to loading specified.
- F. Coordinate with installation of vapor barriers, roof insulation, roofing, and flashing as required to assure that each element of the work performs properly and that combined elements are waterproof and weather tight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.
- G. Counter Flashing: Where counter flashing is required as component of the skylight, install to provide an adequate waterproof overlap with roofing or roof flashing (as counter flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.
- H. RAIL SYSTEM EXAMINATION: Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- I. RAIL SYSTEM INSTALLATION: Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
  - 1. Test units for proper function and adjust until proper operation is achieved.
  - 2. Repair finishes damaged during installation.
  - 3. Restore finishes so no evidence remains of corrective work.

### 3.03 <u>CLEANING AND PROTECTION</u>

A. Protect roof hatch Work until Final Acceptance of the work by the Owner.

- B. Do not permit workmen, or others, to step directly on roof hatches in place, or to place or move equipment over roof hatch surfaces. Protect surfaces during installation of roofing system, sheet metal flashing work and other adjoining work.
- C. Neutralize excess flux as work progresses with five percent to ten percent washing soda solution and rinse thoroughly.
- D. Clean exposed surfaces of every substance which is visible or might cause corrosion or prevent uniform oxidation of the metal surfaces. Exercise extreme care to remove fluxes and ferrous metal particles, including welding splatter and grinding dust.
- E. Do not leave metal debris and discarded materials at the site of the work. Clean each site of the work as the work progresses on a daily basis.

### **END OF SECTION**

### SECTION 07553

### MODIFIED BITUMEN MEMBRANE

#### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Modified bitumen membrane roofing as specified herein shall include, but not be limited to, preparation of subsurface, chemically adhered styrene butadiene styrene modified bituminous membrane, roof flashing application, scupper drains, roof insulation and cover board, vapor barrier and appurtenances.
- B. Modified bitumen membrane roofing shall be provided where shown on the Contract Drawings, specified, or as required for a complete installation.

### 1.02 RELATED SPECIFICATIONS

A.	Section 03300	-	Cast-In-Place Concrete
B.	Section 06100	-	Rough Carpentry
C.	Section 06071	-	Treated Timber and Lumber
D.	Section 07461	-	Preformed Metal Siding
E.	Section 07620	-	Sheet Metal Flashing and Trim
F.	Section 07900	-	Caulking and Sealants

# 1.03 PAYMENT

A. No direct payment will be made for modified bitumen membrane roofing, accessories, or appurtenances; the cost shall be included in the prices for the Work.

# 1.04 REFERENCES

A.	ASTM C177 -	Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus ; 2010.
B.	ASTM C518 -	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus ; 2010.

C.	ASTM C1289 -		Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board ; 2012.
D.	ASTM D1079 -		Standard Terminology Relating to Roofing and Waterproofing. For definition of terms related to roofing work not otherwise defined in the section.
E.	ASTM D1621 -		Standard Test Method for Compressive Properties Of Rigid Cellular Plastics ; 2010.
F.	ASTM D1622 -		Standard Test Method for Apparent Density of Rigid Cellular Plastics ; 2008.
G.	ASTM D3273 -		Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber ; 2012.
Н.	FM DS 1-28 -		Wind Design; Factory Mutual System; 2007.
I.	FM DS 1-29 -		Roof Deck Securement and Above-Deck Roof Components; Factory Mutual System ; 2006.
J.	LTTR: S770.		Long Term Thermal Resistance, as defined by CAN-ULC
K.	PS 1 -		Structural Plywood ; 2007.
L.	PS 20 -		American Softwood Lumber Standard ; 2005.
M.	ASTM E96 -		Standard Test Methods for Water Vapor Transmission of Materials
N.	- UL		Underwriters' Laboratories Fire Resistance Directory
О.	OSHA -		Occupational Safety and Health Administration.
Р.	NRCA		National Roofing Contractor Association - Glossary of NRCA's "The NRCA Roofing and Waterproofing Manual."
Q.	Glossary of Terms		Roof Consultants Institute "Glossary of Roofing Terms" for definition of terms related to roofing work in this Section.
R.	Sheet Metal Terminolo	ogy a	and Techniques: SMACNA Architectural Sheet Metal Manual.

# 1.05 DESIGN CRITERIA

- A. General: Installed roofing membrane system shall remain watertight; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.
- C. Wind Uplift Performance: Roofing system shall be identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE-7.
  - 1. Field-of-Roof Uplift Pressure: 90 lbf/sq. ft. (kN/sq. m).
  - 2. Perimeter Uplift Pressure: 165 lbf/sq. ft. (kN/sq. m).
  - 3. Corner Uplift Pressure: 240 lbf/sq. ft. (kN/sq. m).
- D. FMG Listing: Roofing membrane, base flashings, and component materials shall comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
  - 1. Roofing system shall comply with FM Requirements:
  - 2. Fire/Windstorm Classification: Class 1A-90
  - 3. Hail Resistance: Moderate Hail
- E. EPA Energy Star:
  - 1. Roofing membrane shall achieve an initial reflectance of greater than 0.65 and a three year aged reflectance of greater than 0.50.

### 1.06 SYSTEM DESCRIPTION

A. The product provided by this Section shall be a UL class A fire rated system of fiberglass reinforced, asphalt coated sheet with a polyolefin film backing, nailed to substrate with, three layers of cold applied bitumen membrane system. System shall include all metal flashing, scupper drain assemblies and fluid applied flashing systems.

### 1.07 QUALITY ASSURANCE AND QUALIFICATIONS

- A. Requirements of Regulatory Agencies: All modified bitumen membrane roofing work shall comply with fire-resistance ratings as shown, and as required by governing authorities having jurisdiction and the New York State Building Code and shall be in accordance with the following requirements:
- B. Installer Qualifications: Engage a single installer skilled, trained and with successful experience in the installation of modified bitumen membrane roofing of the types of materials required; and who agrees to employ only tradesmen with specific skill and

successful experience in this type of work. Submit names and qualifications to Engineer along with the following information on a minimum of three successful projects:

- 1. Names and telephone numbers of owner, architects or engineers responsible for projects.
- 2. Approximate contract cost of the modified bitumen membrane roofing system.
- 3. Size of area installed
- C. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
  - 1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
  - 2. Notify Architect well in advance of meeting.

# 1.08 SUBMITTALS

- A. The Contractor shall prepare and submit for approval catalog cuts and reference materials in accordance with the General Conditions, Article 4 Contractor's Working Drawings, Design and Shop Drawings.
- B. Product Data: The Contractor shall submit copies of specifications, installation instructions and general recommendations from the modified bitumen membrane roofing manufacturer. Manufacturer's data substantiating that the materials comply with the requirements shall be included.
- C. Applicator Approval: The Contractor shall submit a document from the modified bitumen membrane roofing manufacturer stating that the subcontractor is an approved applicator for the specified materials. Include the following submittals for approval of the applicator:
  - 1. Two 3 inch x 5 inch samples of the primary roofing and flashing sheets.
  - 2. Latest edition of the roofing system manufacturer's specifications and installation instructions.
  - 3. Descriptive list of the materials proposed for use.
  - 4. Evidence of Underwriters' Laboratories Class A acceptance of the proposed roofing system (including mopping asphalt or cold adhesive) without additional requirements for gravel or coatings. No other testing agency approvals will be accepted.
  - 5. Letter from the proposed primary roofing manufacturer confirming the number of years it has directly manufactured the proposed primary roofing system under the trade name and/or trademarks as proposed.
  - 6. List of three (3) of the manufacturer's projects, located in the United States, of equal size and degree of difficulty which have been performing successfully for a period of at least five (5) years.

- 7. Complete list of material physical and mechanical properties for each sheet including: weights and thicknesses; low temperature flexibility; breaking load; ultimate elongation; dimensional stability; compound stability; granule embedment.
- 8. Specimen Warranty: Submit prior to starting work.
- 9. Pre-Installation Notice: Copy to show that manufacturer's required Pre-Installation Notice
- 10. Installation Notice (PIN) has been accepted and approved by the manufacturer.
- 11. Executed Warranty.
- D. Manufacturer Certification / System Letter: Submit letter signed by roofing manufacturer listing all components of the roofing system and related R-values. Manufacturer must certify that listed system complies with wind uplift resistances as specified in this section and will achieve specified warranty. Any shop drawings related to this specification section submitted without System Letter with be returned without review.

System Letter should also provide minimum number of manufacturer's on site inspections with submissions of field reports and submission of certification of progress to the engineer for review. List of manufacturer's progress inspections should at minimum include the following:

- 1. Pre-installation meeting.
- 2. Substrate review before vapor barrier installation
- 3. Review vapor barrier installation
- 4. Progress and/or Final inspection as required for specified warranty.

# 1.09 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: All modified bitumen membrane roofing work shall comply with fire-resistance ratings as shown, and as required by governing authorities having jurisdiction and the New York State Building Code and shall be in accordance with the following requirements:
- B. Installer Qualifications: Engage a single installer skilled, trained and with successful experience in the installation of modified bitumen membrane roofing of the types of materials required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of work. Submit names and qualifications to Engineer along with the following information on a minimum of three successful projects:
  - 1. Names and telephone numbers of owner, architects or engineers responsible for projects.

- 2. Approximate contract cost of the modified bitumen membrane roofing system.
- 3. Size of area installed
- C. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
  - 1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work including roofing manufacturer.
  - 2. Notify Architect well in advance of meeting.
- D. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive the specified manufacturer's guarantee.
- E. Manufacturer Qualifications: A qualified manufacturer that has UL listing and FMG approval for roofing system identical to that used for this Project.
- F. Test Reports: Roof drain and leader test and Roof system flood test.
- G. Source Limitations: Obtain all components from the single source roofing system manufacturer guaranteeing the roofing system. All products used in the system shall be labeled by the single source roofing manufacturer issuing the guarantee.

### 1.10 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
  - 1. Materials shall not be delivered to the project site before the time of installation.
  - 2. Materials shall be delivered in sufficient quantities to allow continuity of the Work.
  - 3. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
  - 4. Keep combustible materials away from ignition sources.
- B. Storage of Materials:
  - 1. Materials shall be stored in original, undamaged containers with manufacturer's labels and seals intact. Labels shall include the following:
    - a. Name of material.

- b. Manufacturer's stock number and date of manufacture.
- c. Material safety data sheet.
- 2. All materials shall be stored in a dry, enclosed area, out of direct sunlight, off the ground and away from all possible contact with water, ice, or snow.
- 3. Damage to materials during storage shall be prevented primarily by minimizing the amount of time they are stored at the project site before being incorporated into construction systems.
- C. Handling of Materials:
  - 1. Materials shall be handled carefully in order to avoid damage or breakage.
  - 2. Materials shall not be exposed to detrimental conditions or physical damage. Materials which are so exposed shall be permanently removed from the project site and shall not be incorporated into the Work.
  - 3. Materials shall be handled in such a manner so as to prevent inclusion of foreign materials.
  - 4. Packages or containers shall not be opened until all necessary, preparatory Work is complete and installation is to begin immediately. Materials shall not be allowed to become wet or soiled or covered with ice or snow.

# 1.11 PROJECT CONDITIONS

- A. Modified bitumen membrane roofing shall not be applied in ambient temperatures below 50 degrees F, or to a damp, frosty, snow covered, or contaminated surface.
- B. Membrane protection: Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this project.
- C. Limited access: Prevent access by the public to materials, tools and equipment during the course of the project.
- D. Debris removal: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.
- E. Site condition: Complete, to the owner's satisfaction, all job site clean-up including building interior, exterior and landscaping where affected by the construction.
- F. REQUIREMENTS PRIOR TO JOB START
  - 1. NOTIFICATION. Give a minimum of 5 days notice to the Engineer and manufacturer prior to commencing any work and notify both parties on a daily

basis of any change in work schedule.

2. SAFETY. Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

# G. ENVIRONMENTAL REQUIREMENTS

1. PRECIPITATION: Do not apply roofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied roofing, and building interiors are protected from possible moisture damage or contamination.

# D. PROTECTION REQUIREMENTS

- 1. MEMBRANE PROTECTION. Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this project.
- 2. LIMITED ACCESS. Prevent access by the public to materials, tools and equipment during the course of the project.
- 4. DEBRIS REMOVAL. Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.
- 5. SITE CONDITION. Complete, to the owner's satisfaction, all job site clean-up including building interior, exterior and landscaping where affected by the construction.

### 1.12 WARRANTY

- A. The Contractor shall furnish a written, single source warranty for 25 years from the date of Substantial Completion covering all system components, which shall agree that, during the warranty period, prompt repair or replacement of defective materials shall be made without additional cost to the County. In addition the warranty shall cover the following:
  - 1. Single-Source special guarantee includes roofing plies, base flashings, liquid applied flashing, roofing membrane accessories granule surfaced roofing membrane, roof insulation, fasteners, cover board, vapor retarder, walkway products, manufacturer's expansion joints, manufacturer's edge metal products, and other single-source components of roofing system marketed by the manufacturer.
  - 2. Guarantee Period: 25 years from date of Substantial Completion with No Dollar Limit (NDL) at main lower roof and 20 years from date of Substantial Completion on main upper roof.
  - 3. Hail Rider: Guarantee shall have no exclusions for hail events up to 1.5 inches
  - 4. Accidental Puncture Rider: Guarantee shall provide coverage for accidental puncture for up to 16 billed repair hours per year for the life of the guarantee.
- B. Installer's Guarantee: Submit roofing Installer's guarantee, signed by Installer, covering Work of this Section, including all components of roofing system, for the following guarantee period:

#### WORK NO. 63096

1. Guarantee Period: Two (2) Years from date of Substantial Completion.

# PART 2 PRODUCTS

# 2.01 MANUFACTURERS

- A. Modified bitumen membrane roofing: Three ply SBS Modified bitumen membrane roofing acceptable manufacturers that shall as follows:
  - Johns Manville
     Product Information Center
     P.O. Box 5108
     Denver, Colorado 80217-5108, USA
     Phone: 1.800.654.3103
  - 2. Firestone Building Products LLC, Carmel, IN: www.firestonebpco.com. Roofing Specialties (roofing representative)
    141 New Road
    Parsippany, NJ 07054
    Phone: (973) 808-6766
    E-mail: jayd@roofingspec.com
  - The Garland Company, Inc. 3800 East 91st Street Cleveland, OH 44105 Fax: 216-641-0633 Phone: 216-641-7500 Toll Free: 800-321-9336

# 2.02 MATERIALS

- A. General: Furnish all components of modified bitumen membrane roofing system from a single manufacturer, and from a single supplier with adequate resources to provide products of consistent performance characteristics, physical properties and appearances, without delaying the work.
- B. Roofing Membrane Base Ply: ASTM D 6163, Grade S, Type I, Fiberglass-reinforced SBS-modified asphalt sheet; smooth surfaced.

1. Tensile Tear: ASTM Test Method D5147; Minimum Machine Direction (MD) 100 lbf (445N); Cross Machine Direction (XMD) 80 lbf (356)

2. Peak Load a 0°F(-18°C) ASTM Test Method D5147; Minimum MD 105 lbf/in. (18.4 kN/m), XMD 95 lbf/in.(16.6 kN/m

3. Peak Load a 73.4°F (-23°C) ASTM Test Method D5147; Minimum MD 65 lbf/in. (11.4kN/m)

4. Low Temp. Flexibility Unconditioned ASTM Test Method D5147; Minimum -30 ° F (-34°C)

5. Elongation at Peak Load at 0°F (18°C); ASTM Test Method D5147; Minimum MD 5%, XMD 5%

6. Ultimate Elongation at 73.4°F (23°C); ASTM Test Method D5147; Minimum MD 30%, XMD 30%

7. Dimensional Stability; ASTM Test Method D5147; Minimum MD 0.1%, XMD 0,1%

8. Roll Weight: ASTM Test Method D146; Minimum 80 lb (37kg)

9. Thickness: Minimum 88 mils

C. Roofing Membrane Cap Sheet: ASTM D 6164, Grade G, Type II, polyester-reinforced SBS-modified asphalt sheet; granular surfaced; suitable for application method specified.

1. Thickness: 160 mil (4.06 mm).

2. Tensile Strength @ 0°F (-18°C):

- a) Machine Direction: 125 lbs. force/in. width (21.9 kN/m).
- b) Cross Machine Direction: 95 lbs. force/in. width (16.6

kN/m).

- 3. Elongation @  $0^{\circ}F(-18^{\circ}C)$ :
  - a) Machine Direction: 45%.
  - b) Cross Machine Direction: 45%.

4. Tensile-Tear:

- a) Machine Direction: 120 lbs./in. (21.0 kN/m).
- b) Cross Machine Direction: 105 lbs./in. (18.4 kN/m).
- 5. Low Temperature Flexibility: No cracking to -10°F (-23°C).
- 6. Dimensional Stability:
  - a) Machine Direction: 0.70% change.

b) Cross Machine Direction: 0.60% change.

### D. BASE FLASHING SHEET MATERIALS - SBS

- 1. Backer Sheet: ASTM D 6163, Grade S, Type I, fiberglass-reinforced SBSmodified asphalt sheet; smooth surfaced; suitable for application method specified.
- 2. Flashing Sheet: [ASTM D 6164, Grade G, Type II, polyester-reinforced; SBSmodified asphalt sheet; granular surfaced; suitable for application method specified. '
- 3. Liquid Applied Flashing: A liquid and fabric reinforced flashing system created with a stitchbonded polyester scrim and a two-component, moisture cured, elastomeric, liquid applied flashing material, consisting of an asphalt extended urethane base material and an activator.

### 2.03 AUXILIARY ROOFING MEMBRANE - BITUMINOUS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing.
- B. Asphalt Primer: ASTM D 41.
- C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.
- D. Cold-Applied Adhesive: Roofing system manufacturer's asphalt-based, one-component, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with membrane applications.
- E. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosionresistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and provided by the roofing system manufacturer.
- F. Roofing Granules: Ceramic-coated roofing granules matching specified cap sheet, provided by roofing system manufacturer. Granular color Ultra-White.
- G. Coating: Acrylic elastomeric coating with unique bleed-blocking properties particularly well suited for coating over asphalt surfaces.
- H. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

### 2.04 REFLECTIVE AND WATERPROOF COATING

### WORK NO. 63096

A. Elastomeric Coating: ASTM D 6083. A multipurpose, acrylic elastomeric coating for use over a variety of substrates with bleed-blocking properties for coating over asphalt surfaces.

### 2.05 WALKWAYS

A. Walkway Pads: Mineral-granule-surfaced, reinforced modified asphalt composition, slip-resisting pads, manufactured as a traffic pad for foot traffic provided by roofing system manufacturer, with a pad size of 32 inch x 32 inch.

#### 2.06 COVER BOARD

A. Perlite Board: ASTM C 728; composed of expanded perlite, cellulosic fibers, binders and waterproofing agents with top surface seal-coated. Size: <sup>1</sup>/<sub>2</sub> inch minimum.

B.

### 2.07 ROOF INSULATION IN STURCTURALLY SLOPED AREAS

- C. General: Preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- D. Polyisocyanurate Board Insulation: ASTM C 1289, Type II.
  - 1. Provide insulation package with continuous R Value of minimum 6 per inch.
  - 2. Provide a continuous insulation package with minimum thickness of 4-inches.

### 2.08 INSULATION

A. ASTM C 1289, provide insulation boards fabricated to slope of 1/4 inch per 12 inches on top of existing fill unless otherwise indicated.

### 2.09 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. A two part Urethane Adhesive suitable for attaching the insulation and cover board as required by the manufacture of the roofing membrane system.
- C. Provide factory preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Install on top of sloped fill to provide slope as indicated on the drawings.
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosionresistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and furnished by roofing system manufacturer.

#### WORK NO. 63096

E. Insulation Cant Strips: ASTM C 728, perlite insulation board. Cant Strips and Tapered Edge Strips: 45 degree face slope and minimum 5 inch (127 mm) face dimension; provide at all angle changes between vertical and horizontal planes that exceed 45 degrees.

# 2.10 VAPOR RETARDER

- A. SBS Vapor Retarder: Polyethylene-Reinforced Self-Adhering SBS Vapor Barrier
- B. Tri-laminate woven polyethylene, nonslip, UV protected top surface providing temporary weather protection for 90 days.
- C. Self-sealing, high quality SBS rubber and asphalt blend providing low air and vapor permeability.

1. Minimum Width 44.9" (1.14m)

2. Tear Resistance: ASTM Test method D5601; Machine Direction 84 lbf (375N), Cross Machine Direction 90 lbf (400N)

3. Tensile Strength: ASTM Test method D5147; Machine Direction 64 lbf/in (11.3 kN/m), Cross MachineDirection 88 lbf/in (15.4 kN/m)

4. Cold Bending; ASTM Test Method D5147, -31° F (-31° C)

5. Thickness: ASTM Test Method D5147, 30 mil (0.8 mm)

6. Lap Adhesion: ASTM D 1876, 11.4 lb/in (2000 N)

7. Ultimate Elongation at 73.4° F (23° C): ASTM D 5147; Machine Direction 52 %, Cross Machine Direction 24%

8. Water Absorption: D 5147; 0.1% max.

9. Peel Resistance: ASTM Test Method D 903; 6.9 lbs/in (1200 N)

10. Water Vapor Permeance: ASTM Test Method E96 (Procedure B), 0.017 perm (1.30 ng.Pa-sec-m<sup>2</sup>)

11. Air Permeability: ASTM Test Method D1970; <0.007 l/sec-m<sup>2</sup> (1.4x10<sup>3</sup> ft<sup>2</sup>/min. ft<sup>2</sup>)

# 2.11 ACCESSORY MATERIALS

A. Scupper Drain - coated cast iron Roof Drain, parapet type, secured bronze dome integral with flashing clamp, flashing flange and side outlet threaded connection. 4-inch diameter with downspout elbow if cast iron with complete vandal-proof assembly. Provide parapet scupper-sleeve type, flashing clamp, tubular body with 7 <sup>1</sup>/<sub>2</sub>-inch wide flashing flange and adjustable wall collar. Complete assembly as manufactured by Zurn model number Z187 or approved equal.

- B. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
  - 1. Width: 3-1/2 inches (90 mm), nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it. Thickness: As indicated on the contract drawings or if not indicated thickness shall be the same as thickness of roof insulation.
  - 2. Flashing: In accordance with Section 07620 Sheet Metal Flashing and Trim. Seal to and provide work associated with section 07620 Sheet Metal Flashing and Trim.
  - 3. Seal to and coordinate with work of 07461 Preformed Metal Siding for conductor head and leader. Test of scupper drain connection pipe to work of 07461 Preformed Metal Siding conductor head and leader
- C. CAULKING/SEALANTS. A single component, high performance, elastomeric sealant conforming to ASTM D 232, ASTM C 920, or ASTM C 920. Acceptable types are as follows: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to sealants specified in Specification 07900.
- D. RETRO FIT DRAIN: Provide retro fit drain by JM, model Hercules Retro Drain or equal.
  - 1. Drain should be one-piece seamless body with 12" drain stem length and extra large 17.5" diameter flange that allows positive attachment to roof flashing membrane.
  - 2. Provide SuperDome with screw down lid to secure against vandals
  - 3. Claming Ring shall be heavy duty cast aluminum and ensure uniform compression seal of the membrane for strength and durability
  - 4. Mechanical Seal: provide mechanical seal at inside of existing pipe connection to ensure water tight connection to existing. Manufacturer's tools are required for proper installation.
  - 5. Modify drain to field verified elbow conditions in accordance with manufacturer's installation instructions and use correct model to match with existing drainage pipe diameters after field verifications.
  - 6. Provide field fabricated heavy gauge aluminum bracket with wood blocking and adhesive anchor support to secure drain to existing concrete fill/slab.

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# PART 3 EXECUTION

# 3.01 GENERAL

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
- B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.
- C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.
- D. Perform work using competent and properly equipped personnel.
- E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
- F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F (15 to 25 degrees C).
- G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
  - 1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
  - 2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
  - 3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
- H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.
- I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

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### WORK NO. 63096

### 3.02 EXAMINATION

- A. The Contractor shall verify that areas to receive modified bitumen membrane roofing are prepared to final elevations.
- B. Sweep or vacuum all surfaces, removing all loose aggregate and foreign substances prior to commencement of roofing.

# 3.03 SURFACE PREPARATION

- A. Surfaces to receive modified bitumen membrane roofing shall be clean and free of all foreign matter. Concrete surface shall have a wood float or fine broom finish and shall be free of fins, ridges, voids, or entrained air holes.
- B. Voids, rock pockets, and rough surfaces shall be repaired with approved non-shrink grout, or shall be ground to match the unrepaired areas.
- C. All sealant shall be allowed to cure tack free.
- E. Prime metal flanges (all jacks, edge metal, lead drain flashings, etc.) and concrete and masonry surfaces with a uniform coating of ASTM D 41 asphalt primer.
  - 1. Primer shall be applied at all junctures of horizontal and vertical surfaces in strict accordance with the manufacturer's approved instructions, and shall be allowed to dry tack free for a minimum of one hour to a maximum of eight hours. Flashing shall be applied to a minimum height of 8 inches on the vertical surface, and 4 inches on the deck surface. Flashing shall be terminated in accordance with the manufacturer's recommended details.
  - 2. A thin film of primer shall be applied in a 4-foot square area around all drains, and allowed to dry for a minimum of one hour to a maximum of eight hours, over which a 3-foot square section of non-exposed type flashing material shall be installed, centered on drains and onto the deck. Splices or seams shall not be allowed within 3 inches of drains. Flashing shall be terminated under the drain clamping ring, and the inner portion of flashing shall be cut away. Flashing shall be pressed against the primed surface to ensure good adhesion.

# 3.04 VAPOR RETARDER

- A. Install modified bituminous vapor retarder sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
  - 1. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
- B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
  - 1. Repair tears and voids in laps and lapped seams not completely sealed.

- C. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.
- D. Ensure that all penetrations and edge conditions are sealed to prevent moisture and air drive into the roofing system.
- E. Transition membrane shall overlap adjoin work associated with section 07461 Preformed Metal Siding.

#### 3.05 INSULATION INSTALLATION

- A. Coordinate installation of roof system components so insulation and cover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.
- C. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes greater than 45 degrees per manufacturer's instruction.
- D. Install insulation under area of roofing to conform to slopes indicated on contract drawings and on existing sloped fill.
- E. Install insulation boards with long joints in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with like material.
- F. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- G. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- H. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- I. Adhered Insulation: Install each layer of insulation and cover board and adhere to substrate as follows:
  - 1. Install each layer in the manufacturer's two-part urethane adhesive according to roofing system manufacturer's instruction but not less than:
    - a. 12 inches on center in the field

b. 6 inches on center at the perimeter

c. 4 inches on center in the corners

#### 3.06 COVER BOARD INSTALLATION

- A. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.
- C. Install cover board with long joints of cover board in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with cover board.
  - 1. Cut and fit cover board within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- D. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.
  - 1. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- E. Adhered Cover Board: Adhere cover board to substrate as follows:
  - 1. Install in a two-part urethane adhesive according to roofing system manufacturer's instruction.
    - a. 12 inches on center in the field
    - b. 6 inches on center at the perimeter
    - c. 4 inches on center in the corners

### 3.07 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.
- B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Where roof slope exceeds 1/2 inch per 12 inches (1:24, contact the membrane manufacturer for installation instructions regarding installation direction and backnailing

- D. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
- E. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.
  - 1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
  - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
  - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- F. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.08 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

- A. Install one modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
  - 1. Adhere to substrate in cold-applied adhesive according to roofing system manufacturer's instruction.
  - 2. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
- B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
  - 1. Repair tears and voids in laps and lapped seams not completely sealed.
  - 2. Apply roofing granules to cover exuded bead at laps while bead is hot.
- C. Install roofing membrane sheets so side and end laps shed water.

#### 3.09 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

- 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
- 2. Backer Sheet Application: Install backer sheet and adhere to substrate in approved adhesive applied at rate required by roofing system manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 8 inches (200 mm) above roofing membrane and 4 inches (100 mm) onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
  - 1. Seal top termination of base flashing with a strip of glass-fiber fabric set in MBR Flashing cement.
- D. Roof Drains: Set 30-by-30-inch (760-by-760-mm) 4 lb lead flashing sheet in a bed of MBR Flashing Cement on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 4 inches (100 mm) beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
- E. Roof Drains: Flash drain using PermaFlash system. Clamp roofing membrane, flashing, and stripping into roof-drain clamping ring.
  - 1. Install stripping according to roofing system manufacturer's written instructions.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.10 WALKWAY INSTALLATION

- A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.
  - 1. Sweep away loose aggregate surfacing and set walkway pads in additional flood coat of hot roofing asphalt.
- B. Walkway Cap Sheet Strips: Install roofing membrane walkway cap sheet strips over roofing membrane in cold-applied adhesive.

# 3.11 FLASHING AND ACCESSORIES INSTALLATION

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.

- 1. Follow roofing manufacturer's instructions.
- 2. Remove protective plastic surface film immediately before installation.
- C. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches (200 mm) high above membrane surface.
  - 1. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
  - 2. Provide termination directly to the vertical substrate as shown on roof drawings.
- E. EDGE METAL. Completely prime metal flanges and allow to dry prior to installation. Turn the base ply down 2 inches past the roof edge and over the nailer. After the base ply and continuous cleat (if applicable) have been installed, set the flange in mastic and stagger nail every 3 inches on center. Strip-in the flange using the stripping-ply material, extending a minimum of 4 inches beyond the edge of the flange. Terminate the finish ply at the gravel-stop rise of the edge metal. SEE ITEM: SEALANT, for finish of this detail.
- F. METAL PIPE FLASHINGS. Completely prime the metal pipe flanges and allow to dry prior to installation. After the base ply has been applied, set the flanges in mastic and stripin the flange using the stripping-ply material, extending a minimum of 4 inches beyond the edge of the flange. Terminate the finish ply at the flange-sleeve juncture of the pipe flashing. Install a watertight umbrella to the penetration, completely covering the opening of the pipe flashing.
- G. SEALANT. Caulk all exposed finish ply edges at gravel stops, waste stacks, pitch pans, vent stacks, etc..., with a smooth continuous bead of approved sealant.
- K. GRANULE EMBEDMENT. Broadcast mineral granules over bitumen overruns on the finish ply surface, to ensure a monolithic surface color.

#### 3.12 FLOOD TEST

- A. Membrane shall be allowed to cool, after which drains shall be plugged, and barriers installed to contain flood water. Acrylic elastomeric coating shall not be applied until the test is complete and accepted for service.
- B. Surface shall be flooded with a 2-inch head of water above low point, and allowed to set for 24 hours. A weighted bucket with one gallon of water shall be placed in the flooded area to monitor evaporation levels. Surface shall be inspected for leaks, and membrane shall be repaired if leaks are found. After making repairs, system shall be retested.

C. Roof Scupper and Leader Test- Upon approval of the flood test. Seal the end of the leader and allow water to run to the end of the leader. The drainage scupper, conductor head and leader shall allow to set for 24 hours. This test can run simultaneous with Flood Test.

### 3.13 PROTECTION COATING

A. Subsequent to a successful flood test, Acrylic elastomeric coating shall be immediately installed by setting with mastic. If flood testing is delayed, membrane shall be temporarily covered for protection.

### 3.14 PROTECTION

- A. All components of the Work shall be protected from detrimental weather and damage during construction.
- B. Modified bitumen membrane roofing system shall be protected from all damage until Final Acceptance by the County.

# 3.15 ADJUSTMENT

A. System components which are dislodged, damaged, expanded, broken, penetrated or crushed by subsequent installation operations or damaged by detrimental weather shall be immediately replaced with undamaged material in compliance with the Specifications and properly protected as specified.

# 3.16 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's Registered Roof Observer (RRO) to review the flood test and inspect roofing installation on completion and submit report to Architect. Report shall include results of flood test.
- B. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. POST-INSTALLATION MEETING. Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters.

- E. DRAIN VERIFICATION. At final inspection of all work, verify that all drains, scuppers, etc., are functioning properly. Ensure that roof drains have adequate strainers.
  - 1. Field verify type and size of pipe connections required to assure a water-tight connection at roof.
  - 2. Pre-construction test:
    - a. Testing: Test drain by inserting a hose and running water a minimum of 15 minutes at a rate of 5 gallons per minute to determine flow adequacy.
    - b. Test Reports: Reports shall include date of test, location, test method, and test results stating whether drain flow is adequate, or, if not adequate, state cause and make recommendations for correcting flow.

# 3.17 CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period.
- B. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction
- C. After installation, overspray material shall be cleaned from adjacent surfaces. Cleaning shall be performed using materials and processes as recommended by the manufacturer.

# END OF SECTION

# SECTION 07591

### PREPARATION FOR RE-ROOFING

### PART 1 GENERAL

# 1.01 SECTION INCLUDES

- A. Preparation for re-roofing as specified herein shall include, demolition and disposal of existing roofing system, preparing remaining existing substrate to receive new roofing system, and appurtenances.
- B. Preparation for re-roofing shall be accomplished where shown on the Contract Drawings, specified herein, or as required for a complete installation.
- C. The following index of this Specification is presented for convenience:

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3.01	Preparation	2
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### 1.02 PAYMENT

A. No separate payment will be made for preparation for re-roofing, accessories, or appurtenances; the cost shall be included in the lump sum price bid.

# 1.03 HANDLING AND DISPOSAL

- A. Handling of Materials: Existing roofing system materials shall be handled carefully so as not to damage any surrounding finished or natural areas.
- B. Disposal of Materials: Removed existing roofing system materials shall be hauled from site and properly disposed of in accordance with all applicable laws and regulations.

# PART 2 PRODUCTS

# NOT USED

PART 3 EXECUTION

# 3.01 PREPARATION

- A. The Contractor shall protect all surrounding areas and surfaces from damage and staining during the preparation for re-roofing and application of new roofing system.
- B. Existing substrate shall be prepared in accordance with the specifications and the new roofing system manufacturer's instructions.

# 3.02 PROTECTION

- A. All components of the Work shall be protected from detrimental weather and damage until construction operations are completed and acceptable to Engineer.
- B. Work which cannot for reasons acceptable to Engineer be covered with complete construction system before onset of weather detrimental to the Work shall be completely covered and protected in such a manner as to deflect water and weather from the installation without damaging adjacent Work.
- C. Prepared substrate shall be protected from all damage and abuse from all other Contractors and installers involved in the Work until Final Acceptance by the Owner.

# 3.03 CLEANING AND REPAIR

- A. Where finished surfaces are soiled by any source of soiling caused by preparation for reroofing work, cleaning shall be done in accordance with the recommendations of the manufacturer of the items whose surfaces have been soiled.
- B. Defaced or disfigured finishes caused by preparation for re-roofing work shall be repaired or replaced at no additional expense to the Owner.

# **END OF SECTION**

#### SECTION 07620

### SHEET METAL FLASHING AND TRIM

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. The general requirements for sheet metal flashing and trim for a complete water- and weather tight installation complying with all governing codes and standards.
- B. The Contractor shall provide all labor, materials, equipment and incidentals necessary to perform the work of this Section as shown on the Contract Drawings, specified herein or in the Detailed Specifications, or required otherwise for a complete installation.
- C. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

# 1.02 RELATED SPECIFICATIONS

- A. Section 04200 Unit Masonry
- B. Section 04720 Cast Stone
- C. Section 07900 Caulking and Sealants

### 1.03 REFERENCES

- A. SMACNA "Architectural Sheet Metal Manual"
- B. Pennsylvania State Building Code

#### 1.04 SYSTEM DESIGN REQUIREMENTS

- A. Sheet metal flashing and trim to be provided under this Section shall include complete systems of flashing and counterflashing at penetrations in roofing; interlocking, mechanically-keyed, 3-way ribbed stainless steel and copper metal masonry cavity wall flashing and miscellaneous system components such as cast-in-place and built-in-place reglets and other accessory components; miscellaneous flashings not supplied under the work of other Sections; miscellaneous accessories, fasteners and incidental system components.
- B. Installation of the systems shall meet the requirements of FM Approval Rating Class 1-90 construction, without relying upon sealants or other non-metallic detailing and fabricating techniques to achieve weather-and watertightness.
- C. Performance Criteria:

- 1. Sheet metal flashing and trim shall be permanently watertight, and not deteriorate in excess of manufacturers' published limitations.
- 2. Comply with fabrication details recommended by SMACNA and the sheet metal flashing and trim manufacturers, as approved by Engineer at time of Shop Drawing submission.
- 3. Provide completely weather- and watertight wall metal flashing systems. Contractor shall provide only the highest quality materials and methods of construction and installation as recommended by sheet metal flashing and trim manufacturers in compliance with governing authorities and as approved by Engineer at time of Shop Drawing submission.

# 1.05 QUALITY ASSURANCE

A. Engage installers skilled, trained and with successful experience in the detailing, fabrication and installation of each type of sheet metal flashing and trim work required who are recognized sheet metal contractors, equipped to perform workmanship in accordance with the Contract Documents and approved Shop Drawings so that there will be undivided responsibility for the performance of each flashing and trim component of the work.

# 1.06 SUBMITTALS

- A. The Contractor shall submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited to:
  - 1. Installer Qualifications: Submit names and qualifications to Engineer along with the following information on a minimum of three successful projects:
  - 2. Names and telephone numbers of owners, architects or engineers, responsible for the projects.
  - 3. Approximate contract prices for sheet metal flashing and trim.
  - 4. Size of area installed
- B. Samples: Submit for approval the following:
  - 1. Typical examples of sheet metal flashing and trim profiles, 12-inches long with all fasteners, clips, and supports required for the Work. 12-inch by 12-inch sheet of each item specified and 6-inch long pieces of each required system component to be used in the work.
  - 2. Each fastener type required marked as to type of material and with their intended purpose in the work.
- C. Shop Drawings: Submit for approval the following:

- 1. Copies of manufacturers' specifications, installation instructions and general recommendations for sheet metal flashing and trim requirements.
- 2. Include manufacturer's data substantiating that the materials comply with the requirements.
- 3. Provide Shop Drawings showing the coordination of the Work with General Sections 04200 Unit Masonry and 04720 Cast Stone
- 4. Provide detailed Shop Drawings showing all profiles of sheet metal flashing and trim systems to be used in the work, fully dimensioned, located, quantified and presented such that sequence of installation is acceptable to each interfacing material supplier.

## 1.07 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
  - 1. Deliver materials in manufacturers' original, unopened and undamaged containers and rolls, with labels intact and legible and with information accurately representing container contents as approved by Engineer at time of Shop Drawing submission.
  - 2. Items delivered in broken, damaged, rusted, or unlabeled condition shall immediately be removed from project site and not offered again for approval by Engineer.
- B. Storage of Materials:
  - 1. Store materials in an area protected from all construction traffic not associated with the work of this Section.
  - 2. Store materials off the ground and in same package in which they were shipped, and on platforms protected from dirt and other contamination.
  - 3. Store under cover and in a manner which does not permit water to remain on units.
- C. Handling of Materials:
  - 1. Protect all sheet metal flashing and trim work from dents, scratches, warps and bends.
  - 2. Immediately after installation of each system component, remove all strippable protective films.
  - 3. Comply with manufacturer's instructions for handling and installation of the ribbed metal cavity wall flashing materials, except where more stringent requirements are shown or specified.

#### 1.08 PROJECT CONDITIONS

- A. Protection:
  - 1. Provide continuous protection of materials against damage primarily by storing materials under cover and above ground and away from all construction traffic.
  - 2. Provide continuous protection of materials against wetting and contamination.

- B. Scheduling:
  - 1. Coordinate flashings with other Work to ensure secure anchorage and watertight seals, and to minimize exposure to puncture or other damage from the work of other trades.
  - 2. Deliver materials to the site in sufficient quantities to ensure uninterrupted progress of the Work.
  - 3. Do not proceed with the sheet metal flashing and trim Work until substrate construction, blocking, and other construction to receive the Work is completed.
  - 4. Schedule the installation of sheet metal flashing and trim Work to coincide with the installation of waterproofing, drains, piping, blocking, nailers, framing at openings, curbs, unit masonry and other adjoining and substrate work.
  - 5. Proceed with and complete the work only when materials, equipment and knowledgeable tradesmen required for the installation of sheet metal flashing and trim systems are at the site and are ready to follow and integrate the work of this Section with work requiring the installation of sheet metal flashing and trim.

# PART 2 PRODUCTS

# 2.01 MATERIALS AND MANUFACTURERS

- A. Copper Flashing:
  - 1. ASTM B 370, brake formed 16 oz. hard temper (Type H00) cold rolled
- B. Stainless Steel Flashing:
  - 1. ASTM A 480, brake formed AISI Type 304, 28 gauge (0.015") stainless steel, unless otherwise indicated. 2D annealed finish, hard
- C. Solder Materials :
  - 1. Copper: 50 50 tin / lead solder (ASTM B 32), with rosin flux
  - 2. Stainless Steel: 60 40 tin/lead solder ASTM B 32), with acid-chloride type flux, except use rosin flux over tinned surfaces.
- F. Stainless Leaders, Elbows, spout, scupper– Leader straps, support brackets, elbows, fittings, drain bars, and appurtenances shall be factory fabricated for their intended use. Stainless steel shall be in conformance with ASTM A 480, brake formed and fully welded construction AISI Type 304, 24 gauge, unless otherwise indicated. 2D annealed finished hard
  - 1. Size: 5-inch Plain Round scupper with flange as detailed

# 2.02 MATERIALS

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory- mitered and -welded corners and junctions.

- 1. Material: 28 gauge stainless steel
- 2. Select reglet types required from subparagraphs below.
- 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
- 4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
- 5. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
- 6. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
- B. Peel and Stick Membrane Flashing:
  - 1. Provide a rubberized asphalt and polyethylene membrane complying with ASTM D1970, backed with a silicone coated release paper that maintains the adhesive quality of the rubberized asphalt.
  - 2. Provide a rubber based primer for direct adhesion to plywood roof sheathing in areas specified to receive asphalt membrane flashing.
  - 3. Thickness: 40 mils total thickness minimum; 4 mil high strength polyethylene film.
  - 4. Product and Manufacturer: Provide one of the following:
    - a. Bituthene Ice and Water Shield as manufactured by:
      - 1) Construction Products Division, W.R. Grace & Company, Columbia, MD.
      - 2) WinterGuard by CertainTeed Corporation, Valley Forge, PA.
      - 3) Or approved equal.
- C. Miscellaneous Materials:
  - 1. Nails, Screws and Rivets: Same material as flashing sheet, or as recommended by manufacturer of flashing sheet.
  - 2. Cleats: Same metal and gage as sheet being anchored, 2-inches wide, punched for two anchors.

# 2.03 FABRICATION

A. Fabricated Metal Flashing and Trim: Shop fabricate sheet metal flashing and trim to comply with profiles and sizes shown, and to comply with

manufacturer's recommended details. Except as otherwise shown or specified, provide soldered flat-lock seams, and fold back metal to form a hem on the concealed side of exposed edges. Comply with metal producers' recommendations for tinning, soldering and cleaning flux from metal.

- B. On all metal base and counterflashing, and trim provide completely shop-fabricated corners and special flashings; heliarc welded to insure watertight joints. Grind welds smooth so as to be indistinguishable from adjacent surfaces
- PART 3 EXECUTION

## 3.01 EXAMINATION

A. The Contractor shall examine the substrate and the conditions under which the sheet metal flashing and trim work is to be performed, and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

### 3.02 PREPARATION

- A. Clean the substrate of dust, debris, substances and interferences detrimental to the Work and prepare substrates as recommended by the sheet metal manufacturer.
- B. Before installing flashing and trim, verify shapes, and dimensions to be covered.

## 3.03 INSTALLATION

A. General:

- 1. Separate dissimilar metals from substrates and from each other by painting each metal surface in the area of contact with a 15-mil thick application of bituminous coating, as recommended by the manufacturers of the dissimilar metals. Comply with manufacturer's recommendations for other forms of protection of the stainless steel and aluminum against corrosion.
- 2. Provide thermal expansion for running trim, flashing and other items exposed for more than 15 feet 0 inch continuous length. Maintain a watertight installation at expansion seams. Locate expansion seams at 15 feet 0 inch intervals, and 2 feet 0 inch each side of corners and intersections.
- 3. Fabricate and install the work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves and avoidable tool marks, considering the temper and reflectivity of the metal. Provide uniform, neat double-locked seams with cleats rolled into the seam and with minimum exposure of solder, welds and sealant. Except as otherwise shown, fold back the sheet metal to form a hem on the concealed side of exposed edges. All exposed edges of all sheet metal flashing shall be hemmed not less than 1/2-inch wide.
- 4. Conceal fasteners and expansion provisions wherever possible in exposed work, and locate so as to minimize the possibility of leakage. Cover and seal work as required for a watertight installation.

- 5. Provide cleat-type anchorages for metal flashings and trim wherever practical, arranged to relieve stresses from building movement, and thermal expansion and contraction.
- 6. On vertical surfaces lap 2-piece flashings a minimum of 4 inches.
- 7. On sloping surfaces, for slopes of not less than 6 inches in 12 inches, lap unsealed flashings a minimum of 6 inches. For slopes less than 6 inches in 12 inches use soldered flat-locked seams.
- 8. For embedment of metal flashing flanges in single ply roofing or flashing or stripping, extend flanges for a minimum of 6 inches embedment.
- 9. Flashing to be inserted into reglets shall be installed to the full depth of the reglet with the top flange of the flashing edge turned forward to form a hook. Caulk flashing into reglets using stainless steel wedges. Fill reglet with sealant specified in General Specification 07900 Caulking and Sealants.
- 10. All ductile and cast iron pipe and fittings shall be installed in accordance with the manufacturer's recommendations and approved shop drawings. Coordinate work with section 04255 Architectural Terra Cotta.

## B. FLASHING INSTALLATION

- 1. Flashing shall be installed at the junction between vertical and horizontal surfaces such as lintels, cornices, sills and as indicated on the contract documents.
- 2. Separate dissimilar metals from substrates and from each other by using peel and stick membrane flashing in the area of contact, as recommended by the manufacturers of the dissimilar metals. Comply with manufacturer's recommendations for other forms of protection of the stainless steel against corrosion.
- 3. Provide thermal expansion for running trim, flashing and other items exposed for more than 15 feet 0 inch continuous length. Maintain a watertight installation at expansion seams. Locate expansion seams at 15 feet 0 inch intervals, and 2 feet 0 inch each side of corners and intersections.
- 4. Fabricate and install the work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves and avoidable tool marks, considering the temper and reflectivity of the metal. Provide uniform, neat double-locked seams with cleats rolled into the seam and with minimum exposure of solder, welds and sealant. Except as otherwise shown, fold back the sheet metal to form a hem on the concealed side of exposed edges. All exposed edges of all sheet metal flashing shall be hemmed not less than 1/2-inch wide.
- 5. Conceal fasteners and expansion provisions wherever possible in exposed work, and locate so as to minimize the possibility of leakage. Cover and seal work as required for a watertight installation.
- 6. Provide cleat-type anchorages for metal flashings and trim wherever practical, arranged to relieve stresses from building movement, and thermal expansion and contraction.
- 7. On vertical surfaces lap 2-piece flashings a minimum of 4 inches.

- 8. On sloping surfaces, for slopes of not less than 6 inches in 12 inches, lap unsealed flashings a minimum of 6 inches. For slopes less than 6 inches in 12 inches use soldered flat-locked seams.
- 9. Flashing to be inserted into reglets shall be installed to the full depth of the reglet with the top flange of the flashing edge turned forward to form a hook. Caulk flashing into reglets using lead wedges. Fill reglet with sealant specified in General Specification 07900.
- 10. Provide welded joints. Provide upturned, 1/2-inch wide hooked flanges, and weld between adjoining sheets; lay seam flat.
- 11. Downspouts shall be installed in strict accordance with the manufacturer's instructions and recommendations, and in compliance with the SMACNA Architectural Sheet Metal Manual.

#### 3.04 FIELD QUALITY CONTROL FOR WALL FLASHING

- A. Field test wall flashing after installation. After building three courses of unit masonry above area of flashing spray area with water.
- B. Water leaking from the wall below the area of the wall flashing shall be evidence that the wall flashing has been improperly installed.
- C. Remove unit masonry and improperly installed wall flashing and install new wall flashing. Repeat this process until the wall does not shown evidence of leakage beneath ribbed cavity wall flashing. All such remedial work shall be at no additional expense to the City.
- D. Remove all mortar and other debris from cavity and demonstrate free flow of water from the cavity at conclusion of test.
- 3.05 FLOOD TEST
  - A. Drains shall be plugged at the termination of the tail piece, and barriers installed to contain flood water.

#### 3.06 ADJUSTMENT AND CLEANING

- A. Protect sheet metal flashing and trim work until Final Acceptance of the work.
- B. Do not permit workmen, or others, to step directly on flashing sheets in place, or to place or move equipment over flashing and trim surfaces. Protect surfaces during installation of permanent covering work and adjoining work.
- C. Neutralize excess flux as work progresses with five percent to ten percent washing soda solution and rinse thoroughly.
- D. Clean exposed surfaces of every substance which is visible or might cause corrosion or prevent uniform oxidation of the metal surfaces. Exercise extreme care to remove fluxes and ferrous metal particles, including welding splatter and grinding dust.

## **END OF SECTION**

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### SECTION 07900

#### CAULKING AND SEALANTS

# PART 1 GENERAL

#### 1.01 SUMMARY

- A. This Section describes the general requirements for caulking and sealant systems for openings and joints in building roofs and walls between concrete-in-place, masonry units, metal roof flashing, and other equipment and structures in order to provide a positive barrier against the passage of air and moisture.
- B. Complete technical services from the approved caulking and sealant manufacturers and onsite technical representation by their Technical Representatives during the time of delivery, storage and installation of the work of this Section and during other work which may affect the work of this Section as specified herein is also included.
- C. The Contractor shall provide all labor, materials, equipment and incidentals necessary to perform the work of this Section as shown on the Contract Drawings, specified herein or in the Detailed Specifications, or required otherwise for a complete job.
- D. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

#### 1.02 PAYMENT

A. There shall be no separate payment for the work of this Section, all costs shall be included in the Lump Sum price bid for Contract Item GC-1, as specified in Section 01010 – Measurement and Payment.

#### 1.03 REFERENCES

A.	PSBC	-	International Building Code 2009, 13th Edition
B.	ASTM C510	-	Test for Staining and Color Change of Single or Multi component Joint Sealers
C.	ASTM C661	-	Test for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer
D.	ASTM C793	-	Test for Effects of Accelerated Weathering on Elastomeric Joint Sealants
E.	ASTM C794	-	Test doe Adhesion-in-Peal of Elastomeric Joint Sealants
	F.ASTM C1247	-	Standard Test Method of Durability Of Sealants Exposed to Continuous Immersion In Liquids

G.	ASTM D3574	-	Standard Test Methods for Flexible Cellular Materials Slabs, Bonded, and Molded Urethane Foams.
H.	ASTM G53	-	Standard Practice for Operating Light, and Water- Exposure Apparatus (Fluorescent UV- Condensation Type) for Exposure of Non-metallic Materials.
I.	ASTM D816	_	Standard Test Methods for Rubber Cement.

#### 1.10 RELATED SPECIFICATIONS

- A. Section 04200- Unit Masonry.
- B. Section 04720- Cast Stone

#### 1.04 SYSTEM DESIGN REQUIREMENTS

- A. Description:
  - 1. The caulking and sealant systems to be furnished under the work of this Section shall include two-part elastomeric sealants, components, accessories and miscellaneous materials used for sealing joints in horizontal and vertical planes.
  - 2. The Work shall include but is not limited to:
    - a. all joints between cast-in-place concrete and masonry;
    - b. all cast-in-place concrete to cast-in-place concrete expansion joints;
    - c. all joints between masonry and metal;
    - d. all control joints in masonry and concrete;
    - e. all isolation joints between equipment and other items; and
    - f. joints where construction systems are discontinuous or inherently nonwatertight.
  - 3. The Work shall be performed at all locations whether or not indicated required to render the building watertight except where a construction system is specifically specified or shown as not relying upon the use of sealants in order to achieve weather- and water tightness.
- B. Substitutions
  - 1. Do not change products, system components, colors or manufacturers after Shop Drawing and Samples approvals by Engineer.
  - 2. Clearly identify, in a manner which is highlighted to Engineer, all proposed substitutions, modifications, variations, unspecified features and "or equal" products. Provide complete comparative data with specified products at time of Shop Drawing submission.

## C. Sustainable Design Requirements

- 1. Low Emitting Materials: Sealants and sealant primers used on site and within the building's weatherproofing system shall comply with the following limits for VOC content:
  - a. Architectural Sealants: 250 g/L.
  - b. Sealant Primers for Nonporous Substrates: 250 g/L.
  - c. Sealant Primers for Porous Substrates: 775 g/L.

# 1.05 QUALITY ASSURANCE

- 1. Engage a single manufacturer who shall provide the services of a Technical Representative who shall assist Contractor and Engineer by providing technical opinions on the adequacy of materials and methods of installation based on Shop Drawings approved by Engineer.
  - a. Provide such services during the time of delivery, storage, handling and installation of all caulking and sealant system components.
- 2. Test caulking and sealants for compatibility with the substrates specified for conformance to current industry standards, and recommend remedial procedures as required.
- B. Installer Qualifications: Engage a single installer skilled, trained and with successful experience in the application of the types of material required and who agrees to employ only tradesmen with specific skill and successful experience in this type of work.
- C. Performance Criteria: Do not provide exposed caulking and sealant work for metal batten roofing, sheet metal flashing and trim or custom preformed metal siding work in order to render the work watertight. These construction systems shall be detailed, fabricated and provided such that they are inherently watertight without the use of additional caulking, sealant, elastomeric compounds, asphaltic compounds or other similar materials.

D. Compatibility: Before purchase of each specified sealant, investigate its compatibility with the joint surfaces, joint fillers and other materials in the joint system. Provide only materials (manufacturer's recommended variation of the specified materials) which are known to be fully compatible with the actual installation condition, as shown by manufacturer's published data or certification.

## 1.06 SUBMITTALS

- A. Contractor shall submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited to:
  - 1. Samples: Submit for approval the following:
    - a. Actual cured material samples of each type of caulking and sealant specified, 4-inches long, in each of the manufacturer's standard colors.

- b. Samples will be reviewed by Engineer for color and texture only.
- c. Compliance with other requirements is the responsibility of Contractor.
- B. Shop Drawings: Submit for approval the following:
  - 1. Copies of manufacturer's specifications, recommendations and installation instructions for each type of sealant, caulking compound and associated miscellaneous material required. Include manufacturer's published data, indicating that each material complies with the requirements and is intended for the applications shown.
  - 2. Test Reports: Submit for approval the following:
    - a. Compatibility tests for substrates, based on adhesion-in-peel standard test procedures and ASTM C920.
    - b. Copies of certified laboratory test reports indicating conformance with the requirements specified.
  - 3. Guarantee: Submit for approval:
    - a. Copies of written guarantee agreeing to repair or replace sealants which fail to perform as specified.
  - 4. Sustainable Design Submittals:
    - a. Environmental Materials Reporting Form (EMRF) Recycled Content. Provide the following information:
      - 1) Name of Product and Manufacturer.
      - 2) Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).
      - 3) The percentage (by weight) of post-consumer and pre-consumer recycled content in the submitted product(s), if applicable.
  - 5. VOC Reporting Form. Provide the following information:
    - a. For all sealants and sealant primers used on site and within the building's weatherproofing system provide the VOC content in grams/Liter (g/L) less water and other exempt compounds.

## 1.07 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
  - 1. Deliver materials in caulking and sealant manufacturer's original unopened and undamaged containers, with information accurately representing container contents as approved by Engineer at time of Shop Drawing and Samples submissions.
  - 2. Include the following information on the label:
    - a. Name of material and supplier.

- b. Formula or specification number, lot number, color and date of manufactures.
  - c. Mixing instructions, shelf life and curing time when applicable.
- 3. Failure to comply with these requirements shall be sufficient cause for rejection of the material in question, by Engineer, and his requiring its removal from the site. Supply new material conforming to the specified requirements at no additional expense to the City.
- B. Storage of Materials:
  - 1. Store materials so as to preclude foreign materials.
  - 2. Do not store or expose materials to temperature above 90 F or store in direct sunshine.
  - 3. Do not use materials which are outdated as indicated by shelf life.
  - 4. Store sealant tape in a manner which will not deform the tape.
  - 5. In cool or cold weather store containers where temperature approximates 75°F for 16 hours before using.
  - 6. When high temperatures prevail store mixed sealants in a cool place.
- C. Handling:
  - 1. Handle materials carefully to prevent inclusion of foreign materials.
  - 2. Do not open containers or mix components until necessary preparatory work and priming has been completed.

#### 1.08 PROJECT CONDITIONS

- A. Environmental Conditions:
  - 1. Do not proceed with installation of caulking and sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.
  - 2. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.
  - 3. Wherever joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in the lower third of manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures
    - 4. When high temperatures prevail avoid mixing sealants in direct sunlight.
- B. Protection: Do not allow caulking and sealants to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces including rough textured materials. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or the caulking and sealant materials.

## 1.09 WARRANTY

Provide a written guarantee agreeing to repair or replace sealants which fail to perform as airtight and watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data, as an inherent quality of the material for the exposure indicated. Provide guarantee signed by the installer and Contractor. Provide guarantee period of two years.

## PART 2 PRODUCTS

# 2.01 MATERIALS AND MANUFACTURERS

- A. Exterior and Interior Joints in Vertical Planes: Provide one of the following:
  - 1. Dymeric 240FC as manufactured by Tremco Incorporated, an RPM Company, Beachwood, OH.
  - 2. Sikaflex-2C NS by Sika Corporation, Lindhurst, NJ.
  - 3. Or equal.
- B. Exterior and Interior Joints in Horizontal Planes: Provide one of the following:
  - 1. THC 900/ 901 by Tremco Incorporated, an RPM Company, Beachwood, OH.
  - 2. Sikaflex-2C SL by Sika Corporation, Lindhurst, NJ.
  - 3. Or equal.
- C. Window Sealant:
  - 1. DOW CORNING 791 Silicone Weatherproofing Sealant
    - a. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant ASTM C 920, Type S, Grade NS, Class 50,
    - b. Hardness, ASTM D 2240: 34 durometer Shore A, minimum.
    - c. Staining, ASTM C 1248: None on concrete, granite, limestone, and brick.
    - d. Color: [As selected by Architect from manufacturer's full line of not less than 6 colors].
  - 2. Or Equal
- C. Penetration Sealing System:
  - NOFIRNO Cable/Pipe Penetration Sealing System composed of NOFIRNO Sealant, filler sleeves, multi-filler slivers and CRUSHER type warps and SPLIT CASINGs as manufactured and distributed by Beele Engineering / CSD Sealing Systems, Phone: 603-533-8078:
    - a. NOFIRNO Sealant: Color "red brown", with 50% elastic deformation, resistant to

UV, Ozone, arctic conditions and ageing more than 20 years. Sealant shall be resistant to fire.

- b. SPLIT CASING: Tubular modified ABS plastic two piece casing at each penetration and on two sides of the wall set on NOFIRNO RUBBER GASKET on NOFIRNO SEALANT against exterior wall and secured with stainless steel adhesive anchors 1/4" to 3/8" diameter. Casings shall be held together with stainless steel bolts as recommended by the manufacturer. SPLIT CASINGs shall be ordered to minimum size available to suit existing openings.
- c. Order filler material is smaller size available as recommended by the manufacturer to allow for flexibility in the field from NOFIRNO product line.
- d. Sealant shall be installed minimum 7/8" thick on two sides of the opening where accessible
- e. Install per manufacturer's instructions
- f. Smooth sealant with a damped cloth
- 2. Or Equal
- D. Butyl Caulk:
  - 1. SikaLastomer 511 by Sika
  - 2. Butyl Sealant by Temco
  - 3. Or equal

## 2.02 MATERIALS

- A. Exterior and Interior Joints in Vertical Planes:
  - 1. Urethane-based, two-component elastomeric sealant complying with the following:
    - a. ASTM C 920Adhesion-in-Peel, ASTM C 920 and ASTM C794: Minimum 10 lbs/linear inch with no adhesion failure.
    - b. Hardness (Standard Conditions), ASTM C661: 20-25 (Shore A).
    - c. Stain and color change, ASTM C 920and ASTM C510: No discoloration or stain.
    - d. Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weatherometer.
    - e. Rheological Vertical Displacement at 120 F, ASTM C 920: No sag.
- B. Exterior and Interior Joints in Horizontal Planes:
  - 1. Polyurethane-based, two-component elastomeric sealant complying with the following:

- a. ASTM C 920Water Immersion Bond, ASTM C1247: Elongation of 25% with no adhesive failure.
- b. Hardness (Standard Conditions), ASTM C661: 30-40.
- c. Stain and Color Change, ASTM C1247 and ASTM C510: No discoloration or stain.
- d. Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weatherometer.
- Provide colors selected by Engineer from caulking and sealant manufacturer's standard color charts. Engineer will select a maximum of ten colors for the Work. Manufacturers supplying sealants other than those specified above must provide the same colors available from those specified.
- D. Miscellaneous Materials:
  - 1. Joint Cleaner: Provide the type of joint cleaning compound recommended by the sealant and caulking manufacturer, for the joint surfaces to be cleaned.
  - 2. Joint Primer and Sealer: Provide the type of joint primer and sealer recommended by the caulking and sealant manufacturer, for the joint surfaces to be primed or sealed.
  - 3. Bond Breaker Type: Polyethylene tape or other plastic tape as recommended by the caulking and sealant manufacturer, to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of caulking and sealant. Provide self-adhesive tape wherever applicable.
- D. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable nonabsorptive material as recommended for compatibility with caulking and sealant by the caulking and sealant manufacturer. Provide size and shape of rod which will control the joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize the possibility of sealant extrusion when joint is compressed.
- E. Low Temperature Catalyst: Provide the type recommended by the caulking and sealant manufacturer.

## 2.03 MIXING

- A. Comply with sealant manufacturer's written instructions for mixing 2-component sealants.
- B. Thoroughly mix components before use.
- C. Add entire contents of activator can to base containers. Do not mix partial units.
- D. Mix contents for a minimum of 5 minutes or as recommended by the sealant manufacturer, until color and consistency are uniform.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. The Contractor shall examine the joint surfaces, substrates, backing, and anchorage of units forming sealant rabbet, and the conditions under which the caulking and sealant work is to be performed, and notify Engineer in writing of any condition detrimental to the proper and timely completion of the Work and the performance of the sealant systems. Do not proceed with the caulking and sealant work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

## 3.02 JOINT SURFACE PREPARATION

- A. Clean joint surfaces immediately before installation of sealant compound. Remove dirt, insecure coatings, moisture and other substances which would interfere with bonds of sealant compound as recommended by sealant manufacturer's written instructions.
- B. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer's written instructions indicate that alkalinity does not interfere with sealant bond and performance.
  - 1. Etch with 5 percent solution of muriatic acid.
  - 2. Neutralize with dilute ammonia solution.
  - 3. Rinse thoroughly with water and allow to dry before sealant installation.
- C. If necessary, clean porous materials such as concrete and masonry by grinding, abrasive blasting or mechanical abrading. Blow out joints with oil-free compressed air, or by vacuuming joints prior to application of primer or sealant.
- D. Roughen joint surfaces on vitreous coated and similar non-porous materials, wherever sealant manufacturer's data indicates lower bond strength than for porous surfaces. Rub with fine abrasive cloth or wool to produce a dull sheen.

## 3.03 INSTALLATION

- A. Comply with sealant manufacturer's written instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.
- B. Prime or seal the joint surfaces wherever recommended by the sealant manufacturer. Do not allow prime or sealer to spill or migrate onto adjoining surfaces. Allow primer to dry prior to application of sealants.
- C. Apply masking tape before installation of primer, in continuous strips in alignment with the joint edge to produce sharp, clean interface with adjoining materials. Remove tape immediately after joints have been sealed and tooled as directed.
- D. Do not install sealants without backer rods or bond breaker tape.

- E. Roll the back-up rod stock into the joint to avoid lengthwise stretching. Do not twist, braid, puncture or prime backer-rods.
- F. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
- G. Install sealants to depths as recommended by the sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead.
  - 1. For horizontal joints in sidewalks, pavements and similar locations sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, but not more than 5/8-inch deep or less than 3/8-inch deep.
  - 2. For vertical joints subjected to normal movement and sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2-inch deep or less than 1/4-inch deep.
- H. Remove excess and spillage of compounds promptly as the Work progresses.
- I. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
- K. Provide Penetration Sealing System at all round penetrations in interior and exterior wall on both sides. For fire rated assemblies, provide complete fire stopping prior to installation of entry panel. Provide complete sealant seal at round penetrations and perimeter of entry panels.

## 3.04 FIELD QUALITY CONTROL

- A. Where questions of compatibility of sealants and substrate arise the sealant manufacturer shall test the substrate in question for compatibility with the specified sealant and report his findings, with recommendations, to Engineer. Any required sealant change shall be at no additional expense to the City.
- B. Do not proceed with installation of elastomeric sealants over joint surfaces which have been painted, lacquered, waterproofed or treated with water repellent or other treatment or coating unless a laboratory test for durability (adhesion), in compliance with Paragraph 4.3.9 of ASTM C 920 has successfully demonstrated that sealant bond is not impaired by the coating or treatment. If laboratory test has not been performed, or shows bond interference, remove coating or treatment from joint surfaces before installing sealant.
- C. After nominal cure of exterior joint sealants which are exposed to the weather, test for water leaks. Flood the joint exposure with water directed from a 3/4-inch garden hose, without nozzle, held perpendicular to wall face, 2 feet-0 inch from joint and connected to a

water system with 30 pounds per square inch minimum normal water pressure. Move stream of water along joint at an approximate rate of 20 feet per minute.

D. Test approximately 5 percent of total joint system, in locations which are typical of every joint condition, and which can be inspected easilyfor leakage on opposite face. Conduct test in the presence of Engineer, who will determine the actual percentage of joints to be tested and the actual period of exposure to water from the hose, based upon the extent of observed leakage, or lack thereof.

E. Where nature of observed leakage indicates the possibility of inadequate

joint bond strength, Engineer may direct that additional testing be performed at a time when joints have been fully cured, followed by natural exposure through both extreme temperatures and returned to the lowest range of temperature in which it is feasible to conduct testing. Perform testing as directed at any time within 24 months of installation date.

### 3.05 ADJUSTMENT AND CLEANING

- A. Repair sealant installation at leaks or, if leakage is excessive, replace sealant installation as directed.
- B. Clean adjacent surfaces of sealant or soiling resulting from the Work. Use solvent or cleaning agent recommended by the sealant manufacturer. Leave all finish work in a neat clean condition.
- C. Protect the sealants during the construction period so that they will be without deterioration, soiling, or damage at the time of the City's Final Acceptance.

# END OF SECTION

## SECTION 08110

### INTERIOR HOLLOW METAL DOORS AND FRAMES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Standard interior hollow metal doors & frames.

## B. Related Sections:

- 1. Division 08 Section for "Finish Hardware"
- 2. Division 09 Section "Interior Painting" for field painting hollow metal doors and frames.
- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI/SDI A250.8 Recommended Specifications for Standard Steel Doors and Frames.
  - 2. ANSI/SDI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
  - 3. ANSI/SDI A250.6 Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
  - 4. ANSI/SDI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
  - 5. ANSI/SDI A250.11 Recommended Erection Instructions for Steel Frames.
  - 6. ASTM A1008 Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
  - 7. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 8. ASTM A924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
  - 9. ASTM C 1363 Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
  - 10. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors and Frames.
  - 11. ANSI/SDI 122 Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
  - 12. ANSI/NFPA 80 Standard for Fire Doors and Fire Windows; National Fire Protection Association.
  - 13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
  - 14. NFPA 252 Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
  - 15. UL 10C Positive Pressure Fire Tests of Door Assemblies.
  - 16. UL 1784 Standard for Air Leakage Tests of Door Assemblies.

## 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
  - 1. Elevations of each door design.
  - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 4. Locations of reinforcement and preparations for hardware.
  - 5. Details of anchorages, joints, field splices, and connections.
  - 6. Details of accessories.
  - 7. Details of moldings, removable stops, and glazing.
- D. Samples for Verification:
  - 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

## 1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

## 1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

### 1.6 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

### 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
  - 1. CECO Door Products (C).
  - 2. Curries Company (CU).
  - 3. Steelcraft (S).

#### 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

## 2.3 HOLLOW METAL DOORS

- A. General: Provide 1<sup>3</sup>/<sub>4</sub>-inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
  - 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch 1.0-mm) thick steel, Model 2.
  - 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
  - 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1<sup>1</sup>/<sub>4</sub>" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  - 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Manufacturers Basis of Design:
  - 1. Curries Company (CU) Polystyrene Core 707 Series.

#### 2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
  - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  - 3. Manufacturers Basis of Design:
    - a. Curries Company (CU) CM Series.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

#### 2.5 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated

or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

- 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
- 3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.6 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.7 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
  - 1. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- D. Hollow Metal Frames:
  - 1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
  - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
  - 3. Knocked Down Frames: Provide frames with locking corner tabs which permit field assembly. Factory install compression type anchors and countersunk screw holes to secure the bottom of the jambs.
  - 4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.

- 5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- 6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
- 7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
- 8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
- 9. Jamb Anchors: Provide number and spacing of anchors as follows:
  - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches O.C. and as follows:
    - 1) Two anchors per jamb up to 60 inches high.
    - 2) Three anchors per jamb from 60 to 90 inches high.
    - 3) Four anchors per jamb from 90 to 120 inches high.
    - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
  - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches O.C and as follows:
    - 1) Three anchors per jamb up to 60 inches high.
    - 2) Four anchors per jamb from 60 to 90 inches high.
    - 3) Five anchors per jamb from 90 to 96 inches high.
    - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
- 10. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Finish Hardware".
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  - 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

#### 2.8 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
  - 1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

#### 3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and

secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

- 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
- 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
- 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

# 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint

# END OF SECTION

#### SECTION 08225

## FRP DOORS WITH STEEL FRAMES

#### PART 1 - GENERAL

## 1.01 SECTION INCLUDES

- A. The Contractor shall furnish and install all FRP doors and fire rated metal frames, storage and associated equipment shown on the Contract Drawings and specified herein.
- B. The Contractor shall be responsible for reusing the existing door frames with the exception of new door frames indicated on the Door Schedule on the Contract Drawings. The Contractor shall prepare the existing door frames as described in Part 3 of this specification.
- C. The Contractor shall be responsible for coordinating all work in this Section with work covered under Section 08710 Finish Hardware.

# 1.02 RELATED SPECIFICATION

A.	Section 05050	-	Metal Fastening
B.	Section 06200	-	Finish Carpentry
C.	Section 09900	-	Painting
D.	Section 08710	-	Finish Hardware

## 1.03 REFERENCES

A.	AAMA 1503-98	Therm	al Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
B.	ANSI A250.4	-	Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
C.	ASTM B 117	-	Operating Salt Spray (Fog) Apparatus.
D.	ASTM B 209	-	Aluminum and Aluminum-Alloy Sheet and Plate.
E.	ASTM B 221	-	Aluminum-Alloy Extruded Bars, Rods, Wire,
			Profiles, and Tubes.
F.	ASTM D 256	-	Determining the Pendulum Impact Resistance of
			Notched Specimens of Plastics.
G.	ASTM D 543	-	Evaluating the Resistance of Plastics to Chemical
			Reagents.
H.	ASTM D 570	-	Water Absorption of Plastics.
I.	ASTM D 638	-	Tensile Properties of Plastics.
J.	ASTM D 790	-	Flexural Properties of Unreinforced and Reinforced
			Plastics and Electrical Insulating Materials.
Κ.	ASTM D 1308	-	Effect of Household Chemicals on Clear and
			Pigmented Organic Finishes.
L.	ASTM D 1621	-	Compressive Properties of Rigid Cellular Plastics.
М.	ASTM D 1623	-	Tensile and Tensile Adhesion Properties of Rigid
			Cellular Plastics.
N.	ASTM D 2126	-	Response of Rigid Cellular Plastics to Thermal and
			Humid Aging.
О.	ASTM D 2583	-	Indentation Hardness of Rigid Plastics by Means of a
			Barcol Impressor.
Р.	ASTM D 3029	-	Impact Resistance of Flat Rigid Plastic Specimens by
			Means of a Falling Weight.
Q.	ASTM D 6670-01	-	Standard Practice for Full-Scale Chamber
			Determination of Volatile Organic Emissions from
			Indoor Materials/Products.
R.	ASTM E 84	-	Surface Burning Characteristics of Building
~			Materials.
S.	ASTM E 90	-	Laboratory Measurement of Airborne Sound
_			Transmission Loss of Building Partitions.
Τ.	ASTM E 283	-	Determining the Rate of Air Leakage Through
			Exterior Windows, Curtain Walls, and Doors Under
			Specified Pressure Differences Across the Specimen.

U.	<b>ASTM E 330</b>	-	Structural Performance of Exterior Windows,
			Curtain Walls, and Doors by Uniform Static Air
			Pressure Difference.
V.	ASTM E 331	-	Water Penetration of Exterior Windows, Skylights,
			Doors, and Curtain Walls by Uniform Static Air
			Pressure Difference.
W.	ASTM F 476	-	Security of Swinging Door Assemblies.
Х.	SFBC PA 201	-	Impact Test Procedures.
Υ.	SFBC PA 203	-	Criteria for Testing Products Subject to Cyclic Wind
			Pressure Loading.
Z.	SFBC 3603.2 (b) (5)	-	Forced Entry Resistance Test.
AA	. NFPA 252	-	Standard Methods of Fire Tests of Door Assemblies.
			Current Edition
BB	. UBC 7-2	-	Fire Test of Door Assemblies
CC	. UL 10C	-	Positive Pressure Fire Tests of Door Assemblies

#### 1.04 DESIGN REQUIREMENTS

- A. All work shall comply with the Building Code of Philadelphia.
- B. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding systems.
- C. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
- D. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
- E. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.

- F. Hurricane Test Standards, Single Door with Single-Point Latching:
  - 1. Uniform Static Load, ASTM E 330: Plus or minus 75 pounds per square foot.
  - 2. Forced Entry Test, 300 Pound Load Applied, SFBC 3603.2 (b) (5): Passed.
  - 3. Cyclic Load Test, SFBC PA 203: Plus or minus 53 pounds per square foot.
  - 4. Large Missile Impact Test, SFBC PA 201: Passed.
- G. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.
- H. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
- I. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.
- J. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
- K. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
- L. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
- M. Flame Spread: Maximum of 200, Class C.
  - 1. Smoke Developed: Maximum of 450, Class C.

- N. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
  - 1. Flame Spread: Maximum of 25.
  - 2. Smoke Developed: Maximum of 450.
- O. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 footpounds per inch of notch.
- P. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
- Q. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
- R. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
- S. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
- T. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 3029: 120 in-lb.
- U. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
- V. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.
- W. Chemical Resistance, ASTM D 543. Excellent rating.
  - 1. Acetic acid, Concentrated.
  - 2. Ammonium Hydroxide, Concentrated.
  - 3. Citric Acid, 10%.

- 4. Formaldehyde.
- 5. Hydrochloric Acid, 10%
- 6. Sodium hypochlorite, 4 to 6 percent solution.
- X. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.
- Y. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi.
- Z. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.
- AA. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

# 1.05 SUBMITTALS

- A. The Contractor shall submit the following in accordance with the contract requirements:
  - 1. Samples
  - 2. Shop Drawings
  - 3. Working Drawings.
  - 4. Test Reports.
  - 5. Letters of Transmittal.
  - 6. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.

- B. Samples shall include:
  - 1. Corner sections of frames and trim.
  - 2. Cut-away corner sections of FRP/hollow metal doors showing internal reinforcement specified.
  - 3. Insulating material.
  - 4. Color: Submit manufacturer's samples of standard, custom and premium colors of doors and frames.
- C. The Engineer reserves the right to require samples showing fabrication techniques and workmanship of component parts, and the design of accessories and other auxiliary items for all door and frame work, before fabrication of the work proceeds.
- D. Shop Drawings shall include, but not be limited to:
  - 1. Complete layout and installation drawings and schedules with clearly marked dimensions. Drawings shall indicate details of construction, profiles, gauges, reinforcing and location of all doors and frames.
  - 2. Include details of each door and frame type with elevations of door design types, conditions at openings, details of construction, location and installation requirements for all finish hardware and finish hardware reinforcements and details at joints, connections and every typical composite member. Show all door and frame reinforcements including welds, plate lengths, locations and gauges for each component of finish hardware.
  - 3. Provide a schedule of doors and frames using same reference numbers for details and openings as those on the Drawings.

- 4. Provide submittal coordinated with requirements for finish hardware. Provide all template information and internal reinforcement gauges, sizes and locations. Submit finish hardware template requirements with aluminum door and frame submittal.
- E. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed materials compliance with the Contract Documents.
- F. Test Reports: Submit for approval the following:
  - 1. Certification of Labeled Construction for fire doors and frames.
  - 2. Certification of Labeled Construction for doors not requiring labels but requiring labeled construction.
  - 3. Certified laboratory test report for required performance and specified feature verification for doors and frames selected at random by Engineer for testing. At least one test shall be to verify the presence of specified material for use on all doors and frames brought to the site.
  - 4. Provide copies of material purchase receipts, for material used in this Contract, signed by a certified and licensed Notary Public, verifying that material purchased for the work complies with material designations specified as confirmed by approved Working Drawings.
  - 5. Final approval of all door and frame work shall be contingent upon verification of presence of all features specified. Submit report to the Engineer for approval.

- G. Letters of Transmittal: Submit letters of transmittals indicating that door and frame manufacturer has received all finish hardware template and reinforcement information before start of fabrication.
- H. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
- I. Warranty: Submit manufacturer's standard warranty.

## 1.06 QUALITY ASSURANCE

- A. Provide FRP doors and steel frames and accessories manufactured by a firms specializing in the production of FRP door assemblies and complying with specified standards of ANSI, NFPA, and SDI.
- B. Requirements of Regulatory Agencies:
  - 1. Construct assemblies to comply with NFPA Standard No. 80, and applicable provisions of the International Building Code.
- C. Source Quality Control:
  - 1. After Working Drawing approval by the Engineer, manufacturer shall not make any further detailing, fabrication or specific construction changes, nor shall doors and frames be brought to the site which do not conform in all ways to approved Working Drawing submittal. Door fabrication shall meet or exceed GreenGuard Environmental Institute emission performance requirements. <u>www.greenguard.org</u>
  - 2. Doors and frames which are found to differ in any way from those approved by the Engineer at time of Working Drawing approval shall be removed from the work and replaced with doors and frames meeting requirements, even if discovered in the finished work, at no additional expense to the Owner.
  - 3. The Contractor shall provide testing of up to five flush doors and frames, selected at random by Engineer from those brought to the site for the purpose of verifying,

by independent laboratory analysis, the provision of all features specified and indicated on approved Working Drawings. Any door and frame found failing to comply with specified features shall require the removal of all doors and frames from the Project Site, even if discovered after door and frame installation, and the provision of units complying with Specifications as confirmed by independent laboratory testing, at no additional expense to the Owner.

- 4. Discovery of such non-conforming work shall require a complete review of all door and frame work on site and in shop. The Contractor shall prepare additional reports and provide additional testing in order to verify to the Engineer the acceptable condition of the remainder of all other door and frame work, at no additional expense to the Owner.
- D. Material Requirements and Tolerances:
  - 1. Doors frames components shall be manufactured from steel.
  - 2. Provide pencil-line thin butt joints.
  - 3. Provide maximum tolerances of 1/16 inch between the work of this Section and adjoining surfaces, with all work plumb and true to adjoining surfaces with all miters and copes accurately formed.
  - 4. Provide completely water- and vaportight joints.

# 1.07 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be boxed or crated and suitably protected prior to shipment from the factory. Protection shall be arranged to protect all hardware which may be attached.
- B. The Engineer will inspect doors and steel frames upon delivery for damage. Minor damage may be repaired provided the finish items are equal to new work and acceptable to the Engineer; otherwise, remove and replace damaged items with new items meeting the requirements of this Specification.

- C. Failure of the Engineer to discover damaged items at time of product delivery shall not relieve the Contractor of its requirement to only include in the finished work items meeting the requirements of this Specification.
  - 1. Store doors and frames at the building site under cover.
  - 2. Place units up off the floor and not in contact with dirt, other construction materials or debris and away from all construction traffic.
  - 3. Avoid the use of non-vented plastic or canvas shelters which could create a humidity chamber. If cardboard wrapper on doors becomes wet, remove the carton immediately.
  - 4. Provide a <sup>1</sup>/<sub>4</sub>-inch space between stacked doors to promote air circulation. Keep doors and frames dry and clean. Immediately clean and dry doors and frames which become wet or soiled in any way.

## 1.08 <u>SCHEDULING</u>

- A. Coordinate with other work by furnishing Working Drawings, inserts and similar items at the appropriate times for proper sequencing of construction without delays.
- B. Do not install doors and frames until all work of this and other Contracts that could damage doors and frames has been completed.
- C. Provide temporary doors until construction sequencing allows installation of permanent doors without qualification of acceptable work by Contractor.

## PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

- A. FRP doors and frames to be as manufactured by the following:
  - Special-Lite, Inc., GreenGuard Certified PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com.
  - 2. Model OXP as manufactured Overly Door Company 1802 Izard Street, Omaha, NE 68102 Phone: 402 346 4344.
  - 3. Commercial Door Systems, GreenGuard Certified 320 Camer Drive, Bensalem, PA 19020 Phone: 215-244-9080 www.commercialdoorsystems.com.

# 2.02 FRP FLUSH DOORS

- A. Specification is based on Special-Lite Models: SL-17 Pebble Grain Flush Doors fiberglass reinforced polyester (FRP)/Aluminum Hybrid Door.
- B. Construction:
  - 1. Door Thickness: 1<sup>3</sup>/<sub>4</sub> inches.
  - 2. Stiles and Rails: Aluminum Alloy 6063-T5, minimum of 2-5/16-inch depth or 14-gauge type 304 Stainless steel outer channel trim for both stiles and rails.
  - 3. Corners: Mitered or vertical cut mortise and tendon or joined using notched, fitted butt joints.
  - 4. Provide joinery of tubular shaped stiles and rails reinforced to accept hardware as specified.
  - 5. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery.

- 6. Welds, glue, or other methods are not acceptable to join corner joints.
- 7. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
- 8. Rail caps or other face sheet capture methods are not acceptable.
- 9. Extrude top and bottom rail legs for interlocking continuous weather bar.
- 10. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weather seals.
- 11. Bottom of Door: Install bottom weather bar with nylon brush weather-stripping into extruded interlocking edge of bottom rail.
- 12. Glue: FRP door shall meet all requirements for Chapter 26 IBC. The FRP can be glued to the face of the aluminum sheet.
- 13. All doors shall be provided with stainless steel tags, <sup>1</sup>/<sub>2</sub>-inch diameter by 1/16-inch thick, stamped with the door number and black Japan-filled; numbers shall conform to those in the Door Schedule.
- 14. Jambs shall be constructed to be set on the finished floor.
- 15. All exterior doors shall be fully weather-stripped, as indicated in Section 08710.
- 16. Trimmed opening shall be provided as indicated on the contract documents as work of this section.
- 17. Concealed reinforcements of sheet or bar steel shall be provided for hardware and for all attached work. Reinforcement for butt side of doors shall be a continuous 3/16-inch galvanized steel plate. Lock reinforcement shall be No. 12 gauge galvanized steel sheet.

Reinforcement for door closures, holders, checks and brackets shall be No. 12 gauge plate of length as required for finish hardware.

- 18. Edge profiles shall be provided on both stiles of doors beveled 1/8 inch in 2 inches.
- C. Face Sheet:
  - 1. Material: FRP, 0.120-inch thickness, finish color throughout. Abuse-resistant engineered surface.
  - 2. Texture: Pebble.
  - 3. Sheet color shall be through-molded colors from full standard, classic and premium colors as selected by the Engineer. Colors shall include both standard and pre-matched colors options.
    - D. Core:
      - 1. Material: Poured-in-place polyurethane foam. Laid in foam cores are not acceptable.
      - 2. Foam Plastic Insulated Doors: IBC 2603.4.
        - a. Foam plastic shall be separated from the interior of a building by an approved thermal barrier.
        - b. Approved thermal barrier must meet the acceptance criteria of the Temperature Transmission Fire Test and Integrity Fire Test as stated in NFPA 275.
        - c. IBC 2603.4.1.7 foam plastic insulation, having a flame spread index less than 75 and a smoke developed index of not more than 450 shall be permitted as a door core when the face is metal minimum 0.032" aluminum or 0.016" steel.

- d. Standard door assembly can be tested to show it meets these requirements without the use of thermal barrier. If no independent testing conducted all doors with foam plastic core must have a thermal barrier.
- 3. Density: Minimum of 5 pounds per cubic foot.
- 4. R-Value: Minimum of R10.
- E. Cutouts:
  - 1. Manufacture doors with cutouts for required hardware.
- F. Hardware (Refer to Section 08710 for Finish Hardware):
  - 1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

## 2.03 MATERIALS

- A. Aluminum Members:
  - 1. Extrusions: ASTM B 221.
  - 2. Sheet and Plate: ASTM B 209.
- 3. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.
- B. Components: Door and frame components from same manufacturer.
- C. Fasteners:

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- 1. Material: 410 stainless steel.
- 2. Compatibility: Compatible with items to be fastened.
- 3. Exposed Fasteners: Screws with finish matching items to be fastened.
- D. Class A Flame Spread and Smoke Developed Rating:
  - 1. Class A flame spread and smoke developed rating on interior faces of exterior panels and both faces of interior panels.
  - 2. Flame Spread, ASTM E 84: Maximum of 25.
  - 3. Smoke Developed, ASTM E 84: Maximum of 450.

## 2.04 FRAMES

- A. Materials shall be free from defects impairing strength, durability, and/or pressed as required for their respective function. Molded work shall have sharply defined profiles and arises, be clean and sharp. Work shall be of proper dimensions to receive work of others. The indicated and specified thicknesses of the metal are minimum.
- B. Gauges for steel used in the work shall be as follows:

Combination Metal Frames and Trim	U.S. Gauge		
Exterior Combination Frames & Trim	No. 12		
Fillers	As Required		
Hardware Reinforcement	Sheet or bar steel		
Butts, Checks, overhead door holders, brackets and pulls	3/16" thick		
Locking Latches	No. 12		
Trim	No. 16		

- C. All steel frames shall be properly framed together with all joints welded and welds ground smooth before galvanizing process.
- D. Steel frame shall be fire rated in accordance with Contract Documents.

# 2.06 STEEL FRAME COATING

- A. Frames shall be manufactured from hot-dipped galvanized steel having an A60 zinc coating confirming to ASTM A924.
- B. Frames shall be painted per specification Section 09900 Painting as exterior metal in color selected be the engineer.

# 2.07 ANCHORS FOR FRAMES

A. Door frames in concrete openings shall be anchored with 4 hex head stainless steel bolts for each jamb and two hex head stainless steel bolts for each head; where lintels occur, machine bolts shall be used. Removable stops shall be installed to cover the bolt heads, the stops to be fastened with counter sunk oval head screws.

# 2.08 FABRICATION AND WORKMANSHIP

- A. All metal work shall be accurately fabricated and neatly assembled and shall be free from dents, tool marks, warpage, buckle or open joints. All lines shall be straight and true to curvatures as required, arises and angles as sharp as practical, moldings true to profile, mitres formed in true alignment and abutting profiles shall intersect accurately.
- B. Molded members and moldings shall be as shown on the Contract Drawings, unless otherwise approved. Stock moulding shall be as shown on the Contract Drawings unless otherwise approved. Stock moldings which closely approximate the contours shown on the Contract Drawings will be accepted.

- C. All items of template hardware, drilling and tapping shall be located by templates so that accurate alignment will be secured. Templates should be located before manufacturing is commenced.
- D. All members shall be accurately fastened together and shall provide rigid construction in the assembled work. Removable members shall be secured with countersunk head tamperproof machine screws not more than twelve (12) inches apart. All connections, except those of removable members shall be welded or interlocked.
- E. All exposed face joints between members shall be continuously welded and dressed smooth and flush to be practically invisible.
- F. Sinkages, cutouts and concealed reinforcement shall be provided as required for the proper installation and attachment of all hardware.
- G. Sinkages shall be provided for butts lock fronts and strikes so that the exposed surfaces of hardware will finish flush with adjacent surfaces

# 2.10 HARDWARE

- A. Provide, in connection with this work, all hardware not requiring special finish such as screws, anchors, braces, bolts, etc., as required to erect this work properly.
- B. Finishing hardware is described elsewhere in these Specifications. The Contractor shall, however, receive, check, store and apply the finishing hardware insofar as it occurs in connection with work under this Section. Protect door knobs by covering with cloth pads securely wired in place and do not apply escutcheons and other trim until directed to do so, by the Engineer.
- C. Specified manufacturer's supplemental and special reinforcement for hinges, surface applied closers, holders, coordinators, stops and strikes shall be manufacturer's standard but not less than specified and recommended for maximum heavy-duty construction.
- D. Contractor shall provide full assembly as required to achieve specified fire rating including removable intermediate mullion with a key system

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## PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. All doors and frames specified herein shall be neatly installed in designated locations indicated on Drawings.
- B. Fixed units shall be securely fastened in place and operative units adjusted to work properly.
- C. Combination frames and trim shall be securely anchored in place with jambs filled solidly with mortar.
- D. Perform all necessary cutting, drilling and fitting for securing work in position including all necessary cutting, drilling and tapping of the work to accommodate the work of other trades. Drilling and tapping for non-template hardware shall be performed at the site.
  - E. Installation shall be performed in strict accordance with Section 06200 Finish Carpentry and these Specifications.

## 3.02 PREPARATION OF EXISTING FRAMES

- A. Remove all oil, grease, dirt, oxide and other foreign material by solvent cleaning the frame.
- B. Prepare a sample area for adhesion testing using a common degreaser such as great lakes extra muscle or equal.
  - a. Follow cleaning solvents manufacturer's instructions for cleaning all frames.

- C. Patch frame as required to cover any holes or thinning material with a steel reinforced epoxy patch material.
  - a. Use power wire brushing, power abrading, power impact, or other power rotary tools to remove all loose mill scale, all loose or non-adherent rust, and all loose paint. Do not burnish the surface.
  - b.Operate power tools in a manner that prevents the formation of burrs, sharp ridges, and sharp cuts.
- D. After cleaning is complete, apply a test patch of primer/paint. Allow paint to dry at least one week before testing adhesion.

# 3.03 PROTECTION AND CLEANING

- A. The Contractor shall provide protection against stains, dirt or damage to the finished installation. The doors shall be adjusted at installation for proper operation. At conclusion of construction, doors shall have any final adjustments made in order to place the doors in perfect operating condition.
- B. Upon completion of the project all finished work of this Section shall be carefully cleaned. Defective finish shall be removed and refinished, and all work left clean and perfect.

# **END OF SECTION**

# SECTION 08330

# OVERHEAD COILING DOORS

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:1. Insulated service doors.
- B. Related Requirements:
  - 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports, door-opening framing, corner guards, and bollards.

## 1.3 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory.
  - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
  - 4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
  - 5. Include diagrams for power, signal, and control wiring.
  - 6. Provide test report validated by an independent testing lab, showing that the air infiltration rate meets the requirements listed in this specification.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

- 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
  - 1. Bottom bar with sensor edge.
  - 2. Guides.
  - 3. Brackets.
  - 4. Hood.
  - 5. Locking device(s).
  - 6. Include similar Samples of accessories involving color selection.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

# 1.5 CLOSEOUT SUBMITTALS

- A. Special warranty.
- B. Maintenance Data: For overhead coiling doors to include in maintenance manuals.
- C. Record Documents.

## 1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

# 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two (2) years from date of Substantial Completion.

## PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
  - 1. Cornell Iron Works, Inc., Thermiser Max<sup>TM</sup>, or approved equal.

# 2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.
- B. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
  - 1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa), acting inward and outward.
- C. Windborne-Debris Impact Resistance: Comply with ASTM E 1996, tested according to ASTM E 1886 for Wind Zone 1 (110 mph) for basic protection.

# 2.3 DOOR ASSEMBLY

- A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
  - 1. Slat material shall be a minimum of 24-gauge galvanized steel with 24-gauge back. Area between the exterior slat and back slat shall be filled with 7/8" of closed cell urethane insulation with a minimum R-value of 8.0. End of alternate slats shall be fitted with nylon endlocks/windlocks.
  - 2. Endlocks shall be interlocking sections of high strength nylon on alternate slats each secured with two, <sup>1</sup>/<sub>4</sub>" rivets. Provide windlocks as required to meet specified wind load.
  - 3. Guides shall be three angle steel, minimum 3/16", channel bolted to wall. Provide windlock bars of same material if required to meet specified wind load. Provide removable guide stoppers to prevent over travel of curtain and bottom bar. Top 16.5" of coil side guide angles shall be removable for ease of curtain installation and curtain service. Provide zirconium treatment followed by a baked-on polyester powder coat, minimum 2.5 mils cured film thickness. Stock color to be chosen by Owner.
  - 4. Brackets: Fabricate from minimum 3/16" steel plates, with permanently sealed ball bearings. Provide zirconium treatment followed by a baked-on polyester powder coat, minimum 2.5 mils cured film thickness. Stock color to be chosen by Owner
  - 5. Counterbalance: Curtain to be coiled on a pipe of sufficient size to carry door load with deflection not to exceed 0.033 inch per foot of door span. Curtain to be properly balanced by heat-treated steel helical springs, oil tempered torsion type. Provide wheel for applying and adjusting spring torque.
- B. Operation Cycles: Door components and operators capable of operating for normal use of up to 20 cycles per day maximum and an overall maximum of 50,000 operating cycles for the life of the door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Air Infiltration: Maximum rate of less than 0.3 cfm/sq. ft. (5.1 L/s per sq. m) at 15 and 25 mph (24.1 and 40.2 km/h) as tested per ASTM E283 validated by an independent testing agency.

- D. Slat Finish: ASTM A 653 galvanized based coating treated with dual process rinsing agents prior to chemical bonding baked-on base coat and baked-on polyester enamel finish coat. Final color to be chosen by Owner from stock colors.
- E. Bottom Bar: Insulated, reinforced extruded aluminum interior face with full depth insulation and exterior skin slat to match curtain material and gauge. Minimum 4" (ht) x 1-1/16" (thickness). Provide air infiltration certification label affixed to bottom bar.
- F. Hood: Minimum 24-gauge galvanized steel with reinforced top and bottom edges. Provide minimum <sup>1</sup>/<sub>4</sub>" steel intermediate support brackets as required to prevent excessive sag.
  - 1. Shape: Round with internal weather strip.
  - 2. Mounting: Face of wall.
  - 3. Finish: ASTM A 653 galvanized base coating treated Provide zirconium treatment followed by a baked-on polyester powder coat, minimum 2.5 mils cured film thickness. Stock color to be chosen by Owner
- G. Locking Devices: Equip door with locking device assembly.
  - 1. Locking Device Assembly: Provide lock through the operator gearing.
  - 2. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
- H. Weather-stripping:
  - 1. Bottom Bar-Sensing/weather edge with neoprene astragal extending the full width of door bottom bar.
  - 2. Guides-Replaceable vinyl strip on guides sealing against fascia side of curtain.
  - 3. Lintel seal-Double brush seal with EPDM sandwiched between two brush seals at door header to impede air flow.
- I. Electric Door Operator:
  - 1. Usage Classification: Standard duty, up to 20 cycles per hour.
  - 2. Operator Location: Front of hood, not to extend above or below the door coil.
  - 3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet (2.44 m) or lower.
  - 4. Motor Exposure: Totally enclosed, non-ventilated, interior.
  - 5. Motor Electrical Characteristics:
    - a. Horsepower: 1/2 hp.
    - b. Voltage: 115-V ac, single phase, 60 Hz for the Maintenance and Potassium Permanganate Buildings.
    - c. Voltage: 460-V ac, three phase, 60 Hz for the Pretreatment Building.
  - 6. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, emergency manual chain hoist and control station. Motor shall be high starting torque, industrial type, protected against overload with an auto-reset thermal sensing device. Primary speed reduction shall be heavy-duty, lubricated gears with mechanical braking to hold the door in any position. Operator shall be equipped with an emergency manual chain hoist assembly that safely cuts operator

power when engaged. A disconnect chain shall not be required to engage or release the manual chain hoist. Operator drive and door driven sprockets shall be provided with #50 roller chain. Provide an integral Motor Mounted Interlock system to prevent damage to door and operator when mechanical door locking. Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door

- 7. Emergency Manual Operation: Chain type.
- 8. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.
- 9. Control Station(s): Interior, surface-mounted with Open/Closed/Stop push buttons, NEMA 1.
- 10. Control Operation
  - a. Momentary Contact to Close: Fail-safe, UL325-2010 Compliant Entrapment Protection for Motor Operation utilizing a 2-wire, E.L.R. electric sensing/weather edge seal extending full width of door bottom bar.
  - b. Sensing/Weather Edge: Automatic reversing control by an automatic sensing switch within neoprene or rubber astragal extending full width of door bottom bar.
  - c. Electric sensing edge device: Provide a wireless sensing edge connection to motor operator eliminating the need for a physical traveling electric cord connection between bottom bar sensing edge device and motor operator.
- 11. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
- 12. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- 13. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).
- 14. Motor Removal: Design operator so motor may be removed without disturbing limitswitch adjustment and without affecting emergency manual operation.
- 15. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.
- J. Locking:
  - Master-keyable cylinder operable from coil side of bottom bar, options for all types of operation. Provide integral motor interlock.
     Standard Morrise Cylinder
    - a. Standard Mortise Cylinder

# 2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

# 2.5 STEEL AND GALVANIZED-STEEL FINISHES

A. Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with the accessibility standard.

## 3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Test door operation both with motor and manual modes. Check to ensure
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

## 3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.
  - 2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
  - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

## 3.5 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
  - 1. Adjust exterior doors and components to be weather resistant.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

# 3.6 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 1. Perform maintenance, including emergency callback service, during normal working hours.

## 3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

# END OF SECTION

## SECTION 08521

# ALUMINUM WINDOWS AND FRAMES

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install and place into satisfactory service all high-performance, thermal-barrier, custom Architectural Grade aluminum windows and frames, and auxiliary system components, of the performance grade specified.

# 1.02 PAYMENT

A. No direct payment will be made for cast stone, accessories, or appurtenances; the cost shall be included in the prices for the Work.

## 1.03 RELATED SPECIFICATIONS

А.	Section 07900		- Caulking and Sealants.
B.	Section 08800		- Glass, Plastic and Glazing
1.04	REFERENCES		
A.	PBC	-	Philadelphia Building Code
B.	ASTM B117	-	Operating Salt Spray Apparatus, Standard Practice for
C.	ASTM B136	-	Stain Resistance of Anodic Coatings on Aluminum, Standard Method for Measurement of
D.	ASTM B137	-	Measurement of Coating Mass Per Unit Area of Anodically Coated Aluminum, Standard Test Method for
E.	ASTM B209	-	Aluminum and Aluminum-Alloy Sheet and Plate, Standard Specification for
F.	ASTM B221	-	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes, Standard Specification for

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G.	ASTM B244	-	Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments, Standard Test Method for
H.	ASTM B584	-	Copper Alloy Sand Castings for General Application, Standard Specification for
I.	ASTM D395	-	Rubber Property-Compression Set, Standard Test Methods for
J.	ASTM D522	-	Mandrel Bend Test of Attached Organic Coatings, Standard Test Methods for
K.	ASTM D523	-	Specular Gloss, Standard Test Method for
L.	ASTM D573	-	Rubber - Deterioration in an Air Oven, Standard Test Method for
M.	ASTM D968	-	Abrasion Resistance of Organic Coatings by Falling Abrasive, Standard Test Method for
N.	ASTM D1308	-	Effect of Household Chemicals on Clear and Pigmented Organic Finishes, Standard Test Method for
О.	ASTM D2000	-	Rubber Products in Automotive Applications, Standard Classification System for
P.	ASTM D2244	-	Calculation of Color Differences from Instrumentally Measured Color Coordinates, Standard Test Method for
Q.	ASTM D2247	-	Testing Water Resistance of Coatings in 100% Relative Humidity, Standard Practice for
R.	ASTM D3363	-	Film Hardness by Pencil Test, Standard Test Method for
S.	ASTM D4213	-	Evaluating Degree of Chalking of Exterior Paint Films, Standard Test Methods for
Τ.	ASTM E283	-	Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Windows Under Specified Pressure Differences Across the Specimen, Standard Test Methods for

U.	ASTM E329	-	Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction, Standard Specification for		
V.	ASTM E330	-	Structural Performance of Exterior Windows, Curtain Walls, and Windows by Uniform Static Pressure Difference, Standard Test Methods for		
W.	ASTM E331	-	Water Penetration of Exterior Windows, Curtain Walls, and Windows by Uniform Static Air Pressure Difference, Standard Test Method for		
X.	AA	-	The Aluminum Association Incorporated, American National Standard Alloy and Temper Designation Systems for Aluminum		
Y.	AA	-	The Aluminum Association Incorporated, Designation System for Aluminum Finishes		
Z.	American Architectural Manufacturers Association and the Window and Door Manufacturers Association, AAMA/NWWDA, 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors				
AA.	American Architectural Manufacturers Association, AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Glass Doors				
BB.	American Architectural Manufacturers Association, AAMA 800 - Voluntary Specifications Test Methods for Sealants				
CC.	American Architectural Manufacturers Association, AAMA 910 - Voluntary 'Life Cycle'/Specifications and Test Methods for Architectural Grade Windows and Sliding Glass Doors				
DD.	American Architectural Manufacturers Association, AAMA 1503.1 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections				
EE.	American Society of Civil Engineers, ASCE 7 - Minimum Design Loads for Buildings and Other Structures				
FF.	Steel Structures Painting Council, SSPC Paint 12 - Paint Specification No. 12: Cold- Applied Asphalt Mastic (Extra Thick Film)				
GG.	Federal Specification, FS RR-W-365: Wire Fabric (Insect Screening)				

# 1.05 SYSTEM DESCRIPTION

A. This Section describes exterior, high-performance, minimum 3-1/4-inch frame depth, factory-fabricated and factory-glazed, aluminum windows with integral structural polyurethane thermal-breaks and true divided muntins complying with the requirements of AAMA/NWWDA 101/I.S. 2 - Architectural Performance Class and Section 4 - Optional Performance Grades, all with Architectural Class I anodized finish and fabricated as required to resist specified loadings, and resistance to air and water penetration specified and in accordance with the requirements of governing authorities having jurisdiction; associated high-performance operating hardware, auxiliary system items, accessories, fasteners and similar items for completely functioning systems.

# 1.06 DESIGN REQUIREMENTS

- A. Standards:
  - 1. Comply with applicable standards and recommendations by AA, AAMA, and ASCE, except to the extent more stringent requirements are specified or required by governing authorities having jurisdiction at the Site.
  - Comply with AAMA/NWWDA 101/I.S.2 including "non-mandatory" Appendix B, C, and D except where more stringent Wind Velocity Maps are included in ASCE 7 or other governing authorities having jurisdiction.
- B. Modifications: Aluminum window and frame requirements shown are intended to establish basic dimensions of units, modules, profiles, mullion depths, sight lines, support locations of members and the visual design intention. Within these limitations Contractor shall be responsible for the structural adequacy, weather resistance, thermal and condensation resistance, and the detailing and fabrication of all aluminum window and frame system, including anchorage, and to make whatever modifications of, and additions to, the details as may be required to fulfill the minimum performance requirements of AAMA Optional Performance Grade and the requirements of non-mandatory Appendixes specified, at no additional expense to the Owner. Maintain the visual design concept as shown, including member sizes, profiles, support locations and alignment of components.
- C. Performance Criteria:
  - 1. General:
    - a. The design wind load pressures for aluminum windows and frames shall be determined in accordance with analytical procedures established by ASCE 7 and shall take into consideration the load magnification effect caused by gusts in resonance with along-wind vibrations of flexible building and other structures. Professional engineer who prepares, signs, 08521 - 4

stamps its seal on Working Drawings submitted to Engineer shall take into consideration the need for wind-tunnel tests in order to include the effects of across-wind loading, vortex shedding or instability due to galloping or flutter of Project locations where channeling effects or buffeting in the wake of upwind obstructions warrant special consideration, or for those buildings or structures having unusual geometric shapes or response characteristics.

- b. On Projects where the professional engineer believes such conditions may exist, provide Engineer and the Owner with recommendations for further testing required to establish the design criteria for aluminum windows and frames. Identify all costs associated with such testing. Do not proceed with testing until given written approval by the Owner.
- c. After carefully reading system performance criteria and other requirements of the Specification, professional engineer to whom design of the aluminum window and frame system is delegated shall make all requests for clarification of requirements that may be necessary in writing, to Engineer.
- 2. Loading Analysis Criteria:
  - a. Wind Loads: Provide structural analysis, calculations and details indicating compliance with the NYCBC, ASCE 7-93 and ASCE 7-88, based on project location, heights and wind speed of 115 miles per hour (MRI 100 years), Ground Roughness (Exposure) Category D;
    Importance Factor based on ASCE 7 Category IV Essential Facility, and corresponding formula coefficients, to determine velocity pressures.
  - Seismic Loads: Provide aluminum window and frame system, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of the NYBC or ASCE 7, Section 9, whichever are more stringent.
  - c. Dead Loads: Provide aluminum window and frame system components that do not deflect an amount that will reduce glazing bite below 75 percent of required glazing bite dimension when carrying full dead load. Provide minimum of 1/8 inch clearance between members and top of fixed panels, glazing, or other fixed part immediately below. Provide a minimum of 1/16 inch clearance between members and operable windows and doors.

- d. Live Loads: Provide aluminum window and frame system, including anchorage, that accommodates supporting structure's deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
- e. Deflection of Framing Members, ASTM E330: Maximum deflection of L/175 at center of single span when subjected to both positive and negative applicable design pressures, with no permanent deformation or damage of any main frame, sash, panel or sash member in excess of 0.2 percent of the span when the load is removed.
- f. Provide complete loading analysis performance calculations and Working Drawings for all aluminum window and frame system components prepared, signed and stamped with the seal of a licensed professional engineer licensed to practice in the State of New Hampshire and recognized as an expert in the specialty involved.
- 3. Water and Air Infiltration Tests: A 5 foot-10 inch by 3 foot-1 inch window with a 4 foot-10 inch by 2 foot-10 inch minimum vent size shall comply with the following:
  - a. Static Test Pressure Water Penetration Testing, ASTM E331 and AAMA 910: After the AAMA 910 life cycle test, no evidence of uncontrolled water penetration to the interior of the building through the aluminum windows and frames when subjected to a static air pressure difference of 12 pounds per square foot.
  - b. Air Infiltration Testing, ASTM E283: After the AAMA 910 life cycle test, maximum air infiltration of 0.08 cubic feet per minute per square foot, when subjected to a static air pressure difference of 6.24 pounds per square foot.
- 4. Aluminum Window Classification (Grade): Based on AAMA/NWWDA 101/I.S.2, provide the following:
  - Performance Class: In addition to General Requirements of Section 1, Gateway Performance Requirements established in Table 2.1, the Specific Performance Requirements of Section 2.2 and the Material and Component Requirements of Section 3, provide Optional Performance Class - Architectural AW, for all aluminum windows and frames.
  - b. Performance Grade: As a minimum, provide Optional Performance Grade 65 aluminum windows and frames tested for structural test

pressure of 1.5 times design pressure, unless structural calculations based on performance criteria specified identifies the need for more stringent optional performance grade for any area of the Project.

- c. Product Type: Provide AP Projected Window, F Fixed Window, and combination of both as shown on the Contract Drawings.
- 5. Provide design, detailing and fabrication based on the most stringent combination of standards, testing and engineering analysis specified.
- 6. Thermal Movements: Aluminum window and frame system, including anchorage, shall withstand thermal expansion and contraction movements of system and supporting elements resulting from not less than an ambient temperature change of 120 degrees F, which may cause a surface curtain wall material temperature change of 180 degrees F. Limit the deflection as for wind pressure loading. Thermal movements shall not cause permanent deformation, cracking, opening of joints, undue stress on fasteners, or other effects detrimental to weathering performance.
- 7. The design of the aluminum window and frame system, including anchorage, as shown and specified is intended to prevent excessive condensation on the indoor faces of the work, with the heating and ventilating system in operation, and under the following conditions. Provide aluminum window and frame system design, detailing and fabrication in compliance with AAMA 1503.1 that achieves and maintains this design intention:
  - a. Outdoor: Ambient temperature 0 degrees F; 15 mph wind.
  - b. Indoor: Ambient temperature of 75 degrees F; relative humidity of 25 percent.
  - c. Excessive condensation is defined as visible water.
  - d. Condensation Resistance Factor: 58 minimum for frame.
- 8. Provide internal drainage to lead all infiltrated water to the exterior through weep slots.
- 9. Testing: Wherever manufacturer's standard window units comply with the requirements and have been tested in accordance with the specified tests, provide certification by the manufacturer of compliance with such tests; otherwise, perform the required tests through a AAMA accredited and recognized testing laboratory or agency and provide certified test results.

- D. Mock-Up:
  - 1. Before proceeding with final purchase of materials and fabrication of aluminum window and frame components, prepare a mock-up at the Project Site, including all components shown on Working Drawings approved by Engineer, indicating the final relationship and configurations of the various parts and components and the quality of workmanship that shall be achieved in the work.
  - 2. Install mock-up in existing opening, in a location selected by Engineer, and part of an area to receive the work of this Section.
  - 3. Include all items that are part of the aluminum window and frame system including anchorages, insulating glass and dry-seal joint system.
  - 4. Incorporate materials and methods of fabrication and installation that are identical with Project requirements. Accepted mock-up may be incorporated into the finished work.
  - Build as many mock-ups as required to obtain Engineer's acceptance. Disassemble rejected mock-ups and remove all components from Site. Do not incorporate rejected mock-up components into the work.
  - 6. Aluminum window and frame installation that proceeds without an approved mock-up shall be stopped, and a mock-up prepared for Engineer's approval.

# 1.07 SUBMITTALS

- A. Samples: Submit for approval the following:
  - 1. Each required aluminum finish, on 12-inch long extrusions and 6-inch square sheets, of the alloys to be used for the work.
  - 2. Establish samples of the required finish, for Engineer's acceptance, prior to fabrication. Where normal color and texture variations are to be expected, include three or more units in each sample, to show the range of such variations. Provide minimum possible color range variation. Engineer reserves the right to reject material finishes with objectionable variations from the established samples.
  - 3. Each component and cut-away corner of each window complete with finish and operating hardware, 2 foot-0 inches long by 2 foot-0 inches wide, minimum, before Engineer's visit to manufacturer's facility for approval of actual aluminum window and frame systems to be incorporated into this Project.

- 4. Engineer reserves the right to require samples demonstrating design, detailing and fabrication techniques and workmanship for each system auxiliary component and accessory, before fabrication proceeds.
- 5. One of each type fastener employed, with statement of intended use.
- 6. Samples will be reviewed by Engineer for color, finish and workmanship only. Compliance with all other requirements is the responsibility of Contractor.
- B. Working Drawings: Submit for approval the following:
  - 1. Window location chart and schedules of typical aluminum window and frame elevations showing all configurations of operators, sash and muntins, custom panning and other cladding and flashing, fully dimensioned and coordinated with actual measurements obtained at the Project Site and required operating hardware and other auxiliary system components and accessories. Indicate clearly, and in a manner that is highlighted to Engineer, all deviations from the Contract Documents.
  - 2. Details of each aluminum window and frame system detailing conditions at openings, details of construction, location and installation requirements of operating hardware and reinforcements, and details of joints, connections and every typical composite member. Show all window and frame reinforcements including welds, plate lengths, locations and gauges for each component of operating hardware and internal reinforcement. Indicate metal thicknesses; types of fasteners and support locations; and erection tolerances.
  - 3. Copies of manufacturer's specifications, roughing-in diagrams, technical data and installation instructions for each aluminum window and frame system. Transmit copy of each instruction to the installer. Provide setting drawings, templates, instructions and directions for installation, operating instructions and maintenance data.
  - 4. Maintenance Manual (O&M Manual): Upon completion of the work, furnish copies of detailed maintenance manual including the following information:
    - a. Product name and number.
    - b. Name, address and telephone number of manufacturer and local distributor.
    - c. Detailed procedures for routine maintenance and cleaning.

- d. Detailed procedures for light repairs such as dents, scratches and staining.
- 5. Design calculations verifying compliance with performance criteria specified, acceptable to governing authorities having jurisdiction, prepared, signed and stamped with the seal of a registered professional engineer, as specified.
- C. Certificates: Submit for approval the following:
  - 1. Copies of material purchase receipts indicating types of materials purchased and incorporated into this Project, signed by a certified and licensed Notary Public, verifying that material purchased for the work complies with material designations specified as confirmed by approved Working Drawings.
  - 2. Proof of testing laboratory AAMA certification and copies of testing agencies background and experience in preforming similar tests to those specified.
  - 3. Registered professional engineer who prepares, signs and stamps its seal shall provide a written statement confirming responsibility for the design and attest that the work prepared meets the Specifications and the requirements of governing authorities having jurisdiction, and conforms to the prevailing standards of practice for the type of work specified.
- D. Test Reports: Submit for approval the following:
  - 1. Valid AAMA "Notice of Product Certification" indicating that the aluminum windows and frames to be provided for this Project conform to AAMA/NWWDA 101 I.S.2.
- E. Warranties: Submit for review copies of written warranties agreeing to replace aluminum window and frame system components that fail to perform as specified.

# 1.08 QUALITY ASSURANCE AND QUALIFICATIONS

- A. Installer Qualifications:
  - 1. Engage a single installer skilled, trained and with successful experience in the installation of aluminum window and frame systems and with specific skill and successful experience in the erection of the types of units and components required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of work. Submit names and qualification to Engineer along with the following information on a minimum of three successful projects:

- a. Names and telephone numbers of owner, architects or engineers responsible for projects.
- b. Approximate contract cost of the aluminum window and frame system.
- c. Size of area installed.
- 2. Provide aluminum finish applicators experienced in the handling and application of the finish coatings specified, acceptable to the coating or aluminum manufacturer.
- B. Professional Engineer:
  - 1. Engage a registered professional engineer licensed in the State of Pennsylvania and experienced in providing engineering services of the kind indicated.
  - 2. Responsibilities include, but are not necessarily limited to, the following:
    - a. Carefully reviewing system performance and design criteria stated in the Contract Documents.
    - b. Preparing written requests for clarification or interpretation of performance or design criteria for submittal to Engineer by Contractor.
    - c. Preparing, or supervising the preparation of design calculations, and reviewing and approving related Working Drawings prepared by the aluminum window and frame system manufacturer prior to submission to Engineer; testing plan development, and test-result interpretations; and providing comprehensive engineering analyses verifying compliance of the system with the requirements of the Contract Documents.
    - d. Signing and sealing all calculations and engineering analyses.
    - e. Certifying that:
      - It has performed the design of the system in accordance with the performance and design criteria stated in the Contract Documents, and
      - 2) The said design conforms to all applicable local, state and federal codes, rules and regulations and to the prevailing standards of practice.
- C. Erection Tolerances:

- 1. Limit variations from plumb, level or dimensioned angle to the following:
  - a. 1/8-inch maximum deviation in 10 foot vertical or angular run, and in 20-foot horizontal runs.
  - b. 1/4-inch maximum deviation in 40-foot runs, all directions.
- 2. Limit variations from theoretical member locations shown, based on established floor lines and column lines, including variations from plumb and level, to the following:
  - a. 3/8-inch total maximum deviation for members at all locations.
  - b. 1/8-inch maximum change in deviation for members for 10-foot runs, all directions.
- 3. Limit offsets in end-to-end and edge-to-edge alignments of adjoining and consecutive members, which form planes, continuous runs and profiles, to the following:
  - a. 1/16-inch maximum offset in flush alignment, including members which are to be 1/2-inch or less out-of-flush, and including members which are separated 2-inches or less by a reveal or protrusion in the plane of the aluminum windows and frames.
  - b. 1/8-inch maximum offset in alignments which are to be out-of-flush by more than 1/2-inch or separated by a reveal or protrusion of more than 2-inch width.

## D. Source Quality Control:

- 1. Provide engineering design calculations and details prepared, signed and stamped with the seal of a registered professional engineer licensed to practice in the State of New Hampshire and recognized as an expert in the required work.
- 2. Engineer reserves the right, in consultation with the Owner, to visit the aluminum window and frame manufacturer's facilities and determine if the proposed manufacturer's facilities are acceptable. Contractor shall include as part of the work arranging, and all costs for, three visits by four representatives of the Owner and Engineer to visit the manufacturer's facilities for the purpose of approving manufacturer's fabricating techniques and completed aluminum window and frame systems components proposed for installation as part of the work of this Project, unless additional visits are required to determine compliance with Contract requirements.

- 3. Where required by Engineer in order to verify types of metal used in the Work, provide metallurgy laboratory analysis of system component materials.
- 4. Obtain all aluminum window and frame system components, operating hardware, custom panning, flashing and accessories from the same manufacturer.
- 5. Engage a manufacturer who requires that a technical representative be present at the time of mock-up preparation and start of installation and who requires that the completed work be inspected by a technical representative of the aluminum window and frame manufacturer.
- 6. Provide aluminum windows and frames labeled with AAMA or WDMA Hallmark labels.
- 7. Factory and Site Quality Control Procedures: Provide schedules, details, isometrics or explanatory sketches cross-referenced to Working Drawings as required to ensure that both fabrication and installation are in accordance with the Contract Documents. Factory quality control procedures shall include, but not necessarily be limited to, the following:
  - a. Finishing Fabrication: Procedures and controls for tolerances, joinery, sleeves, reinforcement gussets and finishes.
  - b. Finish and Match: Procedures required for the match of exposed surfaces.
  - c. Assembly and Pre-assembled Units: Welds, fasteners, glass, sealants, gaskets and separators.
  - d. Sealing and Pre-assembled Units: As required by the sealant manufacturer. Include sealant documentation as part of Working Drawing submissions.
  - e. Material Handling: Procedures, care, protection, shipping, storage and other requirements to insure safe arrival and handling of materials.
- E. Testing Agency Qualifications: To qualify for approval, an independent testing agency shall demonstrate to Engineer's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the work in accordance with ASTM E329 and AAMA qualifications.

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## 1.09 DELIVERY, STORAGE AND HANDLING

### A. Delivery of Materials:

- 1. Deliver aluminum window and frame system materials, components and accessories dry and undamaged, with manufacturer's protective wrapping intact.
- 2. Deliver aluminum window and frame system components in clearly and legibly labeled with AAMA designations and in undamaged cartons to provide protection during transit and storage.
- 3. Inspect aluminum window and frame system components upon delivery for damage. Remove and replace all damaged items.
- B. Storage of Materials:
  - 1. Do not store aluminum window and frame system components in contact with concrete or other materials that might cause corrosion or staining.
  - 2. Store aluminum window and frame component under cover and in an area protected from the weather and with good air circulation around each piece. Avoid the use of non-vented plastic or canvas shelters which could create a humidity chamber. Immediately remove wrapping if it becomes wet.
  - 3. Provide a 1/4-inch space between aluminum window and frame system components in order to promote air circulation.

# C. Handling of Materials:

- 1. Do not subject aluminum window and frame components to bending or stress.
- 2. Do not damage edges or handle material in a manner that will cause scratches, warps or dents.
- 3. Handle material using appropriate hand wear and tools that do not damage finish of items to remain exposed.

# 1.10 PROJECT CONDITIONS

- A. Protection: Provide continuous protection of materials against damage primarily by storing materials under cover and above ground and away from other construction traffic.
  - 1. Do not install aluminum windows and frames until all work that could damage aluminum window and frame systems has been completed.

- 2. Provide temporary closures until construction sequencing allows installation of aluminum window and frame systems at a time when the systems will not be subject to construction damages of any kind.
- B. Scheduling and Coordination:
  - 1. Review installation procedures under other Sections and coordinate them with the work specified herein.
  - 2. Notify other Contractors in advance of installation to provide them with sufficient time for the installation and coordination of interrelated items that are included in their Contracts and that must be installed in conjunction with the work included in this Section.
  - 3. Schedule the arrival of aluminum window and frame components and accessories to minimize the time they are stored at the Site before installation.
  - 4. Do not proceed with the installation of aluminum window and frame system until Contractor can provide finished work complying with all requirements of the Specifications.
  - 5. Where aluminum window and frame systems require the building-in of plates, inserts and other items, furnish required inserts to avoid delay in the work of other trades. Provide setting drawings, templates, and directions for installation of plates, inserts and anchors, required by the work of this Section but installed under other Sections.
  - 6. Coordinate with other work by furnishing Working Drawings, inserts and similar items at the appropriate times for proper sequencing of construction without delays.
- C. Field Measurements:
  - 1. Verify dimensions in areas of installation before fabrication and indicate dimensions on Working Drawings. Coordinate fabrication schedule with construction progress to avoid delay.
  - 2. Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and equipment locations to ensure actual dimensions correspond to dimensions established for aluminum window and frame system work.

## 1.11 SPECIAL WARRANTY PROVISIONS

- A. General Warranty: The special warrantees specified in this Article shall not deprive the Owner of other rights or remedies the Owner may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under the Contract Documents.
- B. Special Warrantees: Provide the following:
  - 1. Provide written warranty, signed by the manufacturer and running to benefit of the Owner, agreeing to replace, for a period of ten years from the date of Substantial Completion, aluminum window and frame finish that shows excessive wear, as specified, and stating that the coil and spray coated polyvinylidene fluoride-based coating specified complies with the following:
    - a. Coating shall not spall, check, craze, peel or otherwise lose adhesion for a period of ten years from the date of installation, to the extent that such shall create unsightly conditions, impair the intended architectural qualities of the building or otherwise fail to meet performance criteria specified, when viewed from a distance of 5 feet - 0 inches from the item.
    - b. In the event that the coil coated polyvinylidene fluoride-based coating fails to meet the specified standards the manufacturer shall, at its own expense, replace or field paint, at the discretion of the Owner, all areas affected by the failure. In the event that repainting is selected, it shall be done at mutually agreeable intervals throughout the term of the warranty.
    - c. The warranty shall not apply where any failure is caused by accidents, or any external conditions or forces beyond the control of the manufacturer.
  - 2. Provide written warranty, signed by the manufacturer and running to benefit of the Owner, agreeing to replace aluminum window and frame system components that fail in material or workmanship within three years of the date of Substantial Completion. Failure of materials or workmanship shall include, but is not limited to, leakage or air infiltration, deflections, or deterioration of metal in excess of normal weathering, and in excess of performance criteria specified; and defects in, and improper arrangement of, the various parts, accessories, weatherstripping, and other components of the system.

## PART 2 PRODUCTS

# 2.01 PRODUCTS AND MANUFACTURERS

- A. Manufacturers shall be as list below or as approved as equal:
  - 1. Kawneer Co. 5500 ISOWEB hopper style to meet specified size and performance requirements Open in casement Windows 4 inch frame with built in window opening stop

171 Hymus Blvd.. Point Claire, Quebec H9R 1E9

Phone: 514 694 3151

- 2. Efco Corporation XTherm Series 325X single or split to meet specified size and performance requirements Open out casement Windows 3 1/4 inch frame with built in window opening stop
- 3. Or equal

# 2.02 MATERIALS

- A. Extrusions:
  - 1. Provide extruded, double tubular aluminum mullions, muntins, pressure plates, snap covers, two-piece snap trim, sills and glazing stops and trim, equal to ASTM B221, 6063-T5 alloy and temper as recommended by the aluminum window and frame manufacturer to comply with the requirements of performance, fabrication, application of finish and control of color for finishes.
  - 2. Provide extrusions within commercial tolerances, formed true to details shown and free of defects impairing strength, durability, color or finish.
- B. Sheets:
  - 1. Provide aluminum sheet closures, auxiliary components and accessories, equal to ASTM B209, 5005 alloy for exposed sheet and 3003 alloy for non-exposed sheet or as recommended by the aluminum window and frame manufacturer to comply

with the requirements of performance, fabrication, application of finish and control of color for finishes.

- 2. Provide thicknesses as follows:
  - a. Principal Formed Sheet Members: 0.125-inches minimum thickness.
- 3. Provide sheet free of defects impairing strength, durability, color or finish.
- C. Fasteners: Epoxy adhesives or non-magnetic stainless steel, guaranteed by the manufacturer to be non-corrosive and compatible with the aluminum window members, trim, hardware, anchors and other components of the window units.
  - 1. Do not use exposed fasteners, except where unavoidable for the application of operating hardware. Match the finish of the metal surrounding fastener, unless otherwise specified.
  - 2. Provide Philips flat-head machine screws for exposed fasteners, unless otherwise specified.
- D. Thermal Separators: Integral, structural polyurethane.
- E. Glass and Glazing Accessories: As specified in Section 08800.
- F. Wire Fabric Insect Screen and Frames: Provide insect screen and frames for each operable sash.
  - 1. Provide 18 by 16 mesh of 0.009-inch diameter stainless steel wire, complying with FS RR-W-365, Type VI, mounted with polyvinylchloride splines into 5/16-inch by 1-1/2-inch by 0.050-inch extruded tubular aluminum frames with finish to match window in color and performance; corners mitered, gusset reinforced and crimped.
  - 2. Provide insect screens that mount into exterior or interior extruded tracks using two stainless steel leaf springs.
  - 3. Where windows swing outward, and insect screens are mounted on interior, provide sliding wickets framed as for fixed insect screens and trimmed for a tight fit and durability during operation.
- G. Weather-stripping: Provide double rows of manufacturer's replaceable EPDM stripping complying with ASTM D2000, secured in extruded aluminum ports at all vent perimeters.
- H. Brackets, Gussets, Reinforcements and Splice Clips:

- 1. Provide aluminum brackets and reinforcements wherever possible. Where steel units are required for higher strength or other unavoidable necessity, hot-dip galvanize the pieces after fabrication, with 2.0 ounces zinc coating, complying with General Specification 05081.
- 2. Where fasteners screw anchor into aluminum less than 0.125-inches thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, noncorrosive, pressed-in, spline grommet nuts.
- I. Auxiliary Components and Accessories:
  - 1. Provide extruded aluminum, nominal 0.062-inch thick wall, with exposed surfaces finished to match aluminum windows and frames in color and performance; concealed fasteners; all required weather-seals; designed for unrestricted expansion and contraction.
  - 2. Provide complete selection of exterior wrap-around custom panning accessories; two-piece head and jamb receptors; sills and subsills with thermal-breaks, anchors and end dams; two-piece interior snap trim and clips; interior glazing adapters, expanders, receptors, stools and other trim necessary for a complete installation, as determined by Engineer.
  - 3. Provide intermediate, thermally broken, expansion-type, vertical and horizontal integral mullions (stack; offset stack; and three-piece) and mullion covers in configurations and types as required for combinations of windows and sizes of window areas shown.
- J. Bituminous Paint: Cold applied asphalt mastic complying with SSPC-Paint 12, compounded for 30-mil thickness per coat.
- K. Expansion Anchor Devices: Where inserts have not been provided in supporting concrete structure, provide drilled-in expansion bolt anchors of either toothed-stainless steel or lead shield design.

## 2.03 WINDOW OPERATION

- A. General:
  - 1. Projected Windows: Swing-in or swing-out as shown, side-hinged vent sash and fixed window combinations as shown, provide operable sash with two balance-support arms, pivots with friction shoes and two cam handle operators; top mount cam handles if required for pole operation.
- B. Operating Hardware:

- 1. Strike and Cam: White bronze, UNS C86200 cast white manganese bronze complying with ASTM B584.
- 2. Concealed Stainless Steel Hinges: Heavy-duty four-bar hinges with nonmagnetic stainless steel balance arms. Provide sliding pivots with nylon frictionadjustable shoe in a stainless steel track.
- 3. Limit Opening Device: Provide stainless steel adjustable hold-open limit arm with release key for all project-out operable windows.

# 2.04 FABRICATION

- A. General: Provide specified manufacturer's standard fabrication and accessories, except to the extent more stringent requirements are specified. Include complete system for assembly of components and anchorage of window units. Include all components of glass and factory-applied glazing system.
- B. Sizes and Profiles: The required sizes for window units and the profile requirements are shown on the Contract Drawings. The details shown are based upon standard details by one manufacturer. It is intended that similar details by other manufacturers will be acceptable, provided they comply with the size requirements, performance requirements and with minimum/maximum profile requirements shown and specified.
- C. Frame and Vent: All members shall be double tubular; corners mitered, double-gusset reinforced, factory-sealed with sealant complying with AAMA 800 and crimped.
- D. Water Control: Provide pressure equalization gasket on vent interior; vent and frame weeps, foam baffles, and exterior hoods to allow water to drain by gravity and resist wind-blown rain.
- E. Provide field-mounted drip caps on vent exteriors above frame sill.
- F. Operating Hardware:
  - 1. Cut, reinforce, drill and tap frames and windows as required to receive operating hardware. Comply with manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
  - 2. Design, detail and fabricate reinforcement for maximum heavy-duty use, consisted with required guarantee period and performance criteria specified.
- G. Provide extruded aluminum true-divided muntins, and custom panning shapes as shown and specified.

### 2.05 ALUMINUM WINDOW AND FRAME COATINGS

- A. General:
  - 1. After fabrication of the aluminum windows and frames, prepare surfaces for finishing in accordance with recommendations of the aluminum producer and the finisher or processor.
  - 2. Finish all components of each assembly simultaneously so as to attain complete uniformity of color.
  - 3. Sequence the finishing and processing of materials in a predetermined bay-by-bay, floor-by-floor, wall-by-wall plan, which will minimize color and texture differences between adjacent components.
  - 4. All internal and external members of aluminum windows shall be anodized, as specified.
- B. Aluminum Anodic Coating:
  - 1. General:
    - a. Adjust and control the direction of mechanical finishes specified to achieve the best overall visual effect.
    - b. Color and Texture Tolerance: Provide uniform color and continuous mechanical texture for all aluminum components. Engineer reserves the right to reject aluminum fabrications at any time because of color or texture variations that exceed the range of variations established by means of range samples approved by Engineer.
    - c. Anodize all aluminum components specified to receive this finish, whether or not exposed in the finished work.
  - 2. Mechanically finish aluminum by wheel or belt polishing with aluminum oxide grit of 180 to 220 size, using peripheral wheel speed of 6,000 feet per minute; Aluminum Association Designation M32 Medium Satin Directional Texture.
    - a. Hand Rubbed Finish: Where required to complete the work and provide uniform, continuous texture, provide hand rubbed finish to match medium satin directional texture specified in order to even out and blend in satin finishes produced by other means.

- 3. Provide non-etching chemical cleaning by immersing the aluminum in an inhibited chemical solution, as recommended by the coating applicator, to remove all lard oil, fats, mineral grease and other contamination detrimental to providing specified finishes.
  - a. Clean and rinse with water between steps as recommended by the aluminum manufacturer.
- 4. Exposed Aluminum Anodic Coating: Provide anodic coatings as specified which do not depend on dyes, organic or inorganic pigments, or impregnation processes to obtain color. Apply coatings using only the alloy, temperature, current density and acid electrolytes to obtain specified colors in compliance with the designation system and requirements of the Aluminum Association. Comply with the following:
  - a. Provide Architectural Class I high density anodic treatment by immersing the components in a tank containing a solution of 15 percent sulfuric acid at 70 degrees F with 12 amperes per square foot of direct current for minimum of sixty minutes
  - b. Provide the following physical properties, as verified by independent laboratory testing procedures, performed by a laboratory acceptable to Engineer, as specified:
    - 1) Anodic Coating Thickness, ASTM B244: 0.7-mils minimum.
    - 2) Anodic Coating Weight, ASTM B137: 32-mg/sq. in. minimum.
    - 3) Resistance to Staining, ASTM B136: No stain after 5 minutes dye solution exposure.
    - 4) Salt Spray, ASTM B117: 30,000 hours exposure with no corrosion or shade change.
  - c. Anodization Tests: Prepare samples and perform tests on each rack load for ASTM B136 and ASTM B244 compliance, and each production shift for ASTM B137 compliance during the processing, to verify compliance with specified physical properties. Include coupons in each rack load of production material; retain samples and carefully record test date and area of building wall to receive the corresponding materials.
- 5. Seal finished anodized coatings using deionized boiling water to seal the pores and prevent further absorption.

- 6. Product and Manufacturer: Provide one of the following:
  - a. Alumilite Dark Bronze Anodized by Alcoa, Incorporated to match existing window color at each building location.
  - b. Or approved equal.

#### PART 3 EXECUTION

#### 3.01 INSPECTION

- A. Contractor shall examine the alignment of substrates and the sequence of work before erection of the custom aluminum window and frame systems work begins and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the custom aluminum window and frame systems work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.
- B. Custom aluminum window and frame systems work shall not be installed when there is no assurance of adequate, long term protection by Contractor.

#### 3.02 INSTALLATION

- A. All windows shall be installed by factory-trained erectors in strict accordance with installation data provided by approved Working Drawing submittal, and the requirements of these Specifications.
- B. Do not install component parts that are observed to be defective in any way, including warped, bowed, dented, abraded and broken members, and including damaged glass.
- C. Do not cut, or trim, component parts during erection, in a manner that would damage the finish, decrease the strength, or result in a visual imperfection or a failure in performance of the custom aluminum window and frame systems. Return component parts which require alteration to the shop for refabrication, if possible, or for replacement with new parts.
- D. Install component parts level, plumb, true to line and with uniform joints and reveals. Provide required support secured to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers. Use erection equipment that will not mar or stain finished surfaces, and will not damage the component parts.
- E. Apply a bituminous coating of approximately 30-mil dry film thickness, or other permanent dielectric separator, on concealed contact surfaces of dissimilar materials before installation, wherever there is the possibility of corrosive or electrolytic action.

- F. Apply sealant in accordance with manufacturer's written recommendations at joints, wipe off excess and leave exposed sealant surface clean and smooth.
- G. Anchor components parts securely in place as shown, by bolting, or other permanent mechanical attachment system, which will comply with performance requirements and permit movements which are intended or necessary.

### 3.03 FIELD QUALITY CONTROL

- A. Test installed units in conformance with AAMA 502 for air and water infiltration with the window manufacturer and the Owner present.
- B. Select test units as directed by the Engineer and use an AAMA-accredited laboratory provided by Contractor.

# 3.04 PROTECTION

- A. Advise Contractor of protective treatment and other precautions required through the remainder of the construction period, to ensure that window units will be without damage or deterioration, other than normal weathering at time of Final Acceptance.
- B. Contractor shall advise Engineer, in writing, of protection and surveillance requirements that Contractor shall provide at no additional expense to the Owner, to ensure that aluminum windows and frame system will be without damage or deterioration at the time of Final Acceptance by the Owner.
- C. Where protective coating has been supplied, remove coating completely immediately before installation and when construction activities no longer requires its retention.

### 3.05 ADJUSTMENT

- A. All windows shall be adjusted for smooth operation and weathertight closure providing a tight fit at contact points and at weather-stripping after installation is complete and readjusted when necessary prior to Substantial Completion.
- B. At the completion of the work, restore adjacent work, marred by the work of this Section, to an undamaged and clean condition.
- C. Adjacent work that has been physically damaged, or that does not respond adequately to cleaning, shall be replaced with new materials at no additional expense to the Owner.

# 3.06 CLEANING

A. Clean aluminum surfaces immediately after installation, exercising care to avoid damage of finish. Lubricate hardware and other moving parts.

- B. Maintain the aluminum window and frame systems in a clean condition throughout the construction period, so that they will be without any evidence of deterioration or damage, other than the effects of normal weathering, at the time of Final Acceptance.
- C. Select methods of cleaning that will promote the achievement of uniform appearance and stabilized colors and textures for materials that weather or age with exposure.

## **END OF SECTION**

### SECTION 08710

### FINISH HARDWARE

### PART 1 - GENERAL

### 1.1 SUMMARY:

- A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.
  - 1. Door hardware for steel (hollow metal) doors.
  - 2. Door hardware for FRP doors.
  - 3. Keyed cylinders as indicated.

## B. Related Sections:

- 1. Division 8: FRP Doors
- 2. Division 8: Hollow Metal Doors and Frames
- C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.
  - 1. Builders Hardware Manufacturing Association (BHMA)
  - 2. NFPA 101 Life Safety Code
  - 3. NFPA 80 -Fire Doors and Windows
  - 4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
  - 5. UL10C Positive Pressure Fire Test of Door Assemblies
  - 6. ANSI-A117.1 Accessible and Usable Buildings and Facilities
  - 7. DHI /ANSI A115.IG Installation Guide for Doors and Hardware
- D. Intent of Hardware Groups
  - 1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
  - 2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.
- E. Allowances
  - 1. Refer to Division 1 for allowance amount and procedures.
- F. Alternates
  - 1. Refer to Division 1 for Alternates and procedures.

- 1.2 SUBSTITUTIONS:
  - A. Comply with Division 1.

#### 1.3 SUBMITTALS:

- A. Comply with Division 1.
- B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.
- C. Product Data: Manufacturer's specifications and technical data including the following:
  - 1. Detailed specification of construction and fabrication.
  - 2. Manufacturer's installation instructions.
  - 3. Submit 6 copies of catalog cuts with hardware schedule.
- D. Shop Drawings Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.
  - 1. List groups and suffixes in proper sequence.
  - 2. Completely describe door and list architectural door number.
  - 3. Manufacturer, product name, and catalog number.
  - 4. Function, type, and style.
  - 5. Size and finish of each item.
  - 6. Mounting heights.
  - 7. Explanation of abbreviations and symbols used within schedule.
- E. Samples: (If requested by the Architect)
  - 1. 1 sample of Lever and Rose/Escutcheon design, (pair).
  - 2. 3 samples of metal finishes
- F. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.
  - 1. Operating and maintenance manuals: Submit 3 sets containing the following.
    - a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
    - b. Catalog pages for each product.
    - c. Name, address, and phone number of local representative for each manufacturer.
    - d. Parts list for each product.
  - 2. Copy of final hardware schedule, edited to reflect, "As installed".
  - 3. Copy of final keying schedule
  - 4. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

## 1.4 QUALITY ASSURANCE

A. Comply with Division 1.

- 1. Statement of qualification for distributor and installers.
- 2. Statement of compliance with regulatory requirements and single source responsibility.
- 3. Distributor's Qualifications: Firm with 3 years' experience in the distribution of commercial hardware.
  - a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
  - b. Hardware Schedule shall be prepared and signed by an AHC.
- 4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
- 5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.
  - a. Provide UL listed hardware for labeled and 20-minute openings in conformance with requirements for class of opening scheduled.
  - b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.
- 6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.
- B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Comply with Division 1.
  - 1. Deliver products in original unopened packaging with legible manufacturer's identification.
  - 2. Package hardware to prevent damage during transit and storage.
  - 3. Mark hardware to correspond with "reviewed hardware schedule".
  - 4. Deliver hardware to door and frame manufacturer upon request.
- B. Storage and Protection: Comply with manufacturer's recommendations.

#### 1.6 **PROJECT CONDITIONS**:

- A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

# 1.7 WARRANTY:

A. Refer to Conditions of the Contract

- B. Manufacturer's Warranty:
  - 1. Closers: Ten years
  - 2. Exit Devices: Three Years
  - 3. Locksets & Cylinders: Three years
  - 4. All other Hardware: Two years.

# 1.8 OWNER'S INSTRUCTION:

A. Instruct Owner's personnel in operation and maintenance of hardware units.

### 1.9 MAINTENANCE:

- A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section. Obtain sign-off from the Owner these materials have been received and accepted.
  - 1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
  - 2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
  - 3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.
- B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS:

A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

Item:	Manufacturer:
Hinges	Stanley
Continuous Hinges	ABH
Locksets	Best
Cylinders	Best
Exit Devices	Precision
Closers	Stanley D-4550
Protection Plates	Burns
Door Stops	Burns
Flush Bolts	Burns
Threshold & Gasketing	РЕМКО

### 2.2 MATERIALS:

A. Hinges: Shall be Three Knuckle Concealed Ball bearing hinges

- 1. Template screw hole locations
- 2. Bearings are to be fully hardened.
- 3. Bearing shell is to be consistent shape with barrel.
- 4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
- 5. Equip with easily seated, non-rising pins.
- 6. Non Removable Pin screws shall be slotted stainless steel screws.
- 7. Hinges shall be full polished, front, back and barrel.
- 8. Hinge pin is to be fully plated.
- 9. Bearing assembly is to be installed after plating.
- 10. Sufficient size to allow 180-degree swing of door
- 11. Furnish three knuckles with concealed ball bearings
- 12. Provide hinge type as listed in schedule.
- 13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
- 14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
- 15. UL10C listed for Fire
- B. Pin and Barrel Continuous Hinges:
  - 1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
  - 2. Fabricated from 14-gauge material
  - 3. UL and ULC listed for fire-rated 4' x 8' single doors and 8' x 8' pairs up to 3 hour.
  - 4. Slim barrel design
  - 5. Twin nylon self-lubricating bearings located between all knuckles except top and bottom.
  - 6. Two stainless steel bearings top and bottom, to prevent sagging if nylon bearings degrade during a fire.
  - 7. Limited Lifetime warranty
- C. Exit Devices shall:
  - 1. Tested and approved by BHMA for ANSI 156.3, Grade 1
  - 2. Provide a deadlocking latchbolt
  - 3. Non-fire rated exit devices shall have cylinder dogging.
  - 4. Touchpad shall be "T" style
  - 5. Exposed components shall be of architectural metals and finishes.
  - 6. Lever design shall match lockset lever design
  - 7. Provide strikes as required by application.
  - 8. Fire exit devices to be listed for UL10C
  - 9. UL listed for Accident Hazard
  - 10. Provide vandal resistant or breakaway trim
  - 11. Aluminum vertical rod assemblies are acceptable only when provide with the manufacturers optional top and bottom stainless steel rod guard protectors
- D. Door Closers shall be:
  - 1. Tested and approved by BHMA for ANSI 156.4, Grade 1
  - 2. UL10C certified

- 3. Closer shall have extra-duty arms and knuckles
- 4. Conform to ANSI 117.1
- 5. Maximum 2-7/16 inch case projection with non-ferrous cover
- 6. Separate adjusting valves for closing and latching speed, and backcheck
- 7. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
- 8. Full rack and pinion type closer with 1<sup>1</sup>/<sub>2</sub>" minimum bore
- 9. Mount closers on non-public side of door, unless otherwise noted in specification
- 10. Closers shall be non-handed, non-sized and multi-sized.
- E. Door Stops: Provide a dome floor or wall stop for every opening as listed in the hardware sets.
  - 1. Wall stop and floor stop shall be wrought bronze, brass or stainless steel.
  - 2. Provide fastener suitable for wall construction.
  - 3. Coordinate reinforcement of walls where wall stop is specified.
  - 4. Provide dome stops where wall stops are not practical. Provide spacers or carpet riser for floor conditions encountered
- F. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
- G. Door Bolts: Flush bolts for metal doors.
  - 1. Manual flush bolts ANSI/BHMA 156.16 at openings where allowed local authority.
  - 2. Provide Dust Proof Strike ANSI/BHMA 156.16 at doors with flush bolts without thresholds.
- H. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.
- I. Weather-stripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weather-strip is used with parallel arm mounted closers install weather-strip first.
  - 1. Weather-strip shall be resilient seal of Silicone
  - 2. UL10C Positive Pressure rated seal set when required.
- J. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.
  - 1. Door seal shall be resilient seal of Silicone
  - 2. UL10C Positive Pressure rated seal set when required.
- K. Thresholds: Thresholds shall be aluminum beveled type with maximum height of <sup>1</sup>/<sub>2</sub>" for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.
- 2.3 FINISH:
  - A. Designations used in Schedule of Finish Hardware 3.5, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products

- B. Powder coat door closers to match other hardware, unless otherwise noted.
- C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.
- D. Verify hardware to match doors supplied prior to ordering hardware

## 2.4 KEYS AND KEYING:

- A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.
- B. Cylinders, removable and interchangeable core system: Best Patented 7-pin.
- C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."
- D. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.
- E. Furnish keys in the following quantities:
  - 1. 1 each Grand Masterkeys
  - 2. 4 each Masterkeys
  - 3. 2 each Change keys each keyed core
  - 4. 5 each Construction masterkeys
  - 5. 1 each Control keys
- F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- G. Keying Schedule: Arrange for a keying meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements. Furnish 3 typed copies of keying schedule to Architect.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.
  - 1. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 HARDWARE LOCATIONS:

- A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.
  - 1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
  - 2. Recommended locations for Architectural Hardware for flush wood doors (DHI).

### 3.3 INSTALLATION:

- A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B. Conform to local governing agency security ordinance.
- C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.
- D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

# 3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

- A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.
  - 1. Check and adjust closers to ensure proper operation.
  - 2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
    - a. Verify levers are free from binding.
    - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.
  - 3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

# 3.5 SCHEDULE OF FINISH HARDWARE:

#### **Manufacturer List**

<u>Code</u>	<u>Name</u>
AB	Architectural Bldgs.
BE	Best Lock
BU	Burns
MC	McKinney
PE	Pemko
PH	Precision Hardware
RD	Rockwood
ST	Stanley

# **Option List**

Code	<b>Description</b>
CD	CYLINDER DOGGING
B4E	Four Beveled Edges (12" H or less)
CSK	Countersunk Holes (12" H or less)
P45-190	Angle Bracket Plate
P45HD-110	Spacer Block HD Arm on Rabbet

# Finish List (to be confirmed with PWD Queen Lane plant manager during construction)

Code	<b>Description</b>
10A	Antique Bronze, Oiled & Lacquered
612	Satin Bronze, Clear Coated
691	Light Bronze Painted

### **Hardware Sets**

# SET #1

Doors: 101, 104, 303, 306

#### Each to Receive:

2 EA	Contin. Hinge	A505 x Dr. Hgt.	630	AB
1 EA	Remov. Mullion	KR822	689	PH
1 EA	Exit Device	2108 x 4908A	630	PH
1 EA	Exit Device	2102 x 4902A	630	PH
2 EA	Cylinder	1E72/74 as req'd	626	BE
2 EA	Closer	D4551-HCS	689	ST
1 EA	Threshold	2005AV x Width of Opening	628	PE
1 EA	Head/Jamb Seals	305CR	628	PE

# **SET #2**

Doors: 102, 105, 202, 203, 301, 302, 305

Each to Receive:

1 EA	Contin. Hinge	A505 x Dr. Hgt.	630	AB
1 EA	Exit Device	2108 x 4908A	630	PH
1 EA	Cylinder	1E72/74 as req'd	626	BE
1 EA	Closer	D4551-HCS	689	ST
1 EA	Threshold	2005AV x Width of Opening	628	PE
1 EA	Head/Jamb Seals	305CR	628	PE

# **SET #3**

Door: 103

To Receive:

1 EA	Contin. Hinge	A505 x Dr. Hgt.	630	AB
1 EA	Deadlock	48H7R	626	BE
1 EA	Push Plate	54 - 4" x 16"	630	BU
1 EA	Pull Plate	5426B	630	RD
1 EA	Closer	D4551-HCS	689	ST
1 EA	Threshold	2005AV x Width of Opening	628	PE
1 EA	Head/Jamb Seals	305CR	628	PE

# **SET #4**

Door: 106

# To Receive:

6 EA	Hinge	FBB191 - 4 1/2" x 4 1/2"	630	ST
2 EA	Push Plate	54 - 4" x 16"	630	BU
2 EA	Pull Plate	5426B	630	RD
2 EA	Closer	D4551-HCS	689	ST
2 EA	Kick Plate	K50 - 10" x 2" LDW	630	RD

### SET #5

Door: 107

# To Receive:

3 EA	Hinge	FBB191 – 4 ½" x 4 ½"	630	ST
1 EA	Lockset	9K37D15DS3 PAT.	626	BE
1 EA	Closer	D4551 (EDA as req'd)	689	ST
1 EA	Stop	575/520 as req'd	626	BU
3 EA	Silencer	500	GREY	BU

# **SET #6**

Doors: 307, 308

Each to Receive:

3 EA	Hinge	FBB191 – 4 ½" x 4 ½"	630	ST
1 EA	Lockset	9K37AB15DS3 PAT.	626	BE
1 EA	Closer	D4551 (EDA as req'd)	689	ST
1 EA	Kick Plate	K50 – 10" x 2" LDW	630	RD
3 EA	Silencer	500	GREY	BU

#### SET #7

Doors: 309, 310

3 EA	Hinge	FBB191 - 4 1/2" x 4 1/2"	630	ST
1 EA	Push Plate	54 - 4" x 16"	630	BU
1 EA	Pull Plate	5426B	630	RD
1 EA	Closer	D4551 (EDA as req'd)	689	ST
1 EA	Kick Plate	K50 - 10" x 2" LDW	630	RD
1 EA	Stop	575/520 as req'd	626	BU
3 EA	Silencer	500	Grey	BU

NOTE: Verify sill condition prior to purchasing threshold.

NOTE: Description of Operation: Doors normally locked. Entry gained by key. Free egress available at all times.

NOTE: Balance sweeps and seals door manufacturer.

# **END OF SECTION**

#### SECTION 08800

# GLASS, PLASTIC AND GLAZING

## PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Furnishing all labor, materials, equipment and appliances required for the complete execution of new construction work as shown on the Contract Drawings and specified herein.
- B. Principal items of work include:
  - 1. Float glass.
  - 2. Insulated glass.
  - 3. Glazing clips, tapes, gaskets and compound.
  - 4. Setting glass and glazing.
  - 5. Laminated Safety Glass

# 1.02 REFERENCES

A. Applicable Standards:

1.	Federal Standard	Safety Standard for Architectural Glazing		
		CPSC 16 CFR 1201 Materials		
2.	ANSI Z97.1	- Performance Specifications and Methods of Test for		
		Safety Glazing Material Used in Buildings.		

- 3. Flat Glass Marketing Association "Glazing Manual."
- 4. Underwriters' Laboratories "Building Materials Directory."
- 5. Federal Standards DD-9-451D, DD-9-1403C, TT-S-001543A.
- 6. Insulating Glass Certification Program: Provide insulating glass units complying with requirements indicated which are permanently marked with certification label of the following inspecting and testing agency:
  - a. Insulating Glass Certification Council.
  - b. Associated Laboratories, Inc.
- 7. Fire Resistance Rated Wire Glass: Provide UL-labeled and listed products, identical with those tested per ASTM E163 (UL9).
- B. Federal Specifications: DD-G-451C: Glass, Plate, Sheet, Figured (Float, Flat, for Glazing, Corrugated, Mirrors and other uses). TT-S-001543A: Sealing Compound: Silicone Rubber Base (For Caulking, Sealing and Glazing in buildings and other structures).

# 1.03 SUBMITTALS

- A. The Contractor shall submit the following in accordance with 01340 Project Submittal Requirements the General Conditions, Article 4:
  - 1. Samples
  - 2. Shop Drawings

- B. Samples shall include:
  - 1. Two 12" square pieces of each type of glass specified.
  - 2. One bead, approximately 1/4 inch wide x 3 inches long of sealant, indicating color and set of cured material.
- C. Shop Drawings shall include but not be limited to:
  - 1. Complete layout and installation drawings and schedules with clearly marked dimensions.
  - 2. Manufacturer's descriptive data of glass and glazing materials.
  - 3. Recommended installation instructions.
  - 4. Manufacturer's certification that the materials meet specification requirements.

# 1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivered materials shall match to approved samples in every respect. Deliver materials in the manufacturer's original unopened labeled containers, clearly marked with their name and brand. Transport large panes of glass in vertical position with spacers to prevent contact between panes and edges.
- B. Store glass in a dry, well ventilated location at a constant temperature, maintained above dew point. Handling shall be kept to a minimum and all glass shall be protected from soiling, condensation or moisture of any kind.

- C. Glass delivered to the job site with manufacturer's markings, or when markings are applied at the job, use either neutral or slightly acidic adhesive. In no case shall marking materials or adhesives be alkaline. Any staining of glass by alkaline material will be cause for rejection.
- D. The edges of all tempered and insulating glass shall be protected from damage and edges shall not be modified in any way after the glass leaves the factory. Nipping of any glass to reduce size shall not be permitted.
- E. All glass shall be delivered with manufacturer's labels showing type, thickness and quality of material (and UL label as required). These labels shall not be removed until the glass is set and final approval has been secured.

# 1.05 QUALITY ASSURANCE

- A. In addition to complying with pertinent codes, regulations and safety standards, comply with the recommendations contained in the "Manual of Glazing" of the Flat Glass Marketing Association.
- B. Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the referenced standards and the requirements of the Contract Documents, and who shall personally direct all installations performed under this Section.
- C. Coordinate with the various glass, door and window manufacturers to ascertain the proper type of glazing compounds to be used so that all design criteria are met and so that the required manufacturers' guarantees are not invalidated.
- D. Glass thickness specified shall be considered as minimum values and that thicker glass or wider insulating spaces, or both, may be required by door and window manufacturers in order to produce a product which meets the thermal requirements specified in other Sections. Secure and coordinate all requirements from each manufacturer prior to ordering or installing such items.

- E. All glass shall be factory labeled on each pane and shall contain, as a minimum, grade, type and quality of glass and trademark. Glass without factory labels shall be considered unacceptable. After inspection and approval by Engineer, remove labels from all glass.
- F. Check openings to verify that frames are plumb and true, square and secure. Clean surfaces to be sealed; perform work under satisfactory weather conditions; provide shelter and proper temperature.
- G. Take field dimensions for cutting glass and fabricating units.
- H. All glass sizes shall be determined by measuring the frames to receive the glass at the site and/or from guaranteed dimensions provided by the frame supplier. Glass sizes shall comply with the manufacturer's specified tolerances for each type of glass including cutting tolerance, minimum edge clearance, minimum face clearance, and cover on glass.

# 1.06 GUARANTEES

- A. Insulating Glass Manufacturer shall guarantee, for 20 years, to deliver without charge, a replacement for any unit which develops material obstruction to vision due to film formation or dust collection on the interior glass surfaces resulting from failure of the hermetic seal other than through glass breakage.
- B. Laminated Glass Manufacturer shall guarantee, for 5 years, to deliver without charge, a replacement for any light of laminated glass which develops edge separation or other defects which materially obstruct vision through the glass.

# 1.07 ENVIRONMENTAL REQUIREMENTS

A. Perform glazing when ambient temperature is above 40°F.

B. Perform glazing on dry surfaces only.

# PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

- A. PPG Industries.
- B. Libby Owens Ford.
- C. Cardinal IG.
- D. Viracon, Inc.
- E. E. Guardian, Inc.
- F. Or approved equal.

# 2.02 MATERIALS, GENERAL

- A. Unless otherwise specified, all glass shall conform to FS DD-G-451c. All product references are Viracon trade names. All substitutions shall perform equal to or better than products specified.
- B. Insulating glass (unit type 1) shall be one inch thick hermetically sealed units consisting of an outer light of 5/16-inch heat strengthened laminated panels with VH11-50 E Coating System and an inner light of 5/16-inch thick heat strengthened laminated clear glass, each separated by 3/8-inch entrapped, dehydrated air, edges dual sealed and

silicone second sealed. Each laminated glass panel to have .060-inch clear polyisobutylene (PVB) inner layer.

1. Transmittance:

a. Visible Light: 48%	a.	Visible Light:	48%
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- b. Solar Energy: 28%
- d. Ultraviolet: <1%
  - 1) Ultraviolet defined as 300 to 380 nanometers (nm)
- 2. Reflectance:
  - a. Visible Light Exterior: 17%
  - b. Visible Light Interior: 14%
  - c. Solar Energy: 24%

# 3. ASHRAE U-Value:

- a. Winter Nighttime: 0.48 Btu (hr x sq ft x °F)
- b. Summer Daytime: 0.56 Btu (hr x sq ft x °F)
- c. Shading Coefficient: 0.43
- d. Solar Factor (SHGC): 0.37
- e. Relative Heat Gain: 94 Btu/hr x sqft

# 2.03 GLAZING MATERIALS

- A. Use a resilient, non-hardening glazing compound, capable of withstanding the climatic conditions at the Project site, such as silicone or polysulfide sealants.
- B. Secure recommendations from window and glass manufacturers as to the proper type of glazing compound which should be used so as not to delaminate glass, stain materials or otherwise create defects in the work.
  - 1. Make exposed surfaces smooth, even and uniform in appearance. Slope glazing compound to readily shed water.
  - 2. Glazing compound for glazing metal sash, doors, etc., shall meet the requirements of Federal Specifications TT-S-00230 and TT-S-227b respectively for physical qualities and shall be as manufactured by H.B. Fred Kuhls, Tremco Manufacturing Co., Pecora Paint Co., Gibbs and Hohman or approved equal. Preformed vision strips and tape shall be used in conjunction with setting all glass in exterior windows and shall be similar and equal to Tremco vision strips and "Tremco 440" Tape as manufactured by Tremco Manufacturing Co., or approved equal. Tapes and vision strips shall be as selected from the manufacturer's standard products.

# 2.04 GLASS SIZES AND TYPES

- A. Each light of glass shall bear the manufacturer's label, showing kind, thickness and quality and the label shall not be removed until the work has been inspected and approved by the Engineer.
- B. All glass shall be the best quality of its respective kind, free from integral or surface defects and shall not be clouded, cracked or broken.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. Sheet glass shall be cut and set with waves running horizontally.
- B. All measurements and size for the work shall be obtained and verified by the Contractor who shall be responsible for the correct and accurate fitting of all his work.
- C. All glass shall be set in such manner as to avoid possibility of breakage.
- D. Rabbets shall be thoroughly cleaned and shall have been prime coated before glass is set.
- E. Glass shall be well bedded and back glazed and all surplus compound and markings shall be carefully removed from doors, sash and adjoining work, while still fresh. Compound shall be finished in true, even lines, neatly and smooth faced. All glass shall be set in strict accordance with the manufacturer's printed directions.
- F. All glass when set and glazed shall be free from rattle and all exterior glazing shall be executed in such a manner that the work will be watertight. Insulating glass shall be set in compliance with the manufacturer's instructions.
- G. Glazing molds shall be removed and replaced in their correct locations in such a manner as not to mar molding or the screws securing same.
- H. All glazing shall be done at the building after the work into which glass is to be set has been installed. All openings shall be properly marked after being installed, to show that the openings have been glazed.

# 3.02 PROTECTION AND CLEANING

- A. Before and after installation, all work shall be properly protected against damage.
- B. On completion and prior to turning the project over to the City, all metal work and glass shall be cleaned and left in perfect condition. Glass shall be washed outside and inside.
- C. Make required adjustments.
- D. Thoroughly clean all glass and mirrors just before final acceptance by the City, or sooner if authorized by Engineer.
- E. Remove excess glazing compound and foreign materials.
- F. Replace broken or defective glass and hardened, uneven, defective or otherwise noncomplying glazing compound.

# 3.03 GUARANTEE

A. The Contractor shall guarantee all work against defective material or workmanship for a period of one year following acceptance of the work.

# END OF SECTION

#### **SECTION 09900**

#### PAINTING

#### PART 1 - GENERAL

### 1.01 SECTION INCLUDES

- A. Painting, as specified herein, shall include, but not be limited to, preparation of surfaces, shop painting of items furnished, field painting of structures, piping, conduit, ducts, brackets, hangers, supports, and equipment, and marking of piping and electrical conduit
- C. Painting shall be provided where shown on the Contract Drawings, specified herein, or as required for a complete installation.
- D. All equipment for application of the coating shall be furnished by the Contractor shall comply with recommendations of the coating manufacturer.

# 1.02 REFERENCES

- A. Codes and standards referred to in this Section shall be as follows:
- B. SSPC Society of Protective Coatings
  - a. SSPC-SP1 Solvent Cleaning
  - b. SSPC-SP2 Hand Tool Cleaning
  - c. SSPC-SP3 Power Tool Cleaning
  - d. SSPC-SP6 Commercial Blast Cleaning
  - e. SSPC-SP7 Brush-off Blast Cleaning
  - f. SSPC-SP10 Near-White Metal Blast Cleaning
  - g. SSPC-SP-13 Surface Preparation of Concrete

- C. Fed. Spec.- Federal Specifications and Standards of the General Services Administration
  - a. TT-C-542F
  - b. TT-650D
  - c. TT-P-1511B
  - d. TT-P-96D
- D. Mil. Specs. Specifications and Standards of the Department of Defense of the United States Government
  - a. MIL-C-22750F
  - b. MIL-P-23377G
  - c. MIL-C-22750F
  - d. MIL-P-26915C
- E. ASTM American Society for Testing Materials
  - a. ASTM D3359 Measuring Adhesion by Tape Test

## 1.03 SUBMITTALS

- A. The Contractor shall prepare and submit for review, catalog cuts, drawings and reference materials in accordance with Specification 01300 Submittals.
  - 1. Color Chart: The Contractor shall submit the manufacturer's standard color chart for color selection for painting .
  - 2. Paint Samples: The Contractor shall submit two one-quart samples of each required kind of paint material, or the ingredients thereof which are to be mixed on the job. Samples shall be labeled as required under Article 1.07, and shall include the certificate of the manufacturer stating the actual percentages by weight and volume of all ingredients entering into the mixture. Upon request, further samples shall be provided as the work progresses. Painting materials shall not be applied without written approval of samples by the Engineer.

- 3. Painted Surface Samples: Upon request, duplicate samples of the results obtained by painting and finishing various materials on the work shall be submitted. Such samples, and the approved paint applied thereto, shall be applied in strict conformance with these specifications. Finished areas shall be considered adequate for the purpose of determining the quality of the work. All painting work shall be performed in a quality equal to the approved samples. Where equipment is customarily shipped with a standard finish, samples of the proposed color and finish shall be submitted for approval prior to shipping.
- 4. Test Panels: Test panels of coatings and coating systems equal to those specified shall be submitted at the beginning of the work and before final approval of the coating. Test panels shall be exposed to conditions of use similar to those expected in the work. Pertinent records of reports on the behavior of coatings in the test environment shall be submitted with the test panels.
- 5. Test for Water Based Water Repellent in a 4 ft. by 4 ft. area on each type of masonry. Use the manufacturer's application instructions. Let test area protective treatment cure before inspection. Keep test panels available for comparison throughout the protective treatment project.
- 6. Certification: The Contractor shall furnish affidavits from the manufacturer certifying that materials furnished conform to the requirements specified and that paint products have been checked for compatibility.
- 7. Supplementary Schedule: The Contractor shall submit a supplementary schedule of paint products with mil thickness, and solids by volume, including all paint applied in the shop and in the field. The schedule shall be in accordance with the recommendations of the paint manufacturer.
- 8. Certificate of Compliance to Pollution Code stating VOC content of products provided and product regulatory requirements
- 9. List each material and cross-reference to the specific painting system and application. Identify by the Supplier's catalog number and general classification. State number of gallons of each product being purchased for delivery to the Site and the square foot area calculated to be covered by each painting system specified based on theoretical loss of 20 percent. Where actual area to be covered by any paint system exceeds the area submitted to the Engineer for that system, proof of additional material purchase shall be submitted to the Engineer. Calculated coverage shall be as specified for each component of each painting

system specified. This requirement shall not take precedence over the Contractor's responsibility to provide dry film thickness required for each component of each painting system.

- 10. Identify maximum exposure times allowable for each paint system component before the next coat of paint must be applied. Submit proposed methods for preparing surfaces for subsequent coats if maximum exposure times are exceeded.
- 11. Information on curing times and environmental conditions which will affect the curing time of each system component and proposed methods for accommodating variations in curing time. Identify this information for each painting system used in the work.
- 12. Specification for spray equipment with cross-reference to paint Supplier's recommended equipment requirements.
- 13. Maintenance Manual: Upon completion of the painting work, furnish the Engineer copies of detailed maintenance manual including the following information:
  - a. Complete and updated product catalog of paint Supplier's currently available products including complete technical information on each product. Identify product names and numbers of each product used in the painting work.
  - b. Name, address and telephone number of Supplier, local distributor, applicator and technical representative.
  - c. Detailed procedures for routine maintenance and cleaning.
  - d. Detailed procedures for light repairs such as dents, scratches and staining.
- B. Certificates: Submit for approval the following:
  - 1. Certificate stating that materials meet or exceed Specification requirements.

- 2. The Contractor shall provide notarized statement verifying that all painting systems are compatible with surfaces specified. All painting systems' components shall have been reviewed by an authorized technical representative of the paint Supplier for use as a compatible system. Verify that all painting systems are acceptable for the exposures specified and that the Supplier is in agreement that the selected systems are proper, compatible and are not in conflict with the paint Supplier's recommended specifications. Show by copy of transmittal form that a copy of the letter has been transmitted to the paint applicator.
- C. Statement of Application: Upon completion of the painting work, submit a notarized statement to the Engineer signed by the Contractor and painting applicator stating that the work complies with the requirements of these Specifications and that the application methods, equipment and environmental conditions were proper and adequate for installation and for performance in compliance with manufacturer's test results.

## 1.04 QUALITY ASSURANCE

- A. Paint Quality Assurance Records: The following information shall be recorded for every paint project:
  - 1. Date
  - 2. Shift
  - 3. Part Temperature
  - 4. Dew Point
  - 5. Paint Batch Number/s
  - 6. Mixing Time for Each Part and the Combined Parts of a Paint System
  - 7. Pot Life
  - 8. Curing Time of Primer and Finish Layers
  - 9. Holiday Test Results and Repair Data
  - 10. Peel Test Results and Repair Data
  - 11. Foreman or Supervisor's Signature
- B. Applicator Qualifications:

- 1. Submit the name and experience record of the applicator. Include a list of utility or industrial installations. Provide the Engineer with names and telephone numbers of owners, architects, or engineers responsible for the projects listed and the approximate contract prices.
- 2. Applicators who have not had the type of successful experience required to perform the kinds of work specified will not be approved.
- C. Source Quality Control: Obtain materials only from Suppliers who will:
  - 1. Provide the services of a qualified Supplier's representative at the site at the commencement of painting work to advise on materials, job mock-ups, installation and finishing techniques, at the completion of the work to advise the Engineer on the acceptability of completed work, and during the course of the work as may be requested by the Engineer.
  - 2. Certify long term compatibility of all coatings with surfaces.
- D. Pre-installation Meeting: Before erecting job mock-ups, the Contractor, its applicator and representatives of the painting system(s) Supplier shall meet at the site with the Engineer to discuss approved products and workmanship in order to ensure proper application of all components of painting systems and requirements of substrate preparation for the work.
- E. Requirements of Regulatory Agencies:
  - 1. Painting systems for surfaces in contact with potable water or water being treated for potable use shall not impart any taste or odor to the water or result in any organic or inorganic content in excess of the maximum allowable contaminant level established by applicable Laws and Regulations. All such painting systems shall be approved by the applicable regulatory agency. Revise painting systems specified herein to provide Supplier's regulatory agency approved painting system(s) where required.
  - 2. Comply with governing regulations for air quality and material disposal regulations. Revise painting systems specified herein in order to provide Supplier's regulatory agency approved coating systems where required.

3. Comply with governing regulations for blast cleaning operations, confined space entry and disposition of spent abrasive and debris.

### 1.05 TEST SURFACES

- A. Stepped-Down Job Mock-Ups:
  - 1. Demonstrate installation of specified painting system(s) on actual wall surfaces and building components at locations selected by the Engineer.
  - 2. Provide 4 foot 0 inch by 8 foot 0 inch long stepped-down sample area for each painting system. Prior to the application of a painting system, but after the Engineer's approval of the components of each painting system, apply a 4 foot 0 inch wide sample of each operation and application step required by the Specification and the specified Supplier's written application recommendations. Each application step shall be shown as a 2 foot 0 inch long section which shall remain exposed in order to show the Engineer the work performed by that step. Continue application procedures until top coat is provided. Top coat shall be a minimum of 2 foot 0 inches long. Finished job mock-up for each paint system, when completed, shall reveal each step and each coat of paint required for the paint system with 2 foot 0 inch wide strips revealing work performed to prepare the surface and apply each coat. Lengthen overall mock-up as may be required in order to completely demonstrate each painting system. Use tinted shades differing from coat to coat for each component of each painting system.
  - 3. The Engineer may approve or disapprove each component of each painting system on an individual component basis.
  - 4. Painting system work that does not meet the standard approved on the sample areas shall be removed and replaced with new material.
  - 5. Painting system work advanced without approved job mock-ups shall be stopped, completely removed and re-installed, after job mock-up approval by the Engineer, at no additional expense to the Owner.

### 1.06 SAFETY REQUIREMENTS

- All painting materials specified herein, and ingredients of coatings containing substances that are potentially toxic or hazardous shall be shipped with warning labels. These products shall be applied in strict conformance with the safety requirements of the following:
  - 1. The Manufacturer
  - 2. The National Paint and Coatings Association (NPCA)
  - 3. The Society of the Plastics Industry (SPI)
  - 4. The Manufacturing Chemist Association (MCA)
  - 5. The Steel Structures Painting Council (SSPC)
  - 6. The United States Government Occupational Safety and Health Act (OSHA)
  - 7. Ozone Transportation Commission (OTC)
  - 8. The Health and Safety Requirements of the State of Connecticut

#### 1.07 PAINTING REQUIREMENTS

- A. General: The Specifications do not specify the surface treatment for every individual part of the work, however this Contract shall be provided with a complete painting job throughout the work as specified herein. All items customarily or specified to be shop painted shall be primed and finished in the shop. Field painting will not be allowed unless requested in writing to the Engineer, and written consent is given by the Engineer. In general, only areas that are to be field welded are not to be painted until field erected. Equipment that is required to be painted with a color specified for its intended service in accordance with requirements in Division 15 shall be shop painted with a coating system that is compatible with the painting system specified herein. This shall be inclusive of the items specified in paragraph "B" below as being supplied with manufacturer's standard prime and finish coats.
- B. Manufacturer's Standard Finished Items: The following items shall be furnished with the manufacturer's standard prime and finish coats applied in the shop: pumps, motors, gears, gear housings, air compressors, wall fans, temperature control and instrument panels, process air blowers, engines, filters, strainers, air dryers, meters, gas boosters, gas turbines, generators, panelboards, transformers, boilers, condensing units, water chillers, cooling towers, condensers, heat exchangers, humidifiers, air handling units, sound attenuators, air conditioning and dehumidification units, convector cabinets, unit heaters, enclosures for finned tube radiators, cabinet heaters, boilers, wood seats,

lockers, metal toilet partitions, metal urinal screens, aluminum fascia, motor control centers, aluminum light standards, and hoisting equipment. When powder coatings are required by the Specifications, the powder coatings shall be in accordance with the requirements of the manufacturer of the item.

- C. Painted Items: The following items shall be painted as specified herein: steel water storage tank, structural steel and wrought metals, composite metal floor deck, pipelines, hangers and supports, sluice gates, valves, valve and sluice gate operators and stands, guard housings, air filter equipment, effluent strainers, heat exchangers, air receivers, tanks, air silencing equipment, storage tanks, gas domes, sediment tanks, steel stair framing, steel lintels, hollow metal doors and frames, gypsum wallboard, interior concrete block, interior concrete walls, columns, beams and ceilings, covering over insulation on piping, electrical conduit systems, and small piping and copper tubing, ducts, covering over ducts.
- D. Unpainted Items: The following items shall not be painted, unless otherwise specified: registers, grilles, dampers and linkage, fire sprinklers, name and identification plates and tags, floor gratings, brass pipe and fittings, brass valves, stainless steel, wood, cast-iron piping installed underground, stop log panels, spray-on fireproofing steel to receive spray-on fireproofing, surfaces to receive field welding, and faying surfaces of high strength bolted connections.
  - 1. Unpainted Items: "filled ground face concrete masonry units, and ceramic tile."

#### 1.08 DELIVERY, STORAGE AND HANDLING

- A. General: All products and materials shall be delivered, stored, and handled as specified in Division 1 and as follows:
- B. Delivery and Storage: All paint materials delivered and stored at the site shall be from the approved manufacturer only.
- C. Packaging and Labeling: Paints, stains, varnish or ingredients of paints to be used on the job shall be properly prepared, packed, and labeled. All material shall be delivered to the site in original, unbroken containers bearing the manufacturer's printed labels, which shall specify the following:

- 1. Project and Contract No.
- 2. Name of Manufacturer
- 3. Address of Manufacturer
- 4. Generic Name of Paint or Ingredients
- 5. Brand and Trade Mark
- 6. Schedule Letter as Listed Herein
- 7. Percent Solids by Volume
- 8. Net Quantity
- 9. Date of Manufacturer
- 10. Date Packed
- D. Storage: Painting materials shall be stored at the site in manner and place which shall be in accordance with applicable codes and regulations, and in accordance with manufacturer's instructions. The storage space shall be kept clean at all times. Every precaution shall be exercised to eliminate fire hazards.

## 1.09 AIR POLLUTION CODE

- A. All paints, solvents, vanish and coatings specified in this contract shall conform to all Ozone Transportation Commission (OTC) requirements.
- B. The contractor shall furnish the Engineer with certification of compliance from the manufacturer that the paints, solvents, varnishes and coatings conform to the Ozone Transportation Commission (OTC) requirements.

## 1.10 INSPECTION

A. All paints, solvents, vanish and coatings shall be subject to inspection at the place of manufacture and subject to such tests as may be ordered by the Engineer. The Engineer or his representatives may be at the paint manufacturer's plant to witness the entire manufacturing process including filling and closing of the cans for each batch of paint manufactured. Samples of the paint may be taken by the Engineer or forwarded to the Engineer as directed. The Engineer shall have access, at all times, to all places to inspect the methods of manufacture and shall have liberty to inspect the daily laboratory records and analysis of all such paints, solvents, vanishes or coatings as are subject to his inspection. Such analyses as are required will be made by the Engineer.

B. The Contractor shall furnish the Engineer with certification, on the manufacturer's letterhead, stating the name of the Contractor or Subcontractor,

## PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

- A. Standards of Quality: Proprietary protective coatings included herein by brand name or trade mark are given solely as standards of quality and for bidding purposes and do not preclude the use of an approved equivalent.
- B. Latest Products: Unless specified otherwise, the proprietary protective coatings of the manufacturer's latest products in regular production on the date of receipt of order shall be provided.
- C. Equivalents: Equivalent products shall be of a standard, regularly produced product of a manufacturer. Equivalent products shall be submitted on their applicable published printed literature that states the generic type, instructions for use, solids by volume, application rates, and chemical components of vehicles and solids. Equivalent products shall be accompanied by a list of projects where each of the coatings has been used on new construction and has rendered satisfactory service for at least three years. Should the manufacturer's literature of the product being offered call for higher film thickness, the greater film thickness shall be applied, and the submitted schedule shall so state.
  - 1. Painting Manufacturers:
    - a. Tnemec Company, Inc., Kansas City, MO
    - b. PPG Protective & Marine Coatings, Pittsburgh, PA
    - c. Carboline Company, St. Louis, MO
    - d. International Paint, Houston TX
    - e. RD Coatings USA, Stratford, CT.
  - 2. No substitutions shall be considered that decrease the number of coats, the surface preparation or the generic type and formulation of coating(s) specified. Products exceeding VOC limits specified will not be approved.

- 3. The Engineer may review Suppliers' recommendations concerning methods of installation and number of coats of paint for each painting system. The Contractor shall prepare construction cost estimates based on painting systems, number of coats, coverage and installation methods specified.
- 4. All proposed "or approved equal" products shall be submitted with direct comparison to products specified including information on durability, adhesion, color and gloss retention, percent solids, VOCs per gallon and recoatability after curing.
- 5. Approved Suppliers shall furnish the same color selection as the Suppliers specified, including intense chroma and custom pigmented colors in all painting systems.
- 6. Water Based Water Repellent (siloxane based) Manufacturers:
  - a. Sherwin Williams, Edison, NJ; Super V
  - b. Prosoco, Inc; Siloxane PD Concentrate
    3741 Greenway Circle, Lawrence, KS 66046.
    Phone: (800) 255-4255; Fax: (785) 830-9797.
  - c. Fox Industries; FX-424
  - d. Euclid Chemical Corporation; Weather –Guard

## 2.02 MATERIALS

- A. General: Paint and other materials shall be furnished which are of the type and quality of the manufacturer on which the painting schedule specified herein is based.
  - 1. Compatible shop and field coats shall be provided.
  - 2. All coats of paint for any particular surface shall be from the same manufacturer.
  - 3. Paint shall be of approved color as selected from the manufacturer's standard range of colors.
  - 4. The Contractor shall submit proposed modifications to the specified painting systems for the Engineer's approval prior to use.
  - 5. Paints containing lead or manganese driers shall not be submitted.

- B. Ingredients of paints, and other protective mixtures including, but not limited to, urethanes, epoxies, powder coatings and moisture-cured urethanes shall, unless proprietary coatings are specified, conform to the latest editions of the following:
  - 1. Federal Specifications and Standards of the General Services Administration of the United States Government ("Fed. Spec.")
  - 2. Specifications and Standards of the Department of Defense of the United States Government ("Mil. Specs".)
- C. Preparation of paint:, all paints shall be properly prepared in accordance with manufacturers instructions and as specified herein:
  - 1. Paints shall vary not more than 4 ounces using only the specified materials in the proportion stated per gallon from the standard weight.
  - 2. The primer, undercoat, and topcoat shall be made by the same manufacturer, unless otherwise approved by the Engineer.
  - 3. Safety precautions such as handling instructions, ventilation requirements, use of adequate clothing and safety equipment shall be specified by the manufacturer on the label, and in the product data and Material Safety Data Sheet (MSDS).
  - 4. The flash point of any of the paints of the coating system used within Philadelphia shall not be less than one hundred (100) degrees Fahrenheit as determined by the Pensky Martens Flash Point tester, unless otherwise approved by the Engineer.
  - 5. Colors shall be as indicated on the contract drawings or as directed by the Engineer.
- D. Ingredients of paints, and other protective mixtures including, but not limited to, urethanes, epoxies, powder coatings and moisture-cured urethanes shall, unless proprietary coatings are specified, conform to the latest editions of the following:

- 1. Ozone Transport Commission (OTC) regulation for regulation of VOC levels in paint coating systems.
- 2. Federal Specifications and Standards of the General Services Administration of the United States Government ("Fed. Spec.")
- 3. Specifications and Standards of the Department of Defense of the United States Government ("Mil. Specs".)
- E. Material Painting Schedule: All materials shall be painted in accordance with the following schedule. The number of coats shall not be less than the number shown on the schedule.

MATERIAL PAINTING SCHEDULE				
	Paint Symbols**			
	Prime	Finish Coats		
Material and Conditions	Coat	1st	2nd	3rd
Nonferrous Metal and Galvanized Steel:				
Interior Exterior		A	A	A C
Galv. Piping & Duct Work shall NOT be painted.				-
Steel and Iron:				А
Interior	В	B*	А	С
Exterior	Е	B*	А	D
Submerged, Buried or Constantly Wetted	В	B*	D	

MATERIAL PAINTING SCHEDULE					
	Paint Syr	Paint Symbols**			
	Prime	Finish	Finish Coats		
Material and Conditions	Coat	1st	2nd	3rd	
Concealed in Masonry	В	B*			
Wrapped in Insulation	В	B*		D	
Exterior, Exposed to Process Wetting and Drying	В	B*			
Exposed to Potable Water Piping to be insulated shall be shop primed/coated only.	В	В*	Ι	-	
Concrete: Interior Fill Ground Faced Block shall NOT be		D	D		
painted					
Concrete: Exterior @ Tanks	J	J	K	L	
Pipe and Duct Insulation: Exposed		Н	Н		
Exposed threaded area of galvanized piping and conduit	Е				
Gypsum Wallboard, Plaster:		G	Н	Н	

\* Touch-up bare metal with primer.

\*\* See the following Schedule of Paints for corresponding product.

F. Schedule of Paints: Alphabetical designations in the following list are given solely for the purpose of indicating the type and quality of materials desired. Equivalent material from other approved manufacturers may be substituted.

	SCHEDULE OF PAINTS					
Symbol	Product Name and Number	Volume Solids %	Dry Film Thickness Mils per Coat	Federal Standards and Specifications		
А	Tnemec: Series N69 Hi-Build Epoxoline II	69	2.0-3.0	MIL-C-22750F,		
	Carboline: Carboguard 890/691	75/80	2.0-3.0	Type I		
	NOTE: For galvanized & non-ferrous substrates first coat to be Sanitile 120 @1-2 mils					
	PPG PMC Amerlock 2/400 Series Epoxy	83	4.0-8.0			
	International Paint: Interseal 670HS	82	3.0-4.0			
В	Tnemec Series N140-1255 Pota-Pox Plus	67	4.0-6.0	MIL-P-23377G, Type I, Class 2 or		
	Carboline Carboguard 888/691	63/80	4.0-6.0	3		
	PPG PMC Amerlock 2/400 Series Epoxy (For Potable Water Applications Use Amercoat 133)	83	4.0-8.0			
	International Paint: Interseal 670HSor670HSLT	82	3.0-6.0			
С	Tnemec Series 1075 Endura-Shield	67	2.0-3.0	Fed. Spec. TT-C-		
	Carboline: 134 HG	70	2.0-3.0	542F, Type I		
	PPG PMC : Amercoat 450 Series Aliphatic Urethane	67	2.0-5.0			

SCHEDULE OF PAINTS				
Symbol	Product Name and Number	Volume Solids %	Dry Film Thickness Mils per Coat	Federal Standards and Specifications
	International Paint: Interthane 990HS	68	2.0-3.0	
D	Tnemec Series N69 Hi-Build Epoxoline II	68	4.0-5.0	MIL-C-22750F, Type I
	Carboline Carboguard 890/691	75/80	4.0-5.0	
	PPG PMC Amerlock 2/400 Series Epoxy	83	4.0-8.0	-
	International Paint: Interseal 670HSor670HSLT	82	3.0-6.0	
Е	Tnemec Series 90-97 Tneme-Zinc	63	2.5-3.5	MIL-P-26915C,
	Carboline: 621 OR CARBOZINC 859	60	2.5-3.5	Type I, Class B
	PPG PMC Amercoat 68HS Zinc Rich Epoxy Primer (NOTE: Substitute PPG PMC Amercoat 370 Fast Dry Epoxy as a shop prime coat where steel will be used in immersion)	70	2.0-3.0	
	International Paint: Interzinc 52	59	3.0-5.0	-
F	Tnemec Series 130 Envirofill Masonry Filler	68	As Required	None Applicable
	Carboline: Sanitile 100/755 Block Filler	44/99	As Required	
	PPG PMC Amerlock 400BF Epoxy Block Filler	75	10.0-20.0	

SCHEDULE OF PAINTS				
Symbol	Product Name and Number	Volume Solids %	Dry Film Thickness Mils per Coat	Federal Standards and Specifications
	International Paint: Intercryl 320	84	As Required	
G	Tnemec Series 51-792 PVA Sealer	28	1.0-2.0	Fed. Spec. TT-P- 650D
	Carboline: Sanitile 120	38	1.0-2.0	0500
	PPG PMC Amercoat 220 Waterborne Acrylic	35	2.0-5.0	
	International Paint: Intercryl 520	44	2.0-3.0	-
Н	Tnemec Series 6	43	2.0-3.0	Fed. Specs TT-P- 1511B Type I
	Carboline: 3350 or Sanitile 155	38	2.0-3.0	(Gloss)
				TT-P-95D Type
	PPG PMC Amercoat 220 Waterborne Acrylic	35	2.0-5.0	- II and III (Flat)
	International Paint:: Intercryl 530	35	2.0-3.0	-
Ι	Tnemec Series N140-15BL MS Pota-Pox Plus	67	4.0-6.0	None Applicable
	Carboline: Carboguard 891/691	75/80	4.0-6.0	
	PPG PMC Amercoat 133 100% Solids Epoxy NSF	100	4.0-24.0	
	International Paint:: 670HSor670HSLT	82	4.0-6.0	

- G. Water Based Water Repellent (siloxane based) solvent-free blend of silanes and oligomeric alkoxysiloxanes mixes easily with water to produce a penetrating low-VOC water repellent for application to dense or porous masonry surfaces. The Water Based Water Repellent shall meet or exceed the following technical data:
  - 1. ACTIVE SUBSTANCE: Microemulsion concentrate of silanes and oligomeric alkyl alkoxysiloxanes
  - 2. FORM: Clear amber liquid
  - FLASH POINT: 69 degrees F in concentrate (21 degrees C in concentrate) (ASTM D 3278)

140 degrees F (60 degrees C) (in 1:9 dilution)

145 degrees F (62 degrees C) (in 1:14 dilution)

- 4. VOC: 318 grams/liter (ASTM D 5095)
- 5. FREEZE POINT: <-22 degrees F (<-30 degrees C)

## PART 3 - EXECUTION

## 3.01 INSTALLATION

A. Replace the corresponding portion of the table with the information below:

SURFACE PREPARATION SCHEDU	LE
Class of Work	Preparation of Surface Prior to Painting
Interior :	All visible oil, grease, dirt, dust, mill scale,
	rust, paint, oxides, corrosion products and other foreign matter shall be removed by
Structural Steel and Steel Encased in	compressed air nozzle blasting, centrifugal
	wheels or other specified method.

SURFACE PREPARATION SCHEDULE	
Class of Work	Preparation of Surface Prior to Painting
Concrete, or Fireproofing; Ferrous Metals Exterior:	Discoloration caused by certain stains shall be limited to no more than 33 percent of each square inch of surface area in accordance with Steel Structures Painting Council SSPC-SP6.
Ferrous Metals Submerged Under Water and Exterior Exposed Structural Steel and Exterior Exposed Steel (does not include interior structural steel, encased or galvanized)	All visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter shall be removed by compressed air nozzle blasting, centrifugal wheels or other specified method. Discoloration caused by certain stains shall be limited to no more than 5 percent of each square inch of surface area in accordance with Steel Structures Painting Council SSPC- SP10.
Galvanized Steel and Other Metals	All welds, beads, blisters or protuberances, other than identification markings shall be smooth, and other imperfections shall be removed. All nonferrous metals and galvanized steel, whether shop primed or field primed, shall be solvent cleaned in accordance with Steel Structures Painting Council SSPC-SP1.and then abraded with 80- 100 grit sandpaper to provide Surface profile

B. Field Painting Operations: Surfaces to be given protective coating shall be thoroughly cleaned. Scratches and abrasions on equipment which has been shop coated shall be refinished and all surfaces to be field painted shall be approved by the Engineer before proceeding with painting. Painting shall be performed in a continuous and orderly operation to facilitate adequate inspection, however material subject to weathering or corrosion shall be given prime coats as quickly as practicable.

- C. General: All painting and coatings shall be applied in accordance with the manufacturer's recommendations and approved submittals. A representative of the paint manufacturer shall inspect the surfaces to be painted and shall advise on the proper application. The paint manufacturer representative shall periodically be consulted regarding ambient temperature and humidity conditions. Application of primer coat on blasted surfaces shall be prior to the formation of a rust bloom and in no case shall exceed an 8-hr. time period. Painting shall not be applied when the dew point temperature is greater than 5°F below ambient temperature of material being painted. No paint shall be applied during damp or rainy weather or on wet or damp surfaces.
- D. Shop Painting: All shop painting shall be applied by use of brushes or approved spray equipment. In the application of such shop coats, the use of rollers will not be permitted. When necessary, indoor facilities shall be available to protect shop painted components from adverse weather conditions during initial drying periods. These conditions include temperatures below 50 degrees F. and atmospheric moisture condensation. The following items shall be provided with shop coats of primer and finish coats as herein specified before exposure to the weather:
  - 1. Metals:
    - a. Structural steel
    - b. Miscellaneous steel and wrought iron
    - c. Ornamental wrought and light iron
    - d. Iron castings
  - 2. Machinery and Equipment:
    - a. Mechanical and electrical equipment
    - b. HVAC galvanized ductwork, ductwork hangers and shop painted accessories.
  - 3. Pipe:
    - a. All piping except galvanized iron, stainless steel, aluminum, copper, brass bronze piping, PVC piping and CPVC piping.

- E. Where galvanizing has been damaged as a result of threading operation the damaged area shall be coated with zinc rich primer in accordance with 09900-2.02.F paint schedule designation type Field Painting: All painting at the site of the project is hereby designated as field painting for those items that can not be shop painted or are touched up due to minor damage to the painted surface.
- F. Repair and Repainting: Field coatings shall not be applied until all marred surfaces have been repaired or repainted. Shop coated surfaces shall be thoroughly cleaned and retouched prior to the application of successive paint coats in the field.
- G. Unpainted Materials: Do not paint or finish copper, bronze, chromium plate, nickel, stainless steel, aluminum (except ducts and conduit adjacent to finish painted surfaces), monel metal, lead, lead coated copper and brass, except as otherwise indicated.
- H. Items to Receive Coating: All ferrous metals, and insulated surfaces shall be provided with a protective coating. Interior surfaces, exposed masonry walls and concrete walls, floors and ceilings shall be provided with protective coatings as indicated on the drawings and specified.
- I. Surface Condition: Only surfaces that are dry and free from dust, grease or other undesirable or interfering substances shall receive coatings. Coatings shall be as specified in the Painting Schedule.
- J. Application: Finish coats shall be applied after all adjacent work has been completed. Successive coats shall have different shades or tints of color wherever possible. Colors shall be as selected and approved by the Engineer. Prime and successive finish coats shall be cleaned, sand papered, or otherwise treated before the next coat is applied, in accordance with the recommendations of the coating manufacturer, and as approved by the Engineer. All coats shall be inspected and approved by the Engineer, before application of any succeeding coats. All coats shall be applied to the dry film thickness (dft) specified. Coatings shall be applied by skilled personnel under adequate illumination. All painted surfaces shall be left in a clean, orderly and acceptable condition.
- K. Surface and Atmospheric Conditions: Paints shall not be applied when the surface temperature is less than 40 degrees F, when the relative humidity exceeds 85 percent, or when the surface to be painted is wet or damp, unless more stringent requirements are called for by the paint manufacturer.
- L. Method of Application: All paint material shall be applied by brush or roller. Spray painting will be permitted only with the specific approval of the Engineer. Surfaces

which are so close together as to prevent the insertion of a standard size roller or brush shall be painted thoroughly with the prescribed number of coats by using special narrow rollers or brushes.

- M. Adjacent Areas: Areas under and adjacent to painted surfaces shall be fully protected at all times. Dripped or spattered paint shall be promptly removed and any adjacent surfaces that have been damaged or discolored by overspray shall be repaired, refinished, and repainted.
- N. Tinting: Successive coats of paint shall be tinted to make the various coats easily distinguishable. Undercoats of paint shall be tinted to the approximate shade of the final coat of paint. Final coats of paint shall not be applied until all other work has been completed, the dirt and rubbish removed and the surfaces suitably prepared. Paint to be applied shall be at room temperature.
- O. Conditions for Application: Each coat of paint shall be given sufficient time to cure per the manufacturer's recommendation before application of the succeeding coat. Each succeeding coat shall be applied within the recoat time specified by the manufacturer; otherwise the painted surface shall be prepared per the manufacturer's recommendation before it is recoated. Exterior painting will not be allowed in dust laden air, during damp or threatening weather, or on moist or wet surfaces, or when the surface temperature is below 40 degrees F on a falling thermometer or under 50 degrees for catalyzed epoxy material; it will not be allowed in extreme heat or when metal is hot enough to cause the paint to blister and produce a porous film. Do not apply interior painting until the building is thoroughly dry. If the temperature in the interior of the building, in the opinion of the Engineer, is too low painting will be stopped until the building is heated. Proper ventilation and sufficient heat shall be maintained to permit the paint to dry. The building shall be maintained to be free from dust. Contractor shall provide supplemental, protection, dehumidification, heat and ventilation as required for proper cure and compliance with MSDS of all products without additional cost to the Owner.
- P. Remedial Work: Any paint found defective shall be removed. Touch-up and remedial painting shall be provided as directed and as required until completion and acceptance of final work. If damage to the painted surface is excessive, as determined by the Engineer, that item shall be rejected and shipped back, at Contractor's expense, to be properly recoated before it can be accepted.
- Q. Application: Each coat of paint shall be applied as a continuous film of uniform thickness, free of pinholes and blemishes, to the maximum extent practicable. Any thin spots or areas missed in the application shall be repainted and permitted to dry before

the next coat is applied. An approved low voltage wet sponge "holiday" detector shall be used as directed by the Engineer. All paint shall be carefully applied to a smooth even coating without runs or sagging. Enamels shall be brushed with a smooth even flow. Each coat of paint shall be dry, not only on the surface, but throughout the thickness of the paint film, before the next coat is applied. Finished surfaces shall be uniform in gloss, finish, and color, and free from flash spots and brush marks. In all cases, the resultant paint film produced shall be satisfactory in all respects to the Engineer.

- R. Thinning: If the paint material must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material (i.e., one gallon of paint as originally furnished must not cover a greater surface area when sprayed than when applied unthinned by brush). Where thinning is necessary, only the products of the manufacturer furnishing the paint shall be used for the particular purpose, and thinning shall be done with the manufacturer's knowledge, in accordance with his printed instructions.
- S. Thickness and Adhesion Testing: Dry film thickness of each coat shall be as specified herein. Dry film thickness will be checked by the Engineer or a representative with a magnetic gauge for ferrous metal in accordance with SSPC 2 or Tooke gauge destructive test for concrete. Film thickness of shop coats or other previously applied coating shall be checked by the Engineer or a representative and recorded before painting in order to determine thickness of field coats. Dry film thicknesses for concrete surfaces shall be determined by measuring with a wet-film gauge and by material consumption. Paint adhesion shall be tested by the peel method in accordance with ASTM D 3359.
- T. Inaccessible Items: Exposed members which will be inaccessible after erection shall be painted and cleaned prior to erection.
- U. Coverage: All surfaces to be painted shall be completely covered. When color on undercoats shows through the final coat of paint, surfaces shall be covered by additional coats until paint is of uniform color and appearance and coverage is complete.
- V. Safe Atmosphere: The Contractor shall provide sufficient temporary ventilation during painting operations in enclosed areas to remove moisture and solvents, and to keep the atmosphere safe from harmful or dangerous fumes and dust levels for personnel.
- W. Workmanship: Only skilled painters shall perform the work and specialists shall be employed where required. Finished surface shall not show brush marks or other

- X. OSHA Silica Rules: General contractor is to comply with OSHA's Occupational Exposure to Respirable Crystalline Silica rule.
- Y. Irregularities. Top and bottom edges of doors shall be painted as required for the adjacent surfaces. Undercoats on hollow metal shall be thoroughly and uniformly sanded with No. 00 sandpaper, or equal abrasive, to remove all surface defects and provide a smooth, even surface.
- Z. Mixing: All paints and coatings shall be mixed in accordance with the manufacturer's instructions on the printed label. The Contractor shall provide galvanized iron pans of sufficient size to contain all mixing pails and mix all paints and ingredients therein.
- AA. Rates of Application: Paints shall be applied so as to give a coverage per gallon not greater than that recommended by the manufacturer. Quantities of paint used for successive coats on the various parts of the work shall be recorded in a manner satisfactory to the Engineer.
- **BB**. Touch-Up of Shop-Primed and Finished Items: Touch-up of any and all damaged portions and imperfections in shop-primed and finished items shall be accomplished using the same paint as used for the shop prime and finish. Surface shall be prepared prior to touch-up by wire brushing and sanding to remove rust, scale and loose paint.
- CC. Aluminum and Incompatible Surfaces: Where aluminum surfaces come in contact with incompatible metals, lime, mortar, concrete or other masonry materials, one field coat of paint indicated as Symbol "A" under Article 2.02 "SCHEDULE OF PAINTS" in this specification shall be applied.
- DD. Concealed Surfaces: All wall surfaces which will be concealed by equipment shall be painted before equipment installation.
- EE. Drying: The paint shall dry, under normal conditions, dust free in 18 hours, and the film shall be sufficiently dry to recoat in not more than 72 hours.

## 3.02 CLEANING AND REPAINTING

A. The Contractor shall touch up and restore any finish damaged. Paint or other finishes spilled, splashed or splattered shall be removed from all surfaces using care so as not to mar any surface or item being cleaned.

B. The Contractor shall rectify any failures or breakdowns, loosening of the paint or coatings within a year after acceptance of work, regardless of the paint systems used. This will require removal of the entire coating where failure occurs and repainting with the coating system previously specified. Patching will not be allowed.

## **END OF SECTION**

#### SECTION 16170

#### GROUNDING AND BONDING

#### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install grounding systems complete in accordance with the minimum requirements established by Article 250 of the NEC. Article 250 of the NEC shall be considered a minimum requirement for compliance with this Specification.
- B. Grounding of all instrumentation and control systems shall be furnished and installed in accordance with the manufacturer/system requirements and IEEE 1100. Conflicts shall be promptly brought to the attention of the Engineer.
- C. In addition to the NEC requirements, building structural steel columns shall be permanently and effectively grounded:

#### 1.02 CODES AND STANDARDS

- A. Equipment and materials covered under this Section shall be designed, manufactured, and/or listed to the following standards as applicable:
  - 1. UL 467 Grounding and Bonding Equipment
  - 2. IEEE 81 Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
  - 3. IEEE 1100 Recommended Practice for Power and Grounding Electronic Equipment

#### 1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01300, Submittals, the Contractor shall obtain from the equipment manufacturer and submit the following:
  - 1. Shop Drawings
  - 2. Reports of certified field tests.
- B. Each submittal shall be identified by the applicable specification section.

#### 1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
  - 1. Product data sheets.
  - 2. Drawings and written description of how the Contractor intends to furnish and install the grounding system.

## PART 2 -- PRODUCTS

## 2.01 MANUFACTURERS

A. The equipment covered by these specifications shall be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

#### 2.02 GROUND RODS AND GRID

- A. Ground rods shall be rolled to a commercially round shape from a welded copper-clad steel manufactured by the molten-welding process or by the electro-formed process (molecularly bonded). They shall have an ultimate tensile strength of 75,000 pounds per square inch (psi) and an elastic limit of 49,000 psi. The rods shall be not less than 3/4 inch in diameter by 10 feet in length; and the proportion of copper shall be uniform throughout the length of the rod. The copper shall have a minimum wall thickness of 0.010 inch at any point on the rod. Ground rods shall be UL 467 listed. The ground rods shall be manufactured by Erico Products, Blackburn, or equal.
- B. Except where specifically indicated otherwise, all exposed non current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductors in nonmetallic raceways and neutral conductors of wiring systems shall be grounded.
- **C.** The ground connection shall be made at the main service equipment and shall be extended to the ground grid surrounding the structure. The ground grid shall also be connected to the point of entrance of the metallic water service. Connection to the water pipe shall be made by a suitable ground clamp or lug connection to a plugged tee. If flanged pipes are encountered, connection shall be made with the lug bolted to the street side of the flanged connection.
- D. Where ground fault protection is employed, care shall be taken so that the connection of the ground and neutral does not interfere with the correct operation of the ground fault protection system.
- 2.03 FITTINGS

A. Grounding connections to equipment shall be bolted. Cable end connections shall be made by hydraulic crimp or exothermically welded. Split bolt type connectors are not acceptable. Fittings shall be UL 467 listed.

#### 2.04 EXOTHERMIC WELDS

A. All exothermic welding shall be completed per welding kit manufacturer's instructions. Exothermic welds shall be CadWeld by Erico or ThermoWeld.

#### PART 3 -- EXECUTION

#### 3.01 INSTALLATION

- A. Metal surfaces where grounding connections are to be made shall be clean and dry. Steel surfaces shall be ground or filed to remove all scale, rust, grease, and dirt. Copper and galvanized steel shall be cleaned with emery cloth to remove oxide before making connections.
- B. Ground Grid
  - 1. A main ground grid shall be provided for each structure and interconnecting structure grids consisting of driven ground rods as shown on the Drawings. Ground rods shall be driven straight down into the earth, or if objects are encountered, at an angle to avoid the obstruction.
  - 2. The ground rods shall be interconnected by the use of copper cable exothermically welded to the rods. The grounding cables shall be installed after the excavations for the building have been completed and prior to the pouring of concrete for the footings, mats, etc. Copper "pigtails" shall be connected to the ground grid and shall enter the buildings and structure from the outside and shall be connected to steel structures, and equipment as described in this Section and as required to provide a complete grounding system. The copper pigtails shall be exothermically welded to the ground grid, and connected to building reinforcement steel by hydraulic crimp.
  - **3**. Grounding conductors shall be continuous between points of connection; splices shall not be permitted.
  - 4. Where conductors are exposed and subject to damage from personnel, traffic, etc., conductors shall be installed in metal raceway. The raceway shall be bonded to the grounding system.
  - 5. Where subsurface conditions do not permit use of driven ground rods to obtain proper ground resistance, rods shall be installed in a trench or plate electrodes shall be provided, as applicable and necessary to obtain proper values of resistance.
  - 6. Buried exothermic welds and ground ring shall not be backfilled until inspected by Engineer.
- C. Raceways

1. Conduit which enters equipment such as switchgear, motor control centers, transformers, panelboards, variable frequency drives, instrument and control panels, and similar equipment shall be bonded to the ground bus or ground lug, where provided, and as otherwise required by the NEC.

### 3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:
  - 1. Witnessed Shop Tests
    - a. None required.
  - 2. Field Tests
    - a. Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 1, and NETA Acceptance Testing Specifications, latest edition.
    - b. Fall of potential tests shall be performed on the ground grid per IEEE81 recommendations by a third party, independent testing firm. A fall of potential plot shall be submitted at the conclusion of testing for Engineer review. Documentation indicating the location of the rod and grounding system as well as the resistance and soil conditions at the time the measurements were made shall be submitted. Testing shall show that the ground grid has 5 ohms resistance or less. Due to soil conditions and/or unforeseen field conditions, ground resistances greater than 5 ohms may be acceptable if specifically approved in writing by the Engineer. Ground resistance measurements shall be made in normally dry weather not less than 48 hours after rainfall and with the ground grid under test isolated from other grounds.
    - c. Continuity tests for the grounding electrode conductor shall be performed. Test will be accepted when a resistance of less than 1 ohm is shown for this conductor.

## END OF SECTION

#### SECTION 16670

#### LIGHTNING PROTECTION SYSTEM

#### PART 1 – GENERAL

#### 1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, test, and place in satisfactory operation a complete lightning protection system as specified herein. This is a performance specification. The Drawings do not show a complete lightning protection system design. The Contractor shall retain the services of a firm specializing in the design, installation, and testing of lightning protection systems.

#### 1.02 CODES AND STANDARDS

- A. The system shall comply with the following codes and standards:
  - 1. Underwriters Laboratories, Inc. (U.L.):
    - a. U.L. 96 Lightning System Components
    - b. U.L. 96A Installation Requirements for Lightning Protection Systems
    - c. U.L. 467 Grounding and Bonding Equipment
  - 2. National Fire Protection Association (NFPA):
    - a. ANSI/NFPA 780 Lightning Protection Code
  - 3. Lightning Protection Institute (LPI):
    - a. LPI-175 Standard of Practice

#### 1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01300, Submittals, the Contractor shall obtain from the equipment manufacturer and submit the following:
  - 1. Shop Drawings
  - 2. Operation and Maintenance Manuals
  - 3. Spare Parts List
  - 4. Test Reports

5. UL Master Label Certification

#### 1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings for each lightning protection system shall include, but not be limited to:
  - 1. Product data sheets.
  - 2. Complete U.L. approved, full size layout and installation drawings/details with clearly marked dimensions. Drawings shall indicate the exact location of all system components. Drawings shall be signed by a full-time employee of the lightning protection system manufacturer who is in responsible charge of this project and has been engaged in the business for at least ten (10) years.
  - 3. Weights of major all components.
  - 4. Bill of material list for each lightning protection system.
  - 5. Manufacturer's installation instructions.
  - 6. Manufacturer's and installer's standard warranty.
  - 7. Evidence of the designer/installers UL listing.
- D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

#### 1.05 OPERATIONS AND MAINTENANCE MANUALS

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 1. The manuals shall include:
  - 1. Instruction books and/or leaflets.
  - 2. Recommended spare parts list.

- 3. Final as-built construction drawings included in the shop drawings incorporating all changes made during the installation.
- 4. All other information that was included in the shop drawing submittal.

#### 1.06 SPARE PARTS

A. The lightning protection system shall be furnished with all spare parts as recommended by the equipment manufacturer.

In addition to the manufacturer recommended spare parts, the Contractor shall furnish the following minimum spare parts for each structure provided with a lightning protection system under this Contract:

No. Required	Descriptions
2	Air Terminals
2	Point Tip Protectors

- B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the Work, at which time they shall be delivered to the Owner.
- D. Spare parts lists, included with the shop drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- E. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same part number.

#### PART 2 -- PRODUCTS

#### 2.01 MANUFACTURERS

- A. The lightning protection systems covered by this Specification shall be furnished using standard components of proven performance as manufactured by reputable concerns. The systems shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed.
- B. The lightning protection systems shall be furnished and installed by A-C Lightning Security, Inc., Thompson Lightning Protection, Inc, Lightning Elimination and Consultants, Modern Lightning Protection Company, Inc. or approved equal.

- C. System designer/supplier qualifications shall be as follows:
  - 1. System components shall be manufactured by a company specializing in lightning protection equipment with a minimum of 5 years documented experience. Company shall be listed in the Section entitled "Lightning Conductor, Air Terminals and Fittings" of the U.L. "Electrical Construction Materials Directory" for at least 5 years previous to this Contract's bid opening date.
  - 2. The system designer/installer shall be an authorized installer of manufacturer with a minimum of 5 years of documented experience. Designer/Installer shall be listed in the section entitled "Lightning Protection Installation" of the U.L. "Electrical Construction Materials Directory" for at least 5 years previous to this Contract's bid opening date.

## 2.02 LIGHTNING PROTECTION SYSTEMS

- A. General
  - 1. All components and parts of the lightning protection system shall be as specified herein. The materials used shall meet or exceed the material specification requirements of the Underwriters Laboratories, Inc. All materials shall be marked with a UL label or stamp.
  - 2. The complete lightning protection system shall be inspected and included in the Master Label certification.
- B. Conductors
  - 1. Conductors shall be aluminum cable, consisting of a minimum of 24 strands of No. 14 AWG aluminum wire. Copper conductors shall be furnished and installed only where required and when in contact with the earth. Where termination of copper conductors is required to aluminum parts, suitable bi-metallic connectors approved for the purpose shall be furnished and installed.
- C. Fittings
  - 1. Fittings shall be the bolted type with stainless steel bolts, nuts, and washers. Fittings shall be of cast metal construction specifically designed for the application. Crimp-type fittings are not acceptable. Bi-metallic type fittings shall be furnished where required.
- D. Fasteners
  - 1. Fasteners shall be manufactured from non-corrosive material of ample strength and rigidity for the application.
- E. Bases

- 1. Bases shall be bolted style provided with the model to suit the application (i.e. parapet, standing seam, etc.). Bolts, nuts, and washers shall be made of stainless steel. Bases shall be of aluminum or bronze construction, compatible with the material of the surface to which it is attached. Crimp-type bases are not acceptable
- F. Ground Rods
  - 1. Ground rods shall be 3/4-inch by 10-foot 0-inch sectional type copper-clad steel rods; as specified in Section 16170, Grounding and Bonding; quantity as required. Ground rods and all associated hardware shall be UL 467 listed.
- F. Air Terminals
  - 1. Air terminals shall be solid aluminum. Air terminals shall be tapered or blunt tip type to suit the application and furnished with air terminal bases and safety tips (ball or bullet type) for impalement protection.
  - 2. At parapets, air Terminals shall be installed on handrails, using manufacturer provided clamps.
- G. Thru-Roof Hardware
  - 1. Thru-roof penetrations shall have stainless steel nuts, bolts, and washers. Sealing washers and sealing boots shall be provided as required and shall be compatible with the roofing material. Conductor connections to this roof hardware shall be by bolted connection. Crimp type connections are not acceptable.

#### PART 3 -- EXECUTION

## 3.01 INSTALLATION

- A. The lightning protection system shall be furnished and installed in accordance with the manufacturer's installation instructions. One (1) copy of these instructions shall be included with the system components at time of shipment. The system components shall be suitably protected until accepted by the Owner.
- B. The equipment shall be installed in accordance with the manufacturer's recommendations. This shall include, but not be limited to the following:
  - Course all main down conductors to maintain a downward or horizontal run free of pockets or sags. Maintain an eight-inch (8") minimum radius and make no bend greater than 90 degrees. Follow the most direct route with inductance bonding conductors maintaining the horizontal or downward course of the main conductor. Interconnect roof conductors to provide at least two paths to ground from each terminal and to form closed loops. Follow the most direct path possible with down conductors between roof conductors and ground terminals. All down

conductors for new occupiable buildings shall be placed in a concealed manner. Down conductors for existing occupiable structures, tanks, basins, and other non-occupiable structures may be installed exposed.

- 2. Install ground connections at no less than 60-foot intervals and at each down conductor on perimeter. If the structure has a ground grid, the ground rods from that grid may be used for connection to the down conductors. At each ground connection, determine the extent of the grounding arrangement according to the volume and type of soil encountered and the lowest expected moisture content. Have the Owner's representative observe each ground connection. Bond together all electrical service, telephone service, and lightning protection grounds to all underground metallic piping systems as required by Article 250 of the NEC.
- 3. The structural steel frame (where provided) may substitute for main down conductors provided the frame is electrically continuous and of adequate cross-section. Where the steel frame is utilized, connect the roof conductor to steel at least as often and at the same column as the ground connections. Make connections to steel with exothermic welds wherever possible. Provide bonding as required to make the entire metal frame continuous.
- 4. Bond all sizable metal objects within 6-feet of down, roof, or grounding conductors to the system. Use only approved fittings and conductors.
- 5. Wherever possible problems with corrosion are encountered, use substitute approved materials and/or provide corrosion protection. Use bimetallic or other specially designed and approved connectors where dissimilar metals are to be joined.
- 6. Install air terminals within 2-feet of the edge of structure and at intervals not greater than 20feet along perimeter and peak. Provide additional terminals to limit spacing across roof to 50feet maximum. Bond any exposed metallic object or surface to the roof conductor. Flash all terminal or conductor penetrations in the roof to conform to the roofer's requirements.
- 7. Record each ground connection location and mark up a reproducible copy of the approved shop drawings with their location. Also, indicate any substantial field modifications on these drawings. These drawings shall be included in the O&M manual.
- 8. Log all continuity tests of metal framing, ground grid connections, bonding, and similar connections. Indicate the location of tests or plans. Include test results in the O&M manual.
- 9. Retain U.L. to make an inspection of the completed installation and issue a Master Label Certification. Furnish a copy of the Certification to the Owner upon receipt.

### 3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:
  - 1. Certified Shop Tests and Reports
    - a. None Required.

- 2. Field Tests
  - a. After installation, the lightning protection system shall be tested for continuity to the ground grid. The tests shall be made by the lightning protection system installer. Test shall be as follows:
    - i. Record the resistance between each down conductor and the ground grid to ensure a suitable low-resistance connection. All resistance values shall be 1 ohm or less. Test shall be made after the ground grid has been installed and tested per the requirements of Section 16170, Grounding and Bonding.

## **END OF SECTION**

## **CITY OF PHILADELPHIA**



# STANDARD CONTRACT REQUIREMENTS FOR PUBLIC WORKS CONTRACTS

# **PROCUREMENT DEPARTMENT**

January 1, 2019

## **CITY OF PHILADELPHIA**

# STANDARD CONTRACT REQUIREMENTS

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#### STANDARD CONTRACT REQUIREMENTS

#### A. **DEFINITIONS**

1. <u>Definitions</u>. The terms used in the Contract Documents shall have the following meanings:

a. "ADA" has the meaning set forth in Paragraph 113 below.

b. "Amendment" means a written modification or change to any Contract Document signed by both Parties.

c. "Applicable Law" means all applicable present and future federal, state or local laws, ordinances, executive orders, rules, regulations and all court orders, injunctions, decrees and other official interpretations thereof of any federal, state or local court, administrative agency or governmental body, including the City of Philadelphia ("City"), the Commonwealth of Pennsylvania ("Commonwealth") and the United States of America ("USA"). Applicable Law includes, without limitation, laws, etc. relating to the environment, the Philadelphia Home Rule Charter ("HRC"), as amended from time to time, The Philadelphia Code ("Code"), as amended from time to time, and the specific laws set forth in Paragraphs 107–116 below, each as amended from time to time. Sellers submit quotes, and the parties execute, deliver and perform their respective obligations under the Contract, under and pursuant to the applicable provisions of all Acts of the General Assembly of the Commonwealth and applicable ordinances of the City, as such enactments may hereafter be supplemented or amended.

d. "Application for Final Estimate" has the meaning set forth in Paragraph 56 below.

e. "Application for Payment" has the meaning set forth in Paragraph 52 below.

f. "Application for Semi-Final Estimate" has the meaning set forth in Paragraph 55 below.

g. "Bid Solicitation" means a public invitation to submit competitive Quotes for a specific City contract or City contracts that is or are issued by the Procurement Department in accordance with Sections 8-200(1), 2(a) and 2(b) of the Philadelphia Home Rule Charter. A Bid Solicitation includes all addenda thereto issued by the Procurement Department.

h. "Change Order" means an instrument altering the scope of the work under the Contract issued under Paragraph 48 below.

i. The "City" means The City of Philadelphia, a corporation and body politic existing under the laws of the Commonwealth, and includes its various executive and administrative departments, agencies, boards and commissions, including the Department, and its legislature, City Council. The City is a City of the First Class under the laws of the Commonwealth.

j. "City Work" has the meaning specified in Paragraph 107(d) below.

k. "Contingent Price" means a price for a unit or component of work specified on the "Contingent Price List" published from time to time by the City.

1. "Commonwealth" means the Commonwealth of Pennsylvania.

m. "Contract" means the agreement of the Parties evidenced by the Contract Documents.

n. "Contract Documents" means the Standard Contract Requirements; the Department's Standard Details and Specifications, as they apply; the Department's General Bidding and Contract Requirements; the Technical Specifications; the Quote; the Plans with all of the notes thereon (excluding any records or reports of test borings, underground structures, and test piles); the Notice to Proceed ("NTP"), the Notice of Contract Award

("NCA"), the performance bond and the payment bond, as prepared by the Department and issued with the Bid Solicitation, and includes all exhibits, schedules and addenda, if any, to any of the foregoing documents, and any and all Amendments and Change Orders.

o. "Contractor" means the Person that has entered into the Contract with the City, has had its authorized individual(s) sign the Contract Documents on behalf of the Person but does not include, without the City's written consent, any subsidiary, affiliate, agent, etc., or parent company, if any, of the Contractor.

p. "Current Estimate" has the meaning set forth in Paragraph 53 below.

q. "Department" means the department, board, commission, or agency of the City for which the Contractor carries out the work under the Contract, except when the Department of Public Property ("DPP") supervises the Contract, in which case "Department" means the Department of Public Property.

r. "Disputed Change Order" means a Change Order issued by the City under Paragraph 49 below.

s. "Event of Insolvency" means (a) the filing of a voluntary petition by the Contractor under the Federal Bankruptcy Code or any similar state or federal law; or (b) the filing of an involuntary petition against The Contractor under the Federal Bankruptcy Code or any similar state or federal law which remains undismissed for a period of forty-five (45) days; or (c) the Contractor's making of an assignment for the benefit of creditors; or (d) the appointment of a receiver for the Contractor or for the property or assets of the Contractor, if such appointment is not vacated within forty-five (45) days thereafter; or (e) any other proceeding under any bankruptcy or insolvency law or liquidation law, voluntary or otherwise; or (f) the Contractor proves unable to pay its obligations as they mature; or (g) the Contractor is insolvent as otherwise defined under any Applicable Law.

t. "General Bidding and Contract Requirements" means the additional bidding and contract conditions and requirements specifically prepared by the Department for a specific Bid Solicitation (which may accompany the Technical Specifications) and may from time to time include, but not be limited to, Quote proposal forms, special or additional or supplementary instructions to Sellers, minimum wage rate schedules, prevailing wage rate schedules, contingent price lists, requirements of the City's Office of Economic Opportunity ("OEO"), and general tax requirements.

u. "Inspector" means the representative of the City's Project Manager assigned to inspect work and the delivery of services under the Contract.

v. "Lump Sum Bid Breakdown" has the meaning set forth in Paragraph 52 below.

w. "Notice of Contract Award" (NCA) means a notice from the City to the Seller informing the Seller of the City's determination to award the Contract to the Seller.

x. "Notice to Proceed" (NTP) means a notice from the City to the Contractor authorizing the Contractor to commence work under the Contract.

y. "Operating Commissioner" means the director, commissioner, or other head of the Department issuing the work to the Contractor pursuant to the Contract.

z. "Parties" means the City and the Contractor, and a "Party" means either the City or the Contractor.

aa. "Person" means any individual, sole proprietorship, association, company, firm, partnership, limited partnership, joint venture, corporation, limited liability company or other form of entity or association recognized at law.

bb. "PGW" means the Philadelphia Gas Works.

cc. "Plans" means the general plans and design drawings which accompany the Technical Specifications, the Standard Details and Specifications, and such detail and supplementary drawings as may be furnished from time to time.

dd. "Procurement Commissioner" means the head of the City's Procurement Department, or his or her designee.

ee. "Procurement Department" means the Procurement Department of the City.

ff. "Project" means all of the work which the City seeks to complete at the Project site, including, but not limited to, the work which the Contractor has agreed to perform under the Contract. The Project includes other work at the Project site by the City and by other contractors pursuant to other City contracts.

gg. "Project Manager" means the designated representative of the City officer in charge of the construction branch, division or unit of the Department, or the individual specifically designated as "Project Manager" in the Technical Specifications, and any other individual who may be designated in writing by the Project Manager as his or her representative. The City may delegate or provide for the performance of certain of the duties and functions of the Project Manager by architectural or engineering firms under contract with the City.

hh. "Proposal" means a Seller's price and other specific terms and conditions included in a Quote.

ii. "Public Works Contract(s)" means any contract awarded by the Procurement Department for the construction, reconstruction, alteration, or repair of any public building or other public work or public improvement within the City and County of Philadelphia.

jj. "Quote" means a Seller's signed response, including a Proposal, submitted to the Procurement Department pursuant to a Bid Solicitation.

kk. "Responsibility" or "Responsible" means the capacity to perform a City contract in accordance with its terms and conditions. Elements of Responsibility include the following, among others: judgment, skill, promptness, faithfulness, skillful workers, honesty of the Contractor, financial standing, reputation, experience, resources, facilities, past history of adherence to plans and specifications, capacity and ability to do the work according to the plans and specifications, availability and efficiency, and such other factors as may be determined by law and the City.

ll. "Seller" means a Person submitting a Quote, signed by the Person, to the Procurement Department pursuant to a Bid Solicitation. Seller includes only the Person who signs the Contract. Seller does not include, without the written consent of the City, any subsidiary, affiliate, agent, etc., or parent company, if any, of the Person.

mm. "Semi-Final Estimate" has the meaning set forth in Paragraph 55.

nn. "Shop Drawings" means all drawings, diagrams, illustrations, brochures, schedules, performance charts, instructions, and other data which are prepared by the Contractor, its Subcontractors, suppliers, or distributors, or equipment fabricators or manufacturers, and which illustrate the manufacture or fabrication of the product or equipment or any part thereof, and which are submitted to the Department to establish that the materials, articles and components of equipment Contractor proposes to supply will, when installed, meet all requirements of the Contract Documents.

oo. "Standard Contract Requirements" or "SCR" means these Standard Contract Requirements of the City in connection with the Bid Solicitations for, and the award, execution, and performance of Public Works Contracts, except as modified by the Department's General Bidding and Contract Requirements, the Technical Specifications and Plans and any other special requirements for the Contract. These Standard Contract Requirements are attached to and form an integral part of the Contract Documents.

pp. "Standard Details and Specifications" means the standard details and specifications for specific,

recurring types of work or components thereof, as may be issued by the Department from time to time, e.g., the Standard Details and Standard Specifications for Sewers, as issued by the Philadelphia Water Department, or the Standard Construction Items, as issued by the Department of Streets.

qq. "Structures" has the meaning set forth in Paragraph 83 below.

rr. "Subcontract" means a contract made between the Contractor and a Subcontractor, or between a Subcontractor and a sub-subcontractor at any tier, providing for the completion of one or more portions of the work which the Contractor has agreed to perform under the Contract, including agreements for the manufacture or supply of equipment, systems or components forming part of such work.

ss. "Subcontractor" means a Person performing at any tier under a contract with the Contractor or another Subcontractor one or more portions of the work which the Contractor has agreed to perform under the Contract. Subcontractors shall include, without limitation, vendors, manufacturers, suppliers, or other Persons contracting with a Subcontractor or the Contractor for the manufacture or supply of equipment, systems or components forming part of the work under the Contract. There is no contractual relationship (privity of contract) between the Contractor's Subcontractor, or a Subcontractor's subcontractor, and the City.

tt. "Substantial Completion" or "Substantially Complete" or "Substantially Completed" means that construction is sufficiently complete in accordance with Contract Documents and certified by the Project Manager, as modified by Change Orders or amendments, so that (a) the work under this Contract can be used, occupied or operated for its intended use, and (b) all applicable permits and licenses, including, if applicable, a statement or certificate of occupancy, shall have been duly issued by all government offices, including those of the City. In no event shall the Contract be certified as substantially complete until the Contractor has completed at least ninety percent (90%) of the work under the Contract.

uu. "Technical Specifications" means the written and detailed requirements, prepared by the Department, or its consultants or representatives, for materials, equipment, systems, standards and workmanship for the work under this Contract and related services to be performed under the Contract.

vv. "Unbalanced Quote" means an offer by the Contractor which (1) contains extremely low prices on items or types of work which are, as determined by the City in its sole discretion, unimportant or infrequently ordered or performed, and extremely high prices on items or types of work which are frequently ordered or performed, resulting in an effort to qualify as the low Seller while charging disproportionately high prices for certain items or types of work; or (2) contains prices for phases of the work to be performed early in the course of the work under this Contract that are, as determined by the City in its sole discretion, disproportionately high relative to prices for later phases of the work, resulting in payment of a disproportionately high percentage of the total Contract price early in the Contract period.

ww. "Working Days" means calendar days, less allowances for days or parts of days, in increments of one-quarter (1/4) day, for conditions entirely beyond the control of the Contractor as defined in Paragraph 25(c)(2); and also excludes New Year's Day, Memorial Day, July 4<sup>th</sup>, Labor Day, Thanksgiving Day and Christmas Day, or the Monday thereafter when these days occur on Sunday, and Saturdays and Sundays shall not be considered as Working Days.

xx. "Working Drawings" means those drawings prepared by the Contractor to supplement the Plans and Shop Drawings to accurately and clearly depict all working and installation dimensions, arrangement and sectional views, units of equipment in the proposed positions for installation, details of required attachments and connections, and dimensioned locations between units and in relation to the existing and proposed structures. Working Drawings shall show all necessary details and information for making connections between units, accessories, and appurtenances.

2. <u>Interpretation; number, gender</u>. The words "herein" "hereof" and "hereunder" and other words of similar import refer to the Contract as a whole, including all of the Contract Documents, and not to any particular article, paragraph, subparagraph or clause contained in the Contract Documents. Whenever the

context requires, words used in the singular shall be construed to include the plural and vice versa, and pronouns of any gender shall be deemed to include the masculine, feminine and neuter genders.

#### B. QUOTE SUBMISSION REQUIREMENTS

#### 3. <u>Qualifications of Seller</u>.

a. Each Seller must demonstrate to the satisfaction of the City that it is Responsible, capable of performing the work under the Contract, and has successfully completed contracts equivalent in scope and nature, and comparable in magnitude. Seller must further demonstrate that: 1) it has the necessary financial resources, equipment, and workforce to perform the work under the Contract in a proper and satisfactory manner, in accordance with the Contract Documents, and within the time specified, and 2) that the possible award of this Contract to the Seller will not, in the City's sole discretion, overextend the Seller because it is already performing another City contract or other contract(s) or project(s).

b. As required by Section 17-101, as amended, of The Philadelphia Code, entitled "Prequalification of Prospective Bidders for Contracts for Construction of Public Works", all Sellers shall submit to the Procurement Department through PHLContracts, by the date specified in the Quote advertisement(s), a "City of Philadelphia Prequalification Questionnaire," for the purpose of determining the Seller's Responsibility. Should the Seller omit any required information, or refuse to give any required information, or should the information submitted by Seller, in the judgment of the Procurement Commissioner, taking into consideration the recommendations of the Operating Commissioner, reveal that the Seller is not sufficiently equipped or qualified to enter into or perform the Contract, the City shall not accept any Quote from such Seller(s), and the Procurement Commissioner shall notify the Seller to that effect. In such case, Section 17-101 of The Philadelphia Code shall govern any appeal to which the Seller may be entitled.

#### 4. Examination of Contract Documents and Site.

a. Sellers shall thoroughly acquaint themselves with the Contract Documents, including, without limitation, a careful study and review of the Plans and Technical Specifications. Sellers shall examine in detail the Project site and shall acquaint themselves with conditions affecting the work under the Contract and the overall Project, and, when applicable, the condition of walls and foundations of overlying and adjacent structures, the character of the paving, and the soil and subsurface soil. The Quote shall be prepared with due regard to the provisions of the Contract Documents and to the conditions existing or to be anticipated at the Project site.

b. Where test borings, test piles, and existing underground and above-ground structure locations are reported on, or included with, the Contract Plans or Technical Specifications, or where they are provided as separate Plans or Technical Specifications, they are for the information of the City only and are not provided to Sellers to show the conditions to be encountered by the Seller; the correctness, accuracy, or interpretation of the information is not guaranteed or warranted in any fashion by the City; and in no event is any boring or underground or above-ground structure information to be considered as a part of the Contract, notwithstanding any provision to the contrary that may appear in the Technical Specifications. If a Seller uses any of this information in preparing its Quote, Seller shall assume any and all risks resulting from conditions that differ from the conditions or approximation shown on the Plans or Shop Drawings.

1. If Seller desires to obtain similar data or information, or to conduct an independent subsurface investigation of the Project site, the Seller must notify the Department in writing at least ten (10) days prior to the date for opening of Quotes, or not later than five (5) days after the date on which Quotes are first advertised by the City, whichever date is earlier. Upon written notice from Seller, the City shall afford Seller the opportunity, at Seller's sole expense, to make test borings or soundings, to drive test piles, or to dig test pits on that portion of the Project site in which the work under this Contract will take place. Seller shall be responsible for complying with all Applicable Law relating to such activity. The foregoing to the contrary notwithstanding, the City reserves the right to reject such investigations by any Seller when the City deems such rejection to be in the City's best interest. If the City permits such investigations by any Seller, then (a) each such Seller, prior to its entry onto the Project site, shall deliver to the City a certificate of insurance conforming to the

requirements of Paragraph 30 below, and a License Agreement in the form provided by the City; (b) each such Seller shall indemnify, defend and hold the City harmless from and against any and all claims, causes of action, suits, damages, losses, costs and expenses, whether for personal injury or property damage or for any other reason, arising out of such Seller's entry on the Project site; (c) such Seller covenants and agrees that it shall restore the Project site to the same condition as existed prior to such Seller's entry onto the Project site; (d) the City reserves the right to require the delivery of payment and performance bonds prior to any entry onto the Project site by such Seller; (e) in the event more than one Seller seeks to conduct such investigations, the City reserves the right to coordinate and schedule such investigations so as to minimize interference with the use of the Project site and other adjacent sites and any interference with other work at the Project site or adjacent to the Project site.

2. Failure of a Seller to notify the Department in writing of a Seller's desire to obtain such information shall operate as an absolute bar to any claim by a Seller that it had no reasonable means of making an independent subsurface investigation of the site.

c. If a Seller discovers or encounters any ambiguity or discrepancy in the Contract Documents in the course of preparing its Quote, the Seller shall promptly notify the Department of the ambiguity or discrepancy prior to the date and time for receipt and opening of Quotes. The City, so advised, may, at its sole discretion determine whether such ambiguity or discrepancy exists and whether any corrective action is necessary.

5. <u>Antibid-Rigging Act</u>. All Sellers, by submitting a Quote, certify that they have not committed or engaged in, or attempted to commit or engage in, a prohibited activity under the Antibid-Rigging Act, 62 Pa. C.S.A. § 4501, et seq., as amended, in connection with their Quote. In addition, all Sellers by submitting a Quote certify that the Seller has not been convicted or found liable for any act prohibited by any federal or state law in any jurisdiction involving conspiracy or collusion with respect to bidding on any public contract within the five (5) years prior to the date of the Quote; that the Seller acknowledges that a conviction or finding of liability for any act prohibited by federal or state law in any jurisdiction involving conspiracy or collusion with respect to submitting a Quote on any public contract within the three (3) years prior to the date of the Quote shall not prohibit the City from accepting a Quote from the Seller or awarding a Contract to the Seller, but may nonetheless serve as grounds for Seller's suspension or debarment at the sole discretion of the Procurement Commissioner, or may serve as grounds for a non-award of a Contract to the Seller on the basis of the Seller's lack of Responsibility.

6. <u>Multiple Quote Restriction</u>. No Seller shall be a party to more than one (1) Quote for the same Bid Solicitation. A violation of this condition may in the sole discretion of the Procurement Commissioner, result in rejection of any or all such Quotes in which the Seller is interested.

#### 7. <u>Quote Submission</u>.

a. By submitting a Quote, the Seller certifies that it is familiar with the Project site and the conditions affecting the Project site, that it has thoroughly reviewed the Contract Documents, and that all work can be completed for the amount stated in the Quote and within the Contract time specified. No Quote may be considered if received after the date and time for opening of Quotes established by the Bid Solicitation, nor may any Quote be modified after that date and time, except as provided herein or by Applicable Law. The time of Quote opening shall be the time displayed in PHLContracts. In the event of any discrepancy between actual time and the time displayed in PHLContracts, the latter shall determine the time of Quote opening.

b. It is the sole responsibility of the Seller to ensure that it has received any and all addenda and the Procurement Commissioner may, in his or her discretion, reject any Quote for which all addenda have not been executed and returned in accordance with the instructions provided therein.

c. For purposes of determining the basis of a contract award, in the event of a discrepancy between a unit price and an extended price for a work or line item, the unit price shall govern, and the extended price shall be re-computed by the City. If the amount set forth as a unit price is ambiguous, unintelligible, or uncertain for any cause, or is omitted entirely, or is the same amount as the extended price for a work or line item, then the amount set forth as the extended price shall govern for purposes of determining the basis of a contract award. In such event, the extended price shall be divided by the estimated quantity for the work or line item to

arrive at a re-computed unit price which shall thereafter govern for purposes of payment under Paragraph 45.

Where a unit or other price (including a unit price extension or the aggregate or total price) d. contained in the Quote contains a mistake or error in computation, or is otherwise ambiguous as to computation, or there is a discrepancy between a unit price and an extended price for a work or line item, and where the mistake, ambiguity, or discrepancy is not discovered prior to contract award and results in the award of a contract to the Seller, which award is later determined to be mistaken or erroneous, or the Contract Amount is determined to be erroneous, based upon a re-computation of the unit prices and the total price, the Contractor shall bear the sole financial risk of such mistake or ambiguity, and such mistake or ambiguity shall be construed solely against the Contractor and in favor of the City. In all such cases of price mistake, ambiguity, or discrepancy, if work under the Contract has not yet commenced, the City shall have the discretion, at its sole option, to formally rescind the Contract, if the Contractor is deemed not to be the low Seller in accordance with the rule set forth in Paragraph 7(c) above, or to unilaterally reform the Contract and the prices therein in accordance with the rule set forth in Paragraph 7(c), if the Contractor would still be deemed to be the low Seller notwithstanding any mistake, ambiguity, or discrepancy. If work under the Contract has already commenced, the City shall have the discretion, at its sole option, to make payment at the unit price as recomputed in accordance with Paragraph 7(c) above or at the mistaken or ambiguous unit price, or to dispute payment at the mistaken or ambiguous price. In the event of a rescission or reformation of the contract under this Paragraph, the Contractor agrees and acknowledges that it shall have no claim against the City, including any claim for breach of contract or breach of any other legal duty, or for lost profits, costs, damages, or expenses of any kind, arising out of the rescission or reformation. In the event that the City disputes payment to the Contractor at a mistaken or ambiguous unit price, and the parties cannot mutually agree upon a price to be paid to the Contractor for the item of work in question, the payment to the Contractor for the item of work shall not exceed the payment which would be made pursuant to Paragraph 51, and the City's liability to the Contractor for such item of work shall not in any event exceed the Contract Amount as specified in Paragraph 44.

**8.** <u>Quote Withdrawal.</u> P.L. 9, No. 4, Act of January 23, 1974, 73 P.S. § 1601, et seq., as amended, shall govern the withdrawal of Quotes for clerical mistakes. A Seller must provide the Procurement Department written notice of a right to withdraw a Quote under 73 P.S. § 1601, <u>et seq.</u>, within two (2) business days after the opening of Quotes.

9. Quote Responsiveness. Subject to the right of the Procurement Commissioner to waive irregularities and non-responsiveness as set forth below in this Paragraph 9, the Contract Documents are mandatory and must be strictly followed by all Sellers in the preparation and submission of their Quotes. After Quotes are opened, the Procurement Department, and other City departments or agencies where appropriate or specified, shall review all Quotes for responsiveness. Any Quote which is incomplete, obscure, conditional, unbalanced, which contains additions not called for, or irregularities of any kind, including alterations or erasures, or which fails to conform in any respect to the Contract Documents shall be deemed to be non-responsive and shall be rejected, except where the Procurement Commissioner, in his or her sole discretion, determines that the irregularity or non-responsiveness is not material or that a waiver of the irregularity or non-responsiveness is otherwise permitted by the Contract Documents or by Applicable Law. The Procurement Commissioner reserves the right to waive such irregularities or non-responsive matters in a Quote. The Procurement Department's determination of non-responsiveness shall be final and any Quote rejected as non-responsive shall not be eligible for Contract award. The Procurement Commissioner's determination of non-responsiveness is not appealable to the Court of Common Pleas.

10. <u>Security for Execution of Contract</u>. The Seller shall include with its Quote a bid bond in the amount of ten percent (10%) of the gross amount of the Quote. The gross amount of the Quote shall mean the sum of all items enumerated in the Quote, without reduction for "deduct" alternates. All Sellers must use the City's standard bid bond form, which is included in the Bid Solicitation or otherwise available at the City's Procurement Information Center (Rm. 170 Municipal Services Bldg.), in fulfilling the requirement of this Paragraph 10. The City shall not accept any other bid bond form. The Seller may not submit cash. Upon return of the duly executed Contract Documents by the lowest responsible Seller to the City's Law Department, the bid bonds of all Sellers shall be deemed released.

## 11. <u>Bid Processing Fee</u>.

a. In addition to bid security and any other fee or monies required, the Quote shall be accompanied by a non-refundable processing fee in the form of a separate check payable to the City or electronic payment as specified in the bid solicitation. The processing fee is based on the advertised cost estimate for the bid in accordance with the formula below. Cash is not acceptable.

- \$0 when the advertised cost estimate does not exceed \$10,000
- \$10 when the advertised cost estimate is or exceeds \$10,000 but does not exceed \$100,000
- \$30 when the advertised cost estimate is or exceeds \$100,000 but does not exceed \$300,000
- \$50 when the advertised cost estimate is or exceeds \$300,000 but does not exceed \$500,000
- \$100 when the advertised cost estimate is or exceeds \$500,000 but does not exceed \$1,000,000
- \$200 when the advertised cost estimate is or exceeds \$1,000,000 but does not exceed \$2,000,000
- \$300 when the advertised cost estimate is or exceeds \$2,000,000 but does not exceed \$3,000,000
- \$400 when the advertised cost estimate is or exceeds \$3,000,000 but does not exceed \$4,000,000
- \$500 when the advertised cost estimate is or exceeds \$4,000,000 but does not exceed \$5,000,000
- \$600 when the advertised cost estimate is or exceeds \$5,000,000.

b. For the purpose of estimating the amount of the bid processing fee the amount of work and labor or the quantities of materials or supplies to be furnished will be in accordance with the estimated quantities, but the City will not be bound by such estimates in regard to the actual quantities of work and labor or materials or supplies required to be furnished under the Contract.

c. Failure to submit the bid processing fee may result in the Seller's disqualification from submitting a Quote. In addition, if an award is made pursuant to the Bid Solicitation and Quote, any unpaid processing fees owed by the Seller to the City must be paid prior to the City's release of any payments to the Contractor under the Contract.

12. <u>Business Tax Requirements</u>. Any Contractor, or vendor of goods, wares and merchandise, or purveyor of services, who submits a Quote and is awarded a contract by the City or the School District of Philadelphia ("School District" or "SDP"), is subject to Philadelphia's business tax and applicable ordinances and regulations. Anyone who is awarded a contract by the City or the School District of Philadelphia pursuant to a formal bid solicitation, including a Bid Solicitation, shall be deemed to have entered into a contract within the City, and the subsequent delivery of goods into the City, or performance of services within the City constitutes "doing business" in the City and subjects the successful Seller to one or more of the following taxes: (a) Business Privilege Tax; (b) Net Profits Tax; and (c) City Wage Tax. The successful Seller, if not already paying the aforesaid taxes, is required to apply to the Department of Revenue for a tax identification number and to file appropriate business tax returns as provided by law.

13. <u>Tax Indebtedness</u>. The successful Seller shall represent, warrant and covenant that the Contractor and any entities controlling the Contractor, under common control with the Contractor, or controlled by the Contractor are not currently indebted to the City, and will not at any time during the term of the Contract be indebted to the City, and will not at any time during the term of this Contract (including any extensions or renewals thereof) be indebted to the City, for or on account of any delinquent taxes (including, but not limited to, taxes collected by the City on behalf of the School District of Philadelphia), liens, judgments, fees or other debts for which no written agreement or payment plan satisfactory to the City has been established. In addition to any other rights or remedies available to the City at law or in equity, the Contractor acknowledges that any breach or failure to conform to this representation, warranty and covenant may, at the option of the City, result in the withholding of payments otherwise due to the Contractor and, if such breach or failure is not resolved to the City's satisfaction within a reasonable time period specified by the City in writing, may result in the offset of any such indebtedness against said payments or the termination of this Contract for default (in which case the Contractor shall be liable for all excess costs and other damages resulting from the termination), or both.

14. <u>Commercial Activity License.</u> A Commercial Activity License ("CAL") is required for every Person desiring to engage in any business within the City, whether or not such Person maintains a place of business in the City. The successful Seller will be required to furnish a CAL number at the time of Contract

award, but no later than before the "Notice to Proceed" is issued. In the event the successful Seller has applied for, but not been issued, a CAL, a photocopy of the application will be acceptable. The CAL is a one-time license with no expiration date. Only one (1) license is needed for multiple locations or for multiple businesses for the same Person. If the Seller has never had a CAL assigned, the Seller may request one by filing a "Miscellaneous License Application". In order to be assigned a CAL, it is necessary to have a "Philadelphia Business Tax Account Number". This is a number assigned by the City's Department of Revenue to identify City tax accounts. If the Seller has never had a number assigned, the Seller may request one by filing an "Application for Philadelphia Business Tax Account Number". Any tax account previously opened for the Seller which is unsettled or delinquent will cause delay and may preclude the issuance of a new license. Applications may be obtained from the Department of Licenses and Inspection, License Issuance Unit.

**15.** <u>**Comparison of Quotes.**</u> Quotes will be compared on the basis of the aggregate of all the items of the Quote, unless otherwise specified in the General Bidding and Contract Requirements.

16. <u>Award of Contract</u>. The City shall make the Contract award to the lowest responsive, Responsible Seller. In the event of an absolute tie, the Procurement Commissioner shall make the Contract award in accordance with the best interests of the City. The Procurement Commissioner, in his or her sole discretion, may reject all Quotes, if deemed in the best interests of the City. The award of the Contract shall be governed in all respects by 62 Pa.C.S. §3911, as amended. However, the failure of the City to comply with the statutory requirement set forth in 62 Pa.C.S. §3911shall not operate as a release of the Seller, unless the Seller shall first notify the City in writing, prior to the end of the deadline set forth in 62 Pa.C.S. §3911, of the Seller's intent to demand compliance of the City with such requirement.

## 17. <u>Binding Contract and Execution of the Contract.</u>

a. The award shall not become a contract binding upon the City until after written Notice of Contract Award is made by the Procurement Department to the lowest responsive, Responsible Seller and until after all of the following conditions have been satisfied:

1. Successful Seller posts a proper performance bond and a proper payment bond, as provided for in Paragraph 18 below, on the City's current bond forms, within the time set forth in the Notice of Contract Award;

- 2. Successful Seller provides proof of the requisite insurance;
- 3. The Contract is approved as to form by the City's Law Department;

4. The Director of Finance and the City Controller's Office certify the availability of funds for the Contract; and

5. The Procurement Commissioner executes the Contract.

The Procurement Commissioner may, in his or her sole discretion, cancel any contract award if any of the above conditions are not satisfied, or if the Procurement Commissioner, in his or her sole discretion, determines cancellation of the contract award to be in the best interests of the City. In the event of such cancellation, the successful Seller agrees and acknowledges that it shall have no claim against the City, including any claim for breach of contract or breach of any other legal duty, or for lost profits, costs, damages, or expenses of any kind.

b. The execution of the Contract shall be made within sixty (60) days of the date of the award of the Contract and shall in any event be governed in all respects by 62 Pa.C.S. §3912, as amended. Any Seller who is not lawfully released from its Quote and who fails, refuses, or is unable to furnish the required performance and payment bonds or insurance, shall be liable to the City for the actual loss or damage sustained by the City as a result of the failure of the Seller to enter into the Contract. This remedy against the Seller shall be in addition to, and not in lieu of, any remedy or claim which the City may have under the bid bond posted by the Seller.

c. In no event shall the Contract awarded to the Contractor be construed or deemed to include, as a term, covenant or condition, any exception, addition or other term which the Seller may have included or as part of its Quote, except as may be expressly approved by the Procurement Commissioner pursuant to Paragraph 9 above.

18. <u>Contract Surety</u>. As provided by the Act of 1967, December 20, P.L. 869 (8 P.S. § 193.1, *et seq.*, as amended), the successful Seller will be required at the time of execution of the Contract to give security for the faithful performance of the work and for compliance with the Contract in the form of a performance bond, with a surety company approved by the City, in a sum equal to 100% of the amount of the Contract (equal to the Quote amount plus any contingency amount). In addition, as provided by the Act of 1967, December 20, P.L. 869 (8 P.S. § 193.1, as amended), the Contractor will be required at the time of execution of the Contract to give a payment bond, with a surety company approved by the City, in a sum one hundred percent (100%) of the amount of the Contract (equal to the Quote amount), conditioned for the full payment of Subcontractors and others furnishing labor and materials in the performance of the Contract. Both the performance and payment bonds must be submitted by the Seller to the City on bond forms provided by the City.

# C. <u>GENERAL REQUIREMENTS OF THE CONTRACT</u>

**19.** <u>Unauthorized Acts</u>. Any act of any City representative, official, agent, or employee, which is not within the scope of his or her authority as set forth in the Contract Documents or pursuant to the Philadelphia Home Rule Charter, shall not be binding on the City and shall not be deemed as a defense to the Contractor for the breach of any of the terms and conditions of the Contract.

20. <u>Cancellation of the Contract</u>. The Contractor will not be required to proceed with the work of the Contract, if:

- a. for any reason for which the Contractor it is not responsible, the Contractor cannot commence work within three (3) months from the date of execution of the Contract, except in the case of Contracts for street improvements, when six (6) months shall be the limiting period; or
- b. at any time prior to the issuance of the Notice to Proceed, the City, in its sole discretion, determines that it must reduce the scope of the work in an amount equal to or greater than twenty-five percent (25%) of the amount of the Quote. In such event, the City shall give notice thereof the Contractor.

In the event the Contractor cannot commence work, the Contractor shall give notice of cancellation within five (5) days after the date which is three (3) months from the date of execution of the Contract by the Contractor, except in the case of Contracts for street improvements, when the Contractor shall give such notice six (6) months from the date of execution of the Contract by the Contractor. In the event the City gives notice to the Contractor that the City has determined to reduce the scope of the work as provided in Paragraph 20(b) above, then the Contractor shall give notice of cancellation within five (5) days after the date the Contractor receives such notice from the City, otherwise the Contract shall remain valid.

This Paragraph 20 shall not apply to Contracts entered into for work the commencement of which is dependent upon progress of other contracts where this condition is plainly indicated by the character and location of such work at the time the City issues the Bid Solicitation and where Departmental constraints limit construction activities as described in the Technical Specifications. The City shall have no liability, by way of any penalty or otherwise, arising out of the cancellation of the Contract pursuant to this Paragraph 20.

21. <u>Termination for the Convenience of the City</u>. The City may terminate this Contract at any time during the term of the Contract, for any reason, including, without limitation, the City's own convenience. Written notice of termination shall be sent to the Contractor by the Procurement Commissioner and said notice shall set forth the effective date of the termination. Upon receipt of such notice of termination, the Contractor shall stop all work under the Contract. Upon termination under this Paragraph, the City shall be liable to the Contractor only for the cost and profit on the physical work then completed on the job site by the Contractor

and in place. The City shall have no additional liability or cost for termination of the Contract, including, but not limited to, any penalty, the Contractor's anticipated profits, the Contractor's estimating costs, or any loss on the work terminated. If termination of the Contract occurs prior to the issuance of the Notice to Proceed, the City shall not be liable to the Contractor for any cost or lost profits of the Contractor, regardless of whether the Contractor may have performed some physical work, except where the Project Manager has otherwise authorized in writing the commencement of work by the Contractor, in which case the City's liability to the Contractor shall be governed by the prior terms of this Paragraph. Termination of the Contract shall not affect any obligation or liabilities of either Party accruing prior to termination.

22. <u>Contractor's Obligations</u>. The work to be done under the Contract is set forth in detail in the Contract Documents. The Contractor shall furnish all labor, materials, plant, tools and appliances, and shall complete the work to the satisfaction of the Project Manager in the manner and within the time required in the Contract Documents at the prices set forth in the Contract. If at any time the Contractor's methods, workforce, or equipment appear to the Project Manager to be unsafe, insufficient, or inadequate for the proper performance of the provisions of the Contract, the Project Manager may order the Contractor to make such changes as the Project Manager to make such demands shall not relieve the Contractor of its obligations under the Contract. The Contractor shall maintain an office on the Project site where orders and instructions may be delivered, and shall give personal attention to the faithful performance of the work of the Contract. The Contractor shall employ a competent representative or superintendent on the Project site who shall have full authority to receive and execute orders, and to supply such labor, tools, and materials as may be required for the proper performance of the work.

23. <u>Performance of Work by the Contractor</u>. The Contractor is required to perform, on the site and with its own work force, work with a value of at least twenty percent (20%) of the original total contract price, exclusive of profit, overhead and the costs of procuring insurance and bonds. The Contractor shall submit with its Quote a complete description of the work it will perform (e.g., earthwork, paving, brickwork, roofing, etc.), the percentage of the total work this represents, and the estimated dollar value thereof.

24. <u>Materials and Equipment Loaned or Rented by the City</u>. Any materials, or equipment loaned or rented by the City to the Contractor for use on the particular job must be returned by the Contractor in kind or in cash, or as a credit to the Contract as determined by the Department or the Contractor will be considered in default of the Contract. The use or operation of such material or equipment shall be at the Contractor's own risk. The material or equipment shall be taken in its "AS IS" condition and the Contractor shall maintain the material or equipment in the same condition as when received, less normal wear and tear. Should damage occur, repair or replacement shall be made by the Contractor at its own expense, at the election and to the satisfaction of the City, in accordance with specifications approved in writing by the City.

# 25. <u>Contract Time</u>.

a. Times set forth in the Contract Documents for the performance of the work or any portions thereof are essential elements of the Contract. The Contractor shall begin work within ten (10) days from the date of issuance of the Notice to Proceed from the Department directing the Contractor to proceed with the work, and shall complete all work covered by the Contract Documents within the time specified in the General Bidding and Contract Requirements. The Contract completion date shall be determined by reference to the date of the issuance to the Contractor of the Notice to Proceed. In submitting a Quote, the Contractor acknowledges and agrees that the Contract time, as specified in the General Bidding and Contract Requirements, is a reasonable period for performing the work.

b. Except as may otherwise be required by the General Bidding and Contract Requirements or the Technical Specifications, the Contractor shall prepare and submit to the Project Manager, before starting work, a written and detailed construction schedule which shall, at a minimum, indicate the milestone dates on which the Contractor intends to start and end each of the principal items of work under the Contract and which shall indicate generally how the Contractor intends to complete the work under the Contract within the Contract time specified. The Contractor's construction schedule shall include a schedule or timeline for submission of Shop Drawings or other submittals to the Department, which shall be coordinated with the overall construction schedule and which allows for a reasonable time for the Department or the Project Manager to review the submittals or such time as the Department or the Project Manager may otherwise require pursuant to any of the Contract Documents. The Contractor's construction schedule shall in no event exceed the time allotted for completion of the Contract. From time to time, the Contractor shall revise and update its construction schedule to show changes to the schedule and any agreed revisions to the Contract time. The Contractor acknowledges that its failure to submit a written schedule to the Project Manager, as herein provided, shall preclude the assertion of any claims for delay or interference to Contractor's schedule or prosecution of the work and shall further preclude the assertion of any claim or request for an extension of the Contract time.

c. The Contractor shall be entitled to a reasonable extension of time for unavoidable delays or interference in completion of the Contract caused by:

1. Any acts or omissions of the City (but not PGW, or its contractors, or any other non-City utilities or authorities) which occur subsequent to the issuance of the Notice to Proceed and which cause delay in the completion of the Contract, by failure to give possession of the Project site, by changes in the Plans and Technical Specifications, or by requiring for any cause the suspension of the work under the Contract, except where such suspension is the result of a default or other act or omission by the Contractor. Any delay or postponement in the issuance of the Notice to Proceed shall not entitle the Contractor to an extension of the Contractor's remedies in the event of a delay or postponement in the issuance of the Notice to Proceed shall be governed solely by 62 Pa.C.S. §3913, as amended.

2. Causes not reasonably foreseeable by the Parties at the time of the complete execution of the Contract and which are entirely beyond the control and without the fault or negligence of the Contractor, including, but not limited to, acts of God, acts of the public enemy, acts of governmental authorities, quarantine restrictions, general strikes throughout the trade or freight embargoes not caused or participated in by the Contractor, fire, floods, pandemics and weather of unusual severity, such as hurricanes or tornadoes.

d. Delays caused by the Contractor's Subcontractors or materialmen shall not, in themselves, be cause for an extension of time by the City. To warrant an extension of time, such delays must be occasioned by the same causes specified in Paragraphs 25(c)(1) and (2) above.

e. Time extensions shall be handled as follows:

1. The Contractor, within five (5) days after the beginning of any delay or interference to its construction schedule, shall notify the Project Manager in writing of the occurrence of the delay or interference, stating with reasonable particularity the cause or causes of the delay or interference and the Contractor's intention to seek an extension of time.

2. Any claim by the Contractor for a time extension must be made in writing to the Project Manager within ten (10) days after the conclusion of the delay or interference for which a time extension is requested or the City will not consider such claim. The City shall not in any event grant a time extension for any delay or interference which was incurred more than five (5) days before the Contractor gave written notice as required in subparagraph (1) above.

3. Before the Project Manager reviews a claim for a time extension, the Contractor shall demonstrate in writing the effect of the delay or interference on the Contractor's construction schedule, including plotting such effect on the Contractor's critical path documents, showing graphically therein the effect on the Contractor's critical path documents, showing bays. This depiction of the delay or interference must accompany the written claim for a time extension submitted in accordance with subparagraph (2) above. If the Contractor believes that it has been impacted beyond a mere time delay, the Contractor shall also provide the Project Manager with an estimate of the costs incurred by the Contractor as a result of the delay or interference. The failure of the Contractor to provide the Project Manager with this contemporaneous cost estimate shall bar any later claim by the Contractor for any costs incurred as a result of the delay or interference.

4. If the Project Manager determines that an extension of time is in order, the time allowed for any delay will be added to and will correspondingly extend the Contract time for completion and

adjust any Contract completion milestones set forth in the General Bidding and Contract Requirements or the Technical Specifications. The Contractor agrees that a time extension granted by the Project Manager shall be its sole remedy for a delay or interference and shall operate as a full and complete release of any claim by Contractor for any and all costs and expenses related to or arising out of the event giving rise to the delay or interference.

f. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED HEREIN, THE CONTRACTOR AGREES AND ACKNOWLEDGES THAT THERE SHALL BE NO PAYMENT OR COMPENSATION OF ANY KIND TO THE CONTRACTOR FOR DAMAGES OR COSTS ARISING FROM ANY DELAY OR INTERFERENCE WHETHER SUCH DELAY IS AVOIDABLE OR UNAVOIDABLE. CONTRACTOR FURTHER AGREES AND ACKNOWLEDGES THAT ITS SOLE REMEDY IN THE CASE OF DELAYS OR INTERFERENCES TO ITS CONSTRUCTION SCHEDULE WHICH ARE ATTRIBUTABLE TO THE CITY, SHALL BE A REASONABLE EXTENSION OF THE CONTRACT TIME.

g. On contracts on a calendar day basis (a specified number of days), no allowance will be made for Saturdays, Sundays or holidays. On contracts on a Working Day basis, allowances will be made for days or parts of days, in increments of one-quarter (1/4) day, for conditions entirely beyond the control of the Contractor; New Year's Day, Memorial Day, July 4<sup>th</sup>, Labor Day, Thanksgiving Day and Christmas Day, or the Monday thereafter when these days occur on Sunday, and Saturdays and Sundays shall not be considered as Working Days. The Department shall keep a record of the Working Days and the Department shall make this record available to the Contractor on request. The Contract time shall start with the first Working Day after the date of the Notice to Proceed and the scheduled date of completion shall be that established by the specified number of Working Days plus the allowance.

h. If, for reasons other than those stated above, any portion of the work remains uncompleted after the Contract date specified for its completion, notwithstanding Substantial Completion of the work, the Project Manager shall deduct from payments due the Contractor, as liquidated damages an amount per diem, according to the following schedule:

Contract Value	Agreed Delay Damages Per Diem
\$0-\$100,000	\$ 250
\$100,001-\$500,000	\$ 500
\$500,001-\$1,000,000	\$ 750
Over \$1,000,000	\$1,000

These per diem delay damages are assessed as agreed liquidated damages because the Parties have considered the difficulty of determining the City's actual damages and agreed that computation of the City's actual damages is impossible. If a delay is due to causes which the Contractor considers extraordinary or beyond its control, the Contractor must give timely notice thereof in writing as specified in Paragraph 25(e) above. In the event that the General Bidding and Contract Requirements or the Technical Specifications contain a provision allowing for the imposition of liquidated damages for delays to the completion of the work, such provision shall take precedence over this subparagraph (h).

This subparagraph (h) shall not be construed to apply to claims, offsets, credit change orders, and/or chargebacks which the City may assert or assess against any Contractor for the reimbursement or recovery of any costs incurred by a different Contractor on the Project due to the fault or delay of the Contractor. In all such cases, the City shall not be limited to the per diem amounts listed above and shall be permitted to seek recovery or reimbursement of the full amounts incurred by any non-delaying Contractor.

26. <u>Independent Contractor</u>. The Contractor is an independent contractor and shall not in any way or for any purpose be deemed or intended to be an employee or agent of the City. Neither the Contractor nor its employees or Subcontractors shall in any way represent that they are acting as employees, officials or agents of the City.

27. <u>Risk of Loss</u>. The Contractor shall assume all risk and responsibility for casualties of every description in connection with its work. The Contractor shall have charge of the entire work until completion and acceptance, and shall alone be liable and responsible for any injuries to persons and any loss or damage to property, buildings, or adjacent work that may occur as a consequence of or during the progress of the work under this Contract, whether such damage or accident be due to the Contractor's own negligence or that of its servants, agents, employees, or whether such damage or accident be due to the inherent nature of the work, or whether such damage or accident be due to other causes.

28. Indemnification. The Contractor shall indemnify, defend and hold harmless the City, its officers, employees, and agents, from and against any and all losses, costs and expenses, including but not limited to litigation costs, settlement fees and expenses, and counsel fees and expenses, claims, suits, actions, damages, liability and expenses, arising out of or resulting in whole or in part from the performance of the work under the Contract, including, but not limited to, those in connection with loss of life, bodily injury, personal injury, damage to property, contamination or adverse effects on the environment, intentional acts, failure to maintain a drug-free work site and workforce and any other breach of the Contract, regardless of the inherent nature of the work and regardless of whether or not such loss, cost, claim, suit, action, damage, liability, or expense is caused in whole or in part by the negligent act or omission of a party indemnified hereunder. Such obligation shall not be construed to negate, abridge or reduce other rights or obligations of indemnity which would otherwise exist as to a Party or Person described in this Paragraph. The Contractor shall further indemnify, defend and hold harmless the City from and against any and all claims, demands, liens, causes of action, liabilities and judgments of any kind asserted against the City by any Subcontractor or suppliers on account of or relating to the furnishing of services, work, labor, materials or equipment under the Contract for the Contractor.

In claims against any Person indemnified under this Paragraph 28 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Paragraph 28 shall not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers compensation acts, disability benefit acts or other employee benefit acts.

29. Assignment. Except through a Subcontract, the Contractor shall not assign the Contract, or any part of the Contract, or delegate performance of the Contract (other than to its own work forces), without obtaining the prior written consent of the Procurement Commissioner and Operating Commissioner. The decision whether to consent to an assignment, the timing of consent (if any), and conditions to such consent, if any, shall each be at the City's sole discretion. Any consent to the assignment of any monies to be paid under the Contract shall not relieve the Contractor from the faithful performance of any of its obligations under the Contract or change any of the terms and conditions of the Contract. Any purported assignment in violation of this provision shall be void and of no effect. The City's consent to an assignment shall not release the assignor from any liability accrued or thereafter accruing under the Contract. Any assignment or purported assignment shall be in writing and shall contain an express assumption by the assignee of all liability accrued or thereafter accruing under the Contract. Consent by the City to any assignment shall not be deemed a course of conduct, dealing or performance with respect to any other assignment or proposed assignment. For purposes of this Paragraph 29, an assignment includes the transfer or acquisition of the Seller or the Contractor, or a controlling interest therein, through a corporate or other merger, and the appointment of a receiver or bankruptcy trustee, and the transfer of the Contract or the Contractor in any bankruptcy or other insolvency proceeding.

**30.** <u>Insurance</u>. Unless otherwise approved by the City's Risk Manager in writing, the Contractor shall, at its sole cost and expense, procure and maintain, or cause to be procured and maintained, in full force and effect until the Contractor completes the work under the Contract, the types and minimum limits of insurance specified below, covering the Contractor's performance of the work required under the Contract. The Contractor shall procure, or cause to be procured, all insurance from reputable insurers admitted to do business on a direct basis in the Commonwealth or otherwise acceptable to the City. All insurance herein, except Professional Liability insurance, shall be written on an "occurrence" basis and not a "claims-made" basis. In no event shall the Contractor perform any work under the Contract until the Contractor has delivered or caused to be delivered to the City's Office of Risk Management the required evidence of insurance coverages. If the Contractor fails to obtain or maintain the required insurance, the City shall have the right to treat such failure as a default under

the Contract and to exercise all appropriate rights and remedies. All insurance coverages shall provide for at least thirty (30) days prior written notice to be given to the City in the event coverage is materially changed, cancelled, or non-renewed. The City, its officers, employees, and agents, shall be named as additional insureds on the General Liability Insurance policy and, where applicable, the Builders Risk Insurance Policy. The Contractor shall also deliver or cause to be delivered to the City an endorsement stating that the coverage afforded the City and its officers, employees and agents, as additional insureds, will be primary to any other coverage available to them and that no act or omission of the City, its officers, employees or agents shall invalidate the coverage.

- a. <u>Workers' Compensation and Employers' Liability</u>.
  - 1. Workers' Compensation: Statutory limits
  - 2. Employers' Liability: \$100,000 Each Accident Bodily Injury by Accident; \$100,000 Each Employee – Bodily Injury by Disease; and \$500,000 Policy Limit – Bodily Injury by Disease.
  - 3. Other states insurance including Pennsylvania.
- b. <u>Commercial General Liability Insurance.</u>
  - Limit of liability: \$1,000,000 per occurrence combined single limit for bodily injury (including death) and property damage liability; \$1,000,000 advertising injury; \$2,000,000 general aggregate, and \$1,000,000 aggregate for products and completed operations. The City may require higher limits of liability if, in the City's sole discretion, the potential risk warrants.
  - 2. <u>Coverage</u>: Premises operations; Blanket Contractual liability; Personal injury liability; Products and completed operations; Independent Contractors; Employees and volunteers as additional insureds; Cross liability; Broad form property damage (including completed operations); Explosion, collapse and underground hazards; and asbestos abatement liability Coverage (Note: Required for asbestos abatement projects only).
- c. <u>Automobile Liability</u>.
  - 1. <u>Limit of Liability</u>: \$1,000,000 per occurrence combined single limit for bodily injury (including death) and property damage liability.
  - 2. <u>Coverage</u>: Owned, non-owned and hired vehicles.
- d. <u>Builders' Risk/Installation Floater Insurance</u>.
  - 1. <u>When required</u>: This insurance is required only when the total Contract price is \$500,000 or greater (Note: not for road and street work, unless required in the Supplementary Conditions, Technical Specifications, Standard Details and Specifications, and/or General Bidding and Contract Requirements).
  - 2. <u>Coverage</u>: "All risks" in an amount equal to not less than the full replacement cost of the work under the Contract (meaning work in replacement which is of like kind and quality).
  - 3. <u>Period of Coverage</u>: Anything herein to the contrary notwithstanding, the Builders' Risk Insurance shall be procured and maintained during the entire period of performance of the Contract until final acceptance of the work by the City.

Certificates of insurance evidencing the required coverages and additional insured endorsements must specifically reference the City contract Number for which they are being submitted. The original certificates of insurance shall be submitted to the Department and the Office of Risk Management at least ten (10) days before work is to commence and at least ten (10) days before each renewal date. The ten (10) day requirement for advance documentation of insurance coverage may be waived in situations where such waiver will benefit the City, but under no circumstances shall the Contractor actually begin work (or continue work, in the case of renewal) without providing the required proof of insurance and required endorsements. The City reserves the right to require the Contractor to furnish certified copies of the original policies of all insurance required under this Contract, including certified copies of all required endorsements, at any time upon ten (10) days prior written notice to the Contractor.

**31. Proprietary Rights Indemnity.** The Contractor shall indemnify, defend and hold harmless the City, and its officers, employees, and agents, from and against any and all losses, costs and expenses, including, but not limited to, litigation costs, settlement fees and expenses, and counsel fees and expenses, claims, suits, actions, damages, liability and expenses for or on account of the use of patented appliances, products, processes, constructions, designs, or methods, or the infringement of any patent, trademark, service mark, copyright, or trade secret rights of any third party, and the Contractor shall pay all royalties, charges and penalties which may become due or payable by reason of such use or infringement. Before the issuance of the Final Estimate, upon request by the Project Manager, the Operating Commissioner, or the Procurement Commissioner, the Contractor shall give such security, approved by the City Solicitor, as may in the opinion of the Project Manager, the Operating Commissioner, be necessary to indemnify, defend and hold harmless the City, its officers, employees, and agents, as aforesaid.

### 32. <u>Default and Remedies</u>.

а It shall be a violation of the Contract for the Contractor to abandon the work under the Contract; to fail or refuse to prosecute the work with promptness and diligence; to unreasonably delay the work so that it may not be completed within the contract time; to fail or refuse to proceed with work under a Disputed Change Order; to fail or refuse to furnish suitable materials in place of any which may be rejected by the Project Manager as unsuitable as not being in accordance with the Contract Documents, or to refuse or neglect to furnish and supply a sufficient number of properly skilled workers and necessary equipment or either of them; to execute any of the work improperly, carelessly, or in bad faith; to fail or refuse to remove any of the work which, in the opinion of the Project Manager, is defective and unsuitable and not in accordance with the Contract Documents, and to replace it with work that is in accordance with the Contract Documents; to cause or permit to occur an Event of Insolvency with respect to the Contractor; or to otherwise violate any of the terms, conditions, and provisions of the Contract. In the event of a violation of Contract, the Operating Commissioner may notify the Contractor and its surety in writing to require that each remedy the Contractor's violation of the Contract and require the Contractor to comply with the terms, conditions, and provisions of the Contract which it has violated or is violating. The failure of the City to promptly notify the Contractor of a violation of Contract shall not constitute an acceptance by the City of work which is performed or installed in violation of the Contract.

b. If the Contractor shall fail to cure or remedy, or diligently commence to cure or remedy, the violation of the Contract, as described in the notice specified above, within five (5) days after the receipt of said notice, or within twenty four (24) hours after receipt of said notice when, in the opinion of the Operating Commissioner, immediate action is necessary to safeguard life or property, or within some other period of time specified in the notice, the Operating Commissioner shall thereupon notify the Procurement Commissioner, who shall have the right to declare the Contractor in default of the Contract, and to notify the Contractor to discontinue the work or any part thereof under the Contract, and to call upon the surety to carry out its obligations under the performance bond posted for the Contract.

c. If the surety fails to abide by the terms of the performance bond or if the surety shall deny liability to the City under the performance bond, the Procurement Commissioner shall have the right to declare the surety in default under the performance bond and, at his or her sole option, shall also have the right:

1. To terminate the work under the Contract, to maintain conditions, to obtain Quotes (if circumstances will allow) for all or any portion of the work, and to enter into a new contract to complete the work of the original Contract; or

2. In case of an emergency, including, but not limited to, danger to life or property, or serious interference with traffic, to terminate any and all of the work under the Contract, and to then and there secure in the open market, from any Person, at the then current market prices the materials of the quality and quantity required, the necessary workers and mechanics, and the required equipment to complete the Contract.

d. Upon default by the Contractor as herein set forth, all moneys due and owing to the Contractor upon estimates, retainage, or otherwise, materials delivered, materials built into the work, and the Contractor's plant (including tools, appliances, and equipment on the premises intended for use in the performance of the Contract), shall become the property of the City for use in the completion of the work under the Contract, and the City shall have resort thereto to the extent necessary to maintain and complete the work and reimburse the City for its outlays and expenditures.

e. In case of such default by the Contractor the remedies herein provided shall be in addition to and not in substitution of the rights and remedies which would otherwise be vested in the City by statute, at law or in equity, all of which rights and remedies are specifically reserved to the City. In addition, upon default by the Contractor, the Procurement Commissioner shall have the right to secure from any Person the materials, equipment, and labor necessary and required for the proper completion of the Contract. In such event, the Contractor shall pay the City, upon demand, the difference between the cost paid by the City for such materials, equipment and labor and the price or prices set forth in the Contract, together with all costs and expenses incident to the same and incurred by the City. Upon default by the Contractor, the Procurement Commissioner, in his or her sole discretion, shall also have the right, to terminate the Contract and to secure from any Person the materials, equipment, and labor necessary and required for the proper completion of the work. In such event, the Contractor shall pay the City, upon demand, the difference between the price or prices set forth in the Contract and the price or prices which may be paid upon such termination and completion of the work, together with all costs and expenses incident to such re-advertisement. In the exercise of either of these remedies, the City shall further have the right to a set-off against any monies which may be due or may thereafter become due the Contractor under the Contract or any other contract between the City and the Contractor. If the Procurement Commissioner shall secure materials, equipment, and labor to complete the work under the Contract, or if the Procurement Commissioner shall terminate this Contract, the Procurement Commissioner shall have the right to take possession, for the purpose of completing the work under the Contract, of all materials, tools, appliances, and equipment on the Project site, intended for use in the performance of the Contract. The Contractor hereby assigns to the City (and each Subcontract shall require each Subcontractor to assign) all right, title, and interest of the Contractor in and to such materials, tools, appliances, and equipment. The failure of the City to exercise any of the remedies herein provided shall not preclude the resort by the City to any other remedy available to the City arising out of the Contractor's default.

f. The use of any specific remedy herein provided shall not bar subsequent or concurrent resort to any other remedy available to the City at law or in equity, for the recovery of damages or otherwise, on account of such default, or in the event of any other default by the Contractor.

g. The Contractor and its surety shall pay to the City on demand, all loss, expense, cost or damage suffered or incurred by the City by reason of any default.

**33.** <u>Subcontracts</u>. Within fifteen (15) days after execution of the Contract, the Contractor shall submit in writing to the Project Manager the names of all Subcontractors who will perform any work on the Contract or who will supply any materials or equipment for the Contract. All proposed Subcontractors who have not been pre-approved by the Department may be approved by the Project Manager if in his or her opinion such proposed Subcontractor is reliable, Responsible and competent to perform the work in compliance with the Contract Documents. The City, acting in its sole discretion, reserves the right to reject any Subcontractor. The City shall have no liability to the Contractor for additional compensation under the Contract, or otherwise, in connection with the substitution of a Subcontractor for any proposed subcontractor rejected by the City pursuant to this Paragraph 33. The Contractor shall be as fully responsible to the City for the acts and omissions of its

Subcontractors and Persons either directly or indirectly employed by them, as it is for the acts and omissions of the Contractor and Persons directly or indirectly employed by the Contractor. The City and the Contractor specifically understand and intend, and acknowledge and agree that no Subcontractor utilized by the Contractor shall have any right or claim against the City or the Department to any monies due and owing to the Contractor for the performance of work under the Contract. Each Subcontract for any portion of the work is hereby assigned to the City provided that (a) such assignment is effective only after termination of the Contract by the City and only for a Subcontract which the City, acting in its sole discretion, accepts by issuing notice to such Subcontractor and to the Contractor; and (b) such assignment, if exercise of the foregoing option for an assignment shall be in the City's sole discretion, the City having no duty or obligation to the Contractor, such Subcontractor or any surety, to exercise or decline to exercise the foregoing option for an assignment. The Contractor shall incorporate the foregoing option for an assignment into each Subcontract for any portion of the work.

**34.** <u>Permits and Licenses</u>. Unless otherwise noted elsewhere, the Contractor shall obtain all permits and licenses required by the City or pursuant to Applicable Law in connection with the performance of all or any part of the work under the Contract, unless otherwise specifically directed. The Contractor will be required to pay the current fee for such permits and licenses required in connection with all or any portion of the work under the Contract, including any permits and licenses required in connection with any equipment, system or component forming part of the work.

# 35. <u>Co-operation and Coordination with other Contractors.</u>

a. The Contractor shall have the duty to co-operate and coordinate with any other contractors on other work which is being performed concurrently on or adjacent to the Project site, including specifically PGW, or its contractors or any other non-City utilities or authorities, and shall afford reasonable facilities and access to them. The Project Manager will decide any matters in dispute as to the performance of the work, including access to the Project site and priority of performance on either side of any division line between contiguous sections of the Project site where the Contractor and another contractor each work.

b. Where the work or any portion thereof is performed by the Contractor as part of a "multipleprime" project, or in conjunction or combination with other "prime" contractors, the Contractor shall have the duty to cooperate and coordinate its work with the work of each of the other prime contractors. The Contractor shall further have a duty not to delay, disrupt, interfere with, or otherwise retard the progress of the work of any of the other prime contractors.

It is expressly understood by the Contractor that, on "multiple-prime" projects, the City relies c. primarily, but not exclusively, upon the organization, management, skill, cooperation and efficiency of the "Contractor for general construction" (unless a different Contractor is otherwise designated in the General Bidding and Contract Requirements or the Technical Specifications) to oversee, coordinate, and plan the work of all the other prime contractors, including, but not limited to, the prime contractors for electrical, mechanical, HVAC, and plumbing work, so as to complete the work under all of the prime contracts in a timely and efficient manner. The Contractor therefore expressly recognizes that the "Contractor for general construction" shall be the coordinating Contractor for all aspects of the multiple-prime contract work, including the scheduling of all such work. The Contractor shall have an explicit duty on "multiple-prime" projects to rely primarily upon the organization, management, skill, cooperation and efficiency of the "Contractor for general construction" to oversee, coordinate, and plan its work with the work of all of the other prime contractors, so as to ensure completion of the work under all of the contracts, including the Contract, in a timely and efficient manner and without disruption and interference. It is expressly understood by the Contractor, however, that the City is also relying upon the organization, management, skill, cooperation and efficiency of the Contractor so as to ensure completion of the work under the Contract in a timely and efficient manner and without disruption and interference.

d. It is expressly understood by the Contractor that time is of the essence of this Contract. The Contractor agrees to diligently prosecute its work in coordination and cooperation with the work of the other prime contractors and under the coordination of the "Contractor for general construction," without delay,

interference, or disruption, so as to ensure the completion of the Contract work in a timely and efficient manner and in conformity with the schedule approved by the City under the Contract. In the event that the Contractor shall unnecessarily delay, disrupt, or interfere with the work of any of the other prime contractors, the Contractor shall be liable for the payment of all costs and expenses incurred by such prime contractor or prime contractors on account of such delay, disruption, or interference. The Contractor accordingly authorizes the City to deduct the amount of such costs and expenses from any monies due and owing to the Contractor under the Contract. The Contractor shall further assume all liability, financial or otherwise, in connection with its Contract and shall protect, defend, and hold harmless the City from and against any and all damages or claims that may arise because of inconvenience, delay, interference, disruption, or loss experienced by the Contractor because of the presence and operations of other prime contractors working within the limits of the same multiple-prime project.

e. The provisions of this Paragraph 35 shall be read in conjunction with any provisions in the Technical Specifications, the Proposal, and the Plans, and, notwithstanding Paragraph 95 of these Standard Contract Requirements, the provisions of this Paragraph 35 shall take precedence over any other provisions in the Technical Specifications respecting the "coordination and cooperation" among prime contractors on a "multiple-prime" project, except where such other provisions shall impose greater duties upon the Contractor for coordination and cooperation.

36. <u>Clean-up of Project Site</u>. The Contractor and its Subcontractors shall remove all rubbish or refuse and all unused materials and tools from the Project site daily, if required by the Project Manager, and as the work progresses the Contractor shall carefully clean and keep the Project site clean from such rubbish and refuse. The Contractor shall furnish to the Project Manager upon request all documentation regarding the proper disposal of all rubbish, soil, refuse, and other debris. Before the City will approve the completion of the work under the Contract, the Project site and any other place or places affected by the work shall be thoroughly cleared of all construction and other debris and dust, and left clean, free from debris, construction plant, buildings, and materials; fit for travel or other proper use; and in as good condition as existed before the work was begun. The Contractor shall resod or plant anew any grass plot or plots disturbed, and replace any shrubbery destroyed. Structures shall be broom clean, free from stains, spots or other blemishes, and ready for use, and all glass shall be washed. The clean-up work shall be governed by the record of existing conditions made and filed with the Department prior to the commencement of work.

### 37. <u>Maintenance after Completion and Contractor's Guarantee.</u>

a. The Contractor shall guarantee the work of the Contract against defects in materials and workmanship for a period of one (1) year from the date of completion and acceptance of the work by the City, unless a longer period is specified, and shall guarantee and warrant that all equipment shall perform in accordance with the specifications of the manufacturer and in accordance with the Technical Specifications. When individual items of the Contract, including equipment, are formally accepted in writing by the Project Manager and used or operated by the City prior to the completion of the total work under the Contract, the period of guarantee for such items shall be calculated from the date of final written acceptance of such items, provided, however, that the item of work and equipment is used or operated by the City for a period of ninety (90) consecutive days following the date of acceptance without the occurrence of any defects, breakdowns, or faulty operation. Paving, including curbs and footway, shall be similarly guaranteed for a period of five (5) years from the date of completion and acceptance of the work by the City.

b. If, within such one (1) year or five (5) year period of guarantee, any of the work shall prove to be defective either in materials or workmanship, or if damage occurs by settlement of the backfill placed under this Contract, or if any part or parts of any equipment furnished shall prove to be inadequate, insufficient, or defective, either in design, materials, or workmanship, the Contractor shall immediately, upon demand of the Project Manager (whose decision as to such inadequacy, insufficiency, or defectiveness shall be binding and conclusive upon the Parties hereto), repair and replace the same in accordance with the Plans and Technical Specifications, and shall repair and replace any damage to other parts or structures at the Contractor's sole cost and expense, without cost or expense to the City, to the approval and satisfaction of the Project Manager.

c. Should the Contractor or its sureties fail to comply with the orders of the Project Manager to replace or repair defective materials, workmanship, or equipment as aforesaid within the time specified in

subparagraph (a) above, the Operating Commissioner shall notify the Procurement Commissioner, who shall have the right to declare the Contractor or its surety, or both, in default and to proceed with the correction of the defect in accordance with the methods provided herein.

Access to Accounting Records. The Contractor shall certify that all materials, equipment, and labor charged to the City are accounted for and shall keep such full and detailed accounts as may be necessary for proper financial management under this Contract. The Contractor shall retain, and shall provide the City and its representatives access to, all records, books of account, correspondence, instructions, Shop Drawings, receipts, vouchers, memoranda, and similar data and documentation pertaining to the Contract for a period of five (5) years following final payment, or earlier termination of the Contract, or for such longer period as may be required by law; however, if any litigation, claim or audit is commenced prior to expiration of said five (5) year period, then the records shall be retained until all litigation, claims or audit findings have been completely terminated or resolved, without right of further appeal, or if Applicable Law requires a longer period, then the records shall be retained for such longer period. From time to time during the performance of the work under the Contract, and for a period of five (5) years after the completion of the work under the Contract, the City may audit any and all aspects of the Contractor's performance under the Contract, including but not limited to its billings and invoices. Representatives, agents or contractors of the City, including the Department, or other authorized City representatives including, without limitation, the City Controller may conduct audits. If requested by the City, the Contractor shall submit to the City all vouchers or invoices presented for payment pursuant to the Contract, all cancelled checks, work papers, books, records and accounts upon which the vouchers or invoices are based, and any and all documentation and justification in support of expenditures or fees incurred pursuant to the Contract. All books, invoices, vouchers, records, reports, cancelled checks and other materials shall be subject to periodic review or audit by the City. All work, equipment, materials, systems, subassemblies, tools appliances and plant shall be subject to inspection and review by City, federal and state representatives, as may be applicable, or their designees, at the offices of the Contractor in the City, or in another location with the City's consent. The Contractor shall cooperate with all City, state and federal inspections and reviews conducted in accordance with the provisions of the Contract. Such inspection and review of the Contractor's work hereunder shall be in the sole discretion of the inspecting or reviewing entity. Such inspection or review may include, without limitation, review of staffing ratios and job descriptions, and meetings with any of the Contractor's staff who are either directly or indirectly involved in providing all or any portion of the work hereunder. The Contractor shall make available, within the City at reasonable times during the performance of the work hereunder and for the period set forth above in this Paragraph 38, all records pertaining to the Contract for the purpose of inspection, audit or reproduction by any authorized representative (including any agent or contractor and the City Controller) of the City, the Commonwealth Auditor General, and any other federal or state auditors, as may be applicable, at no additional cost to the City.

# 39. <u>Sales and Use Tax; Federal Excise Tax</u>.

a. The City is not subject to federal, state or local sales or use tax or federal excise tax. Contractor hereby assigns to City all of its right, title and interest in any sales or use tax which may be refunded as a result or the purchase of any materials in connection with the Contract, and the Contractor, unless directed by the City, shall not file a claim for any sales or use tax refund subject to this assignment. The Contractor authorizes the City, or its agent, in its own name or in the name of the Contractor, to file a claim for a refund of any sales or use tax subject to this assignment. To the extent it may be applicable to the work under this Contract, the Contractor covenants and agrees that it shall not bill the City for or otherwise pass-through to the City for payment any Federal Excise Tax paid in connection with the work under this Contractor for a refund of any Federal Excise Tax paid in connection with the work under this Contractor for a refund of any Federal Excise Tax paid in connection with the work under this Contract.

b. The Contractor agrees to include the above referenced Paragraph in any Subcontracts with Subcontractors.

#### D. ADMINISTRATION, MEASUREMENT, AND PAYMENT

**40. Status and Authority of the Project Manager.** The Project Manager shall be responsible for the general direction of the work to be performed under the Contract, the interpretation of the Plans and General Bidding and Contract Requirements, and the Technical Specifications, the ordering of additions to or deductions from the work, and the determination of procedure. The Project Manager shall give all orders and directions contemplated under the Contract. The Project Manager shall in all cases determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are to be paid for under the Contract, and shall have authority and sole discretion to reject all work and materials which in his or her opinion do not conform to the requirements of the Contract. The Project Manager shall determine all other questions that may arise in relation to the execution of the work and shall have the authority to halt the work whenever such action may be necessary to secure the safe and proper execution of the Contract. The Project Manager shall adjust and decide any differences or conflicts that may arise between the Contractor and other prime contractors for the performance of concurrent work. The provisions of this Paragraph are not intended to supersede or limit the provisions of Paragraph 35.

41. <u>Plans and Technical Specifications</u>. The Plans, with all notes thereon, and the Technical Specifications are intended to be consistent with one another and of equal force and effect, and in the event the Contractor should believe that an apparent discrepancy may exist between the Plans and the Technical Specifications, the Contractor shall bring such apparent discrepancy to the attention of the Project Manager, who will interpret their meaning. The Plans give general dimensions and sizes, and such details as are required to cover special features. Figures shall have preference over scale in reading dimensions. The Contractor shall maintain at the site of the work for use of the Project Manager or Inspector one record copy of the Plans and Technical Specifications, and Change Orders and other Contract modifications, and one record copy of all approved Shop Drawings and other submittals, including the construction schedule.

42. <u>Shop Drawings and Working Drawings</u>. The Contractor shall prepare and submit to the Department or the Project Manager, as specified in the Technical Specifications or as required by the Project Manager, all Shop Drawings and Working Drawings, which shall include all details required to carry out the City's Plans and Technical Specifications. By approving and preparing Shop Drawings and other similar submittals, the Contractor represents that it has determined and verified materials, field measurements, and field construction criteria related thereto and has checked and coordinated the information contained within such Shop Drawings and submittals with the requirements of the Contract Documents. The Contractor shall not proceed with any portion of the work until the Shop Drawings or other submittal which governs the work has been approved. The Shop or Working Drawings shall conform to standards specified by the Department. Upon correction, if found necessary, and after approval, the Contractor shall furnish three (3) or more prints of the Shop Drawings or Working Drawings for construction purposes. After the completion of the work, the documents shall be delivered to and become the sole property of the City for its unrestricted use. The approval of Shop Drawings shall not relieve the Contractor of responsibility for the proper fit of the work, nor for its completion pursuant the Contract.

Lines and Grades - City Datum. Vertical dimensions are given in United States standard 43. feet and fractions thereof. Unless otherwise stated, elevations preceded by a plus (+) or a minus (-) sign refer respectively to distances above or below the established City Datum, which is two and one quarter (2.25) feet above mean high water in the Delaware River at Chestnut Street, Philadelphia. Dimensions locating buildings and structures shall be verified and checked in the field by the Contractor before proceeding with construction details affected thereby. Curb line and paving stakes giving the requisite basic data will be set by the City. The price for the setting of these lines shall be at the predetermined rate as set by the Board of Surveyors and made part of the public record or as stated in the Contract Documents. The Contractor will be held responsible for the proper and correct extensions of measurements from such data, and the correctness of work based thereon. The Contractor will be held responsible for the preservation of stakes, benchmarks, and survey monuments, until authorized to remove them. Should any stakes be disturbed, the cost of replacing them will be charged against the Contractor at the then current fee as determined by the City's district surveyor and regulator, to be deducted from the Final Estimate. All survey monuments or benchmarks moved, covered or uprooted in the course of performance of the work of this Contract will be reset by the City at the expense of the Contractor, at the then current fee per monument or benchmark, as determined by the City's district surveyor and regulator. Said cost shall be deducted from the Final Estimate. The Contractor shall provide reasonable and necessary opportunities and facilities for setting points and taking measurements. The Contractor shall not proceed until it has made timely demand upon the District surveyor and regulator for, and has received from him or her, such points and from the resident engineer such instructions as may be necessary for the progress of the work. Any work improperly done without lines or levels or instructions shall be removed and replaced by the Contractor at its own expense. Failure to do so may be considered a default under the Contract.

44. Contract Amount. The total amount which is to be paid by the City to the Contractor for the work performed and materials supplied under the Contract shall in no event exceed the sum of the Contractor's Quote price, plus a contingency fund of approximately ten percent (10%) of the Contractor's Quote price (to be specified by the Procurement Department upon the award of the Contract), which fund is intended to cover additional compensation which may be due to the Contractor as a result of Change Orders issued pursuant to Paragraphs 48 and 49 below, as such sum may be increased or reduced pursuant to a Change Order or Change Orders, or pursuant to an Amendment. The City shall specify the contract amount in the Notice of Contract Award. The Contractor acknowledges that the City's liability under the Contract shall be limited by the amounts which shall have been or may be from time to time appropriated by City Council. The City reserves the right to authorize the Contractor to commence work prior to appropriation of the total amount of the Contract, in which case the City shall give the Contractor notice thereof, and the City shall not be liable hereunder in any amount greater than that appropriated therefor by City Council. Payments will only be made payable to the Contractor as shown on the purchase order; the invoice must reflect this same Contractor name as the entity to "pay to". For any bids awarded for work to begin on or after July 1, 2019, the City has instituted a policy of making all of its payments through electronic deposits into the awarded Contractor's designated bank account. Before any City payments are made, the Contractor will be required to supply the City with the information necessary for the City to initiate electronic payments by completing one of the electronic payment processing enrollment forms available on the City's vendor portal at https://secure.phila.gov/finance/vendorpayments. Applicants awarded a contract before July 1, 2019 are encouraged to complete one of the electronic payment processing enrollment forms before the conversion to electronic payments becomes mandatory. The City intends to stop issuing paper checks. The foregoing notwithstanding, nothing herein shall be construed to limit the City's ability to make payments by assessment bills as provided in paragraph 57, below.

45. <u>Scope of Payments</u>. Payment for the cost of all work, labor, materials, and services required to complete the work of the Contract as shown in the Plans, Technical Specifications, Standard Details and Specifications, or as otherwise specified (except where payment is otherwise specifically provided), will be made at the unit prices or lump sum prices contained in the Quote. The prices contained in the Quote shall each cover the supply and installation, in a good, sound, substantial and workmanlike manner, of everything required for and incidental to the full completion of the work of that item as called for by the Plans, Technical Specifications, Standard Details and Specifications, or as otherwise specified, including its proportionate share of the expense of all plants, tools, and equipment required; the cost of all bonds, fees, and permits; of all administration, superintendence, and insurance; and of any loss or damages arising out of the nature of the work, from the action of the elements, from any unforeseen difficulties encountered in the prosecution of the work, and from risks of all kinds connected with the work, except as otherwise specifically provided in the Contract Documents.

46. Quantities are Approximate. When quantities of the various classes or components of work and materials required under the Contract are stated in the Bid Solicitation or elsewhere, such quantities are estimated and approximate, except where otherwise stated to the contrary. When stated in the Bid Solicitation or a Seller's Proposal, they are given only for the purpose of comparing the Quotes on a uniform basis. The City does not guarantee that such estimated quantities will correspond to the actual quantities ultimately required to complete the work, and the City will not allow any claim for damages, for anticipated profit, or for loss of profit of the Contractor in the event that actual quantities used to complete the work under the Contract vary from the estimates in the Bid Solicitation. The Department reserves the right to increase or decrease the quantities or to entirely omit any of the items as contained in the Bid Solicitation to the extent found necessary by the Project Manager, provided that the aggregate cost of the work performed is within the limit of funds fixed in the Contract.

#### 47. <u>Changes.</u>

Standard Contract Requirements Rev. Date: January 1, 2019 Page 24 a. If changes to any portion of the work or the requirements of the Plans, Technical Specifications or Standard Details and Specifications are deemed necessary by the Project Manager, in order to carry out and complete the work covered by the Contract Documents, the Project Manager may by notice to the Contractor order alterations to or changes in the work covered by the Contract Documents, and the Contractor shall promptly comply with such orders. No changes or alterations to the work shall be made or performed by the Contractor except upon prior written orders from the Project Manager authorizing the change and a Change Order fixing the additional compensation or deduction therefor, except where the order authorizing the change states that the method of compensation or deduction shall be determined at a later date.

b. Where the Project Manager pursuant to Paragraph 47(a) orders additions to or deductions from the amount of work called for by the Plans or Technical Specifications, or where changes are ordered in writing in the design of the work or the requirements of the Plans or Technical Specifications which increase or reduce the cost of the work to the Contractor, adjustment in compensation therefor shall be made to cover the additional work required or the work reduced, in accordance with a written order of the Project Manager, as follows:

1. For work for which applicable unit prices are bid in the Bid Solicitation, payment or deduction shall be made in accordance with the prices bid. When the final quantity of work performed on a unit price bid item differs substantially (twenty-five percent (25%) or more) from the Bid Solicitation quantity, the Project Manager will review the price contained in the Quote and the actual work performed by the Contractor and may, in his or her sole discretion, determine if an adjustment is appropriate. Where the Project Manager deems an adjustment appropriate, the Contractor shall:

i. substantiate that the Quote unit price remains fair and reasonable despite the substantial change in quantity; or

ii. in the case of substantial underrun compared to the previously estimated quantity, negotiate a revised unit price for all the work actually completed; or

iii. in the case of substantial overage compared to the previously estimated quantity, negotiate a revised unit price for that portion of the actual work completed in excess of one hundred twenty-five (125%) of the Quote quantity.

This provision shall not be deemed, however, to vest in the Contractor any rights to any adjustment.

2. For work not covered by the unit prices contained in the Quote, payment or deduction shall be made at the applicable contingent prices named for work.

3. For work for which neither the unit prices bid nor the prices for contingent work are applicable, payment or deduction shall be made in accordance with Paragraphs 48 and 49 below.

#### 48. <u>Change Orders by Agreement.</u>

a. If alterations or changes increase the cost of the work to the Contractor, additional compensation will be allowed by the City, based upon unit prices, contingent prices, or by a detailed cost proposal submitted by the Contractor to the Project Manager, negotiated by the Department and agreed to by the Contractor, or by Force Account, in accordance with Paragraph 51 below. The cost proposal shall detail the costs of materials, labor, overhead and profit, as well as any proposed changes to the Contract time. If such alterations or changes reduce the cost of the work to the Contractor, the amount of such reduction may be deducted by the City, and any such reduction may be based upon unit prices contained in the Quote for the performance of the deleted items of work, or upon a detailed cost proposal submitted by the Contractor to the Project Manager and negotiated by the Department. Credit Change Orders will include the same mark-ups as chargeable Change Orders. The Contractor shall submit its cost proposal for the change or alteration within twenty (20) days after the Project Manager gives notification to the Contractor of the intended change or

alteration. Thereafter, a formal Change Order will be executed and signed by the Department reflecting the change or alteration and the additional cost or reduction negotiated by both Parties.

b. A Change Order negotiated and agreed to by the Contractor and the City and then executed as a Change Order by the City and the Contractor shall be deemed to cover all of the Contractor's costs associated with the change or alteration to the work, as reflected in the Change Order, including all costs and expenses incurred by the Contractor for time, material, labor, and extended or field office or home office overhead. Any Contract time extension granted by the City for the Change Order shall be the sole time extension granted for the change or alteration and for which Contractor is entitled, and no other time extension shall be granted by the City in connection with the work reflected in such Change Order. No loss of profit on account of any changes or alterations to the work or on account of work not executed or performed by the Contractor will be allowed, except that the Contractor may be entitled to an extension of time on account of changes or alterations to the work, provided that the Contractor satisfies the requirements of Paragraph 25 above.

c. The Contractor agrees and acknowledges that after a Change Order is negotiated and agreed to by the Parties and then executed by the City, the Change Order shall operate as a full and complete waiver and release of any and all claims of the Contractor related to or arising out of such change or alteration, whether such change or alteration is considered individually or cumulatively, including, but not limited to, any claim by the Contractor for extended home office overhead, extended field office overhead, time-impact costs, schedule delay costs, acceleration costs, compression costs, loss of productivity costs, extra work, additional work, and interference costs, or any combination of such costs.

Disputed Change Orders. If, after submission of a cost proposal, the Department and the 49. Contractor cannot agree upon a price within a reasonable amount of time, or if the Contractor disputes the applicability of unit prices or contingent prices, the Project Manager may direct the Contractor to perform or complete the extra or additional work notwithstanding that there is no agreement between the Parties as to price, and the Contractor shall proceed to perform the work so as to avoid any delay or interference to the progress of its work. In all such cases, the Contractor shall promptly comply and maintain proper force account time sheets and records, in accordance with Paragraph 51 below. The Project Manager shall also process a Change Order in an amount that he or she determines to be reasonable, necessary and appropriate. If the Contractor does not agree with the amount processed by this Disputed Change Order, the Contractor must notify the Project Manager within ten (10) days of issuance of the Disputed Change Order that it is proceeding under protest and that it reserves the right to a claim for the cost of the disputed work. In all cases of Disputed Change Orders which are protested by the Contractor, the Contractor shall submit to the Project Manager, within five (5) days after completion of the work, a detailed cost proposal which shall detail the costs of materials, labor, overhead and profit, actually expended by the Contractor for the work, as well as any changes to the Contract time.

50. **Disputed Work.** If the Contractor is of the opinion that any work required or ordered by the Project Manager violates the terms and provisions of the Contract or is not called for under the Contract Documents, the Contractor shall promptly notify the Project Manager, in writing, of its contentions with respect thereto and shall request a final determination thereof. If the Project Manager determines that the work in question is work required under the Contract Documents and is not "extra" work, or that the order complained of is proper, the Project Manager will direct the Contractor to proceed with the work in question. In all such cases, the Contractor shall promptly comply and maintain proper force account time sheets and records, in accordance with Paragraph 51 below. In order to preserve its right to claim compensation for such disputed work or damages resulting from compliance with such an order, the Contractor must notify the Project Manager in writing, within five (5) days of receiving notice from the Project Manager of this final determination, that the work is being performed or that the determination and direction is being complied with under protest. Furthermore, in order to claim an adjustment in the Contract price for work performed under protest, the Contractor must submit in writing to the Project Manager, within five (5) days after completion of the work in question, the nature and precise amount of compensation sought for the work, as well as copies of all force account time sheets and records compiled by the Contractor for the work. Failure of the Contractor to so notify the Project Manager of both its protest and its claim for compensation shall be deemed as a full and final release and waiver of any claim for extra compensation or damages therefor.

### 51. <u>Force Account</u>.

a. Payment under Force Account will be for the reasonable, actual and necessary direct cost of the work in accordance with the orders of the Project Manager, and in addition thereto the percentage of such cost hereafter stated. "Reasonable, actual and necessary direct cost" shall be deemed to include the following:

1. Wages of forepersons, equipment operators and skilled and semi-skilled and common laborers directly assigned to the specific operation at actual payroll rate of wages per hour and actual fringe benefits paid, labor taxes as established by law, and workers compensation and employers liability insurance, for each hour that such employees are actually engaged in the performance of the authorized work and, if directed, overtime, as provided by existing laws and regulations, as well as other insurance premium expenses, including but not limited to premiums for general liability insurance, where the such insurance premium expenses are a direct function of the foregoing wages, but only to the extent such insurance premium expenses derive solely from the foregoing wages.

2. The reasonable actual expenditure for materials (including sales tax paid, if applicable, and except as provided to the contrary in Paragraph 39 above), used up or incorporated in the work.

3. For any equipment, including machinery and trucks, mutually deemed as necessary for the performance of the work, the Project Manager shall allow the Contractor reasonable rental rates, computed as follows: (i) for all equipment rented, the Contractor will be reimbursed the reasonable actual costs based upon the receipts provided, plus an allowance for operating cost as provided in subparagraph (ii) of this subparagraph 51(a)(3).; (ii) for all equipment owned, including pumps and compressors, a reasonable hourly rate will be determined by using the reasonable monthly rental rates taken from the current edition (with updated supplements) of the Rental Rate Blue Book for Construction Equipment and dividing it by one hundred seventy-six (176); an allowance may be made for operating costs for each and every hour the machinery or equipment is actually operated in accordance with the rates listed in the aforesaid rental book; if the machinery or equipment is required to be at the work site, but is not operated, the Contractor may be compensated at the reasonable hourly rental rate, exclusive of operating costs. The Contractor will be allowed to add to the above rates the reasonable predominate areas adjustment percentage for the state as shown on the area adjustment map contained in the Rental Rate Blue Book for Construction equipment. In the case of any machinery or equipment not referred to in the Rental Rate Blue Book for Construction Equipment, a monthly rental rate shall be computed on the basis of an amount that is the equivalent of six percent (6%) of the manufacturer's list price for the sale (new) of such equipment; the hourly rate in such cases will be determined by dividing the monthly rate by one hundred sixty (160) when actually operating, and by one hundred seventy-six (176) when at the Project site, but not operating, to which no percentage shall be added. The above rates shall be for the time such equipment is required on the Project site for the performance of force account work exclusively.

b. To the reasonable, actual and necessary direct cost of the work done under Force Account as noted above, twenty percent (20%) will be added to the expenditure for labor and fifteen percent (15%) will be added to the expenditure for materials, excluding sales tax. No additions will be allowed for equipment costs, whether such equipment is rental or Contractor-owned. These percentages shall be deemed to cover the cost of heat, light, bond or bonds, use and up keep of small hand tools, administration, engineering, field and office superintendence, home office and site overhead, extended general conditions, non-payroll taxes, insurance (including general liability and non-payroll insurance), all loss, damage, risk and expenses incidental to the work and profit. The Contractor shall have no claim in excess of the above, such payments being in full compensation for the performance of such work and the furnishing of such materials and for all expense in connection therewith and incidental thereto.

c. Should the Contractor subcontract any portion of the work, with the prior written approval of the Project Manager, payment for that portion will be computed as the reasonable, actual and necessary costs defined above (exclusive of any profit to the Subcontractors), plus the percentages allowed, plus eight percent (8%) mark-up of the total paid to the Subcontractor. No additional percentage mark-up by or for any additional tiers of Subcontractors will be allowed.

d. The Contractor shall submit daily a statement in duplicate of work done on a Force Account

basis within twenty-four (24) hours of the time the work is done, and representatives of the Project Manager and the Contractor shall make daily comparison of the time and rates of labor, material used, etc., as shown therein. After correction, if necessary, this comparison shall be signed by each and filed with the Project Manager and the Contractor. The Contractor shall submit to the Project Manager monthly, prior to each Current Estimate, four (4) copies of an itemized statement of the amount and value of labor and materials furnished, accompanied by the original invoices for work performed under a Subcontract, and by an affidavit certifying the correctness of such statement. The Project Manager shall have access to any books, vouchers, time sheets, records, and memoranda showing the labor employed and the materials actually used on the specific operation and the actual net cost thereof, for the Contractor and any Subcontractor(s). Daily force account time sheets must include the name and job titles of employees, actual starting and quitting times, and the total number of hours worked each day by each employee.

e. Work done under Force Account shall be subject to all of the requirements of the Contract. It shall be prosecuted in an orderly, reasonable and economical way, and the prices paid for labor and material and the method of prosecuting the work shall be subject to the approval of the Project Manager. Neither work nor material will be paid for under Force Account unless it is ordered as such in writing.

**52.** <u>Lump Sum Bid Breakdown; Applications for Payment</u>. In order to assist the Project Manager in estimating approximate quantities and the value of the work performed, the Contractor shall furnish in writing to the Project Manager within thirty (30) days after the issuance of the Notice to Proceed, an apportionment of any lump sum Quote (the "Lump Sum Bid Breakdown") showing in detail its component parts. The Lump Sum Bid Breakdown shall be subject to the approval of the Project Manager. In addition, the Contractor shall furnish within sixty (60) days of the commencement of the work, and thereafter every thirty (30) days until Substantial Completion of the work, an application for payment (the "Application for Payment") which shall set forth in detail the approximate quantities and value of the work performed as of the date of the Application for Payment in conformity with the approved Lump Sum Bid Breakdown. The Contractor shall certify that the information set forth in the Application for Payment is true, correct and complete, and accurately and fairly represents the work performed to date by the Contractor in accordance with the Contract Documents.

# 53. <u>Current Estimates</u>.

The Project Manager, after receipt of an Application for Payment, shall prepare a current a. estimate (the "Current Estimate") of the approximate quantities and value of the work performed at intervals of about one (1) month during the progress of the work, except that the first Current Estimate may be prepared within sixty (60) days of the commencement of work under the Contract, provided at all times, however, that the Contractor is in compliance with all of the requirements of the Contract and the value of the work done during the time covered by the Current Estimate exceeds the amount of fifteen hundred dollars (\$1,500). The City shall make payments to the Contractor on the basis of the Current Estimates, when approved by the Project Manager. The City shall have no obligation to pay interest on the amount due under any Current Estimate, any provision of Applicable Law to the contrary notwithstanding. Payments on uncompleted items will be for the value of work done and materials furnished, as apportioned by the Project Manager. The Current Estimates are approximate only, and subject to correction in the Final Estimate. The payment of a Current Estimate shall not bind the City to the acceptance of any materials furnished or work performed by the Contractor. The City shall not be precluded from later contesting a Current Estimate and shall enjoy every legal defense, or other claim or counterclaim, in recoupment or otherwise, by reason of the character, quality, and quantity of the work and materials covered by a Current Estimate, notwithstanding payment of a Current Estimate.

b. The City may withhold payment for deficient items according to the terms of the Contract. The City shall pay the Contractor according to the provisions of 62 Pa. C.S.A. §§ 3931 et seq., as amended, Subchapter D, Prompt Payment Schedules, for all other items which appear on the Application for Payment and have been satisfactorily completed. If the City withholds payment from the Contractor for a deficient item, it shall notify the Contractor of the deficient item within sixty (60) calendar days of the date that the City received the Application for Payment.

c. Subject to the provisions of subparagraph (e) below, Current Estimates on Contracts which include the furnishing or installing of electrical, mechanical, plumbing, heating, and other equipment, systems or

components especially fabricated as part of the work under the Contract, which are subject to mechanical or electrical test, will include payment of invoice or invoices previously paid by the Contractor, not to exceed ninety percent (90%) of the amount shown on the Lump Sum Bid Breakdown approved by the Project Manager for such equipment, systems or components, when such equipment is delivered to the site, City property, or a bonded warehouse approved by the Project Manager. The City shall pay the balance of ten percent (10%) upon completion of successful testing of such equipment, systems or components, and acceptance thereof by the City. If no invoice is available, the City will pay the Contractor fifty percent (50%) of the cost of such specially fabricated equipment, systems or components, in conformity with the Lump Sum Bid Breakdown when delivered to the site, City property, or a bonded warehouse approved by the Project Manager, and an additional forty percent (40%) when such equipment, systems or components are installed and ready for test. The City shall pay the balance of ten percent (10%) upon completion of successful testing of such equipment, systems or components are installed and ready for test. The City shall pay the balance of ten percent (10%) upon completion of successful testing of such equipment, systems or components are installed and ready for test. The City shall pay the balance of ten percent (10%) upon completion of successful testing of such equipment, systems or components, and acceptance thereof by the City. The Current Estimates described in this subparagraph shall be reduced by the retainage required under Paragraph 54 below.

d. Subject to the provisions of subparagraph (e) below, Current Estimates may also include, when authorized by the Project Manager, an amount equal to the actual cost of specially fabricated materials and equipment not subject to electrical or mechanical test, furnished but not incorporated into the work, provided that the quantity allowed does not exceed the corresponding quantity estimated in the Contract Documents. The Current Estimates described in this subparagraph shall be reduced by the retainage called for in Paragraph 54 below.

e. Before including payments for equipment and materials described in subparagraphs (c) and (d) above in a Current Estimate, the Project Manager must be satisfied that:

1. the equipment and materials are properly stored, insured and protected through appropriate security measures;

2. paid invoices of suppliers support the Contractor's actual net cost for the equipment and materials;

3. the equipment and materials will be incorporated in the work under this Contract within a reasonable period; and

4. the Contractor assumes full responsibility for the safe storage and protection of the equipment and materials. If the equipment and materials paid for hereunder are damaged, stolen or prove to be unacceptable, the payment made therefor shall be deducted from subsequent estimates and payments unless the equipment and materials are promptly replaced to the satisfaction of the Project Manager and in conformity with the requirements of the Contract Documents. Equipment and materials shall be available for inspection and inventory at the storage site by the Project Manager or his or her authorized representative at all times. Upon payment, title to all such equipment and materials shall be vested in the City, free and clear of any and all debts, claims, liens, mortgages, taxes and encumbrances. The Contractor, at its own expense, shall execute such documents and take such other steps as reasonably required by the City to vest the aforesaid title in the City.

f. The Contractor for itself and any and all Subcontractors acknowledges and agrees that neither the Contractor nor any Subcontractor has any right to file a mechanics', materialman's or other lien against the Project site under the Pennsylvania Mechanics' Lien Law of 1963, Act of August 24, 1963, P.L. 1175, 49 P.S. § 1101 *et seq.*, as amended, or under any other law.

54. <u>Retainage</u>. Act 57 of 1998, 62 Pa.C.S. §3921, as amended, shall govern the withholding of retainage on the Contract. Provided that the Contractor is making satisfactory progress and is in compliance with all of the requirements of the Contract and there is no specific legal or other basis for the withholding of greater amounts, retainage under the Contract shall be ten percent (10%) of the amounts due the Contractor until fifty percent (50%) of the work under the Contract is completed, at which time one-half (½) of the amount then retained shall be returned to the Contractor, and thereafter five percent (5%) of the amounts due the Contractor until substantial completion of the Contract.

## 55. <u>Semi-Final Estimate and Punchlist</u>.

Upon substantial completion of the Contract, the Contractor shall submit an Application for a. Semi-Final Estimate (the "Application for Semi-Final Estimate"), which shall include a request for a semi-final inspection of the work under the Contract. The Project Manager shall make a semi-final inspection within thirty (30) days of the City's receipt of the Application for Semi-Final Estimate and request for inspection. If, based on said inspection, the City determines that the Contractor has Substantially Completed the work under the Contract, the Project Manager shall issue a certificate of Substantial Completion, which shall include the punchlist items required under subparagraph 55(b) below, and the Project Manager shall process the Semi-Final Estimate. The City shall, upon receipt of said Application for Semi-Final Estimate and upon receipt by the City of any guarantee bonds and other written warranties which may be required in accordance with the contract to ensure proper workmanship for a designated period of time, make payment on the Semi-Final Estimate within forty-five (45) days after issuance of the Certificate of Substantial Completion, except as provided in Paragraph 54 above, and less such additional sums as the City may withhold pursuant to this Paragraph 55. The City shall have the same right to withhold payment from the Semi-Final Estimate as is set forth in subparagraph 53(b) above with respect to Current Estimates. The City shall pay interest on the amount due under the Semi-Final Estimate to the extent provided by Applicable Law. Except as provided in Paragraph 54 above, the Semi-Final Estimate shall reduce the retainage withheld by the City to one and one-half  $(1\frac{1}{2})$  times the amount required to complete any remaining uncompleted items of work, provided that the Contractor has made satisfactory progress towards completion of the Contract and is in compliance with all of the requirements of the Contract and provided there is no legal or other basis for the withholding of a greater amount. The City reserves the right to withhold additional retainage to the extent the same as is permitted under 62 Pa.C.S. § 3921, as amended.

b. Upon preparation of the Semi-Final Estimate, the Project Manager, with the assistance of the Contractor, shall list in detail and in comprehensive fashion the remaining uncompleted items of work, and a reasonable cost of completion for each item on said list, or such other basis for payment thereof as may be provided in the Contract (which ever method may apply pursuant to the Contract), in an official punchlist which shall thereafter be issued in writing to the Contractor. If the Contractor disputes any of the items on the official punchlist, the Contractor must notify the Project Manager in writing, detailing the items in dispute and the nature of its dispute, with all supporting documentation, within five (5) days after receipt of the official punchlist. The Contractor must commence work on the official punchlist within ten (10) Working Days after receipt of the official written punchlist. The Contractor shall thereafter proceed promptly and expeditiously to complete the official punchlist items, and shall give notice to the Project Manager in writing of the date on which the Contractor completes the official punchlist items. The Contractor shall perform and complete all work on the official punchlist at its sole cost and expense and at no additional cost or expense to the City, subject to payment of the Final Estimate under Paragraph 56 below. The Contractor's work in completion of the official punchlist items shall in all respects be governed by the requirements of the Contract Documents.

56. Final Estimate and Inspection. The Project Manager shall conduct final inspection of the work, including the completion of all punchlist items, after completion of all punchlist items to the Project Manager's satisfaction and within thirty days (30) of receipt of the Contractor's formal written request for such final inspection and application for Final Estimate (the "Application for Final Estimate") (which request the Contractor shall not make until completion of the punchlist items). After the punchlist inspection, and provided that all the requirements of the Contract Documents have been complied with to the satisfaction of the Project Manager, including completion of all official punchlist items, the Project Manager will prepare a final payment (the "Final Estimate") and, based upon the Final Estimate, the City will pay the balance due to the Contractor, after all allowable additions and deductions have been made, by checks drawn by the City Treasurer or assessment bills as provided in Paragraph 57 below, or a combination of these two methods of payment. The foregoing to the contrary notwithstanding, the City shall have the same right to withhold payment from the Final Estimate as is set forth in subparagraph 53(b) above with respect to Current Estimates.

**57.** <u>Assessment Bills</u>. Where required by ordinance of the City Council of the City, the Contractor shall receive, and accept as payment, assessment bills against abutting property, as compensation for furnishing materials, labor, tools, and equipment, and for doing the work set forth in the Contract Documents. The Contractor shall collect such assessment bills at its own cost, and employ all legal remedies or proceedings, whether by lien, civil action, or otherwise, including recourse to the appellate courts, to which the City may be entitled. The

Contractor acknowledges and understands that the City does not in any way guarantee either the value, or the collection, of any assessment bill or bills, and that in the event of neglect to properly file and collect the assessment bill or bills, no recourse shall be had to the City by reason thereof. The Contractor hereby accepts and assumes all risk of failure to collect any such assessment bill or bills.

## 58. <u>Contractor Claims</u>.

a. Except as otherwise provided in these Standard Contract Requirements, the Contractor must notify the Project Manager in writing of any and all claims whatsoever relating to or arising out of Contractor's performance of the work under the Contract within ten (10) days of the event or occurrence giving rise to the claim, except where a shorter time is specified by the Contract Documents. The written notice of claim to the Project Manager shall provide a detailed statement of and basis for the claim, with supporting documentation attached. For purposes of this Paragraph 58, a "claim" shall mean a demand or assertion by the Contractor seeking, as a matter of right, an adjustment or interpretation of the Contract, payment of money, extension of time or other specific relief with respect to the terms and conditions of the Contract. The Project Manager will review all claims submitted by the Contractor and shall approve or reject each claim in whole or part, or shall request additional documentation in support of the claim from the Contractor.

b. The City and the Contractor hereby release and waive any and all claims against each other for consequential damages arising out of or related to the Contract and the work performed thereunder. This mutual release and waiver includes damages incurred by the Contractor for principal home office expenses, including home office overhead and the compensation of personnel stationed there, for losses of financing, business, and reputation, and for loss of profit associated with any other work, except anticipated profit arising directly from the Contract and the work thereunder. Nothing hereunder shall preclude, however, the assessment by the City of liquidated direct damages, when applicable in accordance with the Technical Specifications, General Bidding and Contract Requirements, and other applicable locations in the Contract Documents, or damages pursuant to Paragraph 25(h) above.

c. After Substantial Completion of the work under the Contract, but prior to the Contractor's acceptance of the Final Estimate, the Contractor shall notify the Project Manager in writing of any and all unresolved and previously asserted claims relating to or arising out of the work. The Contractor's written notice of claims to the Project Manager shall list the claims by number, assign a dollar value to each claim, and provide a detailed statement of each claim, with supporting documentation attached, including a copy of the notice by which the Contractor first brought the claim to the attention of the Project Manager.

d. Failure of the Contractor to notify the Project Manager of any claims in accordance with subparagraphs (a) and (c) above, and the Contractor's acceptance of and negotiation of payment under the Final Estimate under Paragraph 55 above, shall constitute and operate as a full and final release and a waiver of all such claims by the Contractor.

## 59. <u>Review by Project Manager of Contractor Claims and Compulsory Non-Binding</u> <u>Mediation of Contractor Claims</u>.

a. Within thirty (30) days after receipt of the Contractor's notice to the Project Manager under Paragraph 58(c) above, the Project Manager shall review all identified claims of the Contractor and shall notify the Contractor whether the claims are approved or rejected, in whole or in part.

b. Any claim of the Contractor which shall have been rejected by the Project Manager, in whole or in part, shall be subject to non-binding mediation. Mediation of the claim shall be an irrevocable condition precedent to institution of legal proceedings by the Contractor against the City with respect to such claim.

c. The Contractor must submit its demand for mediation to the Project Manager and the City of Philadelphia Law Department, c/o Chief Deputy City Solicitor, Affirmative and General Litigation Unit not later than 30 days after the Project Manager's notice of rejection. Failure of the Contractor to submit such claim to mediation within this time period shall be an absolute bar to institution of legal proceedings by the Contractor.

d. The Contractor shall submit a written timely request for mediation to the Project Manager and the City of Philadelphia Law Department, c/o Chief Deputy City Solicitor, Affirmative and General Litigation Unit. Upon submission of the claim to mediation, the City and the Contractor shall endeavor to resolve the claim by mediation in accordance with such rules as may be mutually agreed upon by the City and the Contractor.

e. The fee of the mediator, who shall be selected jointly by the parties, and the common expenses and costs incurred in connection with conduct of the mediation, shall be borne equally by the City and the Contractor. The mediation shall be conducted in the City of Philadelphia. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

## 60. <u>Contractor's Liability for Services and Materials</u>.

a. Notwithstanding the acceptance and approval by the City of any work the Contractor shall continue to be responsible for the professional quality, technical accuracy and the coordination of all work under the Contract. The Contractor shall, without additional compensation, correct any defects, deficiencies or omissions in the work.

b. The City's review, approval, or acceptance of, or payment for, any of the work performed under the Contact shall not constitute any representation, warranty, or guaranty by the City as to the substance or quality of the work reviewed, approved, or accepted, and shall not be construed to operate as a waiver or estoppel of any of the City's rights or privileges under the Contract, nor or of any cause of action arising out of the performance of the Contract. No Person shall rely in any way on such review, approval or acceptance by the City. The Contractor shall be and remain liable in accordance with the Contract and Applicable Law for all damages to the City caused by the Contract or the work under the Contract. Review, approval or acceptance by the City or the Project Manager under the Contract shall not constitute approval otherwise required by any City department, board, commission, or other regulatory agency in the exercise of such department's, board's, commission's or agency's independent regulatory authority of police powers under applicable law.

61. <u>False Claims</u>. The Contractor covenants and agrees that it shall promptly reimburse the City for (a) all sums paid to the Contractor by the City as a result of any false, fictitious or fraudulent billings, invoices, contract overcharges, and the like, and (b) all other costs which are incurred by the City as a result of the false fictitious or fraudulent billings, invoices, contract overcharges and the like. The Contractor further covenants and agrees that it shall promptly reimburse the City for all expenses and costs, including but not limited to attorneys' fees and expenses, incurred by the City in recovering any such sums from the Contractor. This Paragraph shall survive termination of the Contract and completion of the work under the Contract.

# E. MATERIALS, WORKMANSHIP, AND INSPECTION

62. <u>Materials and Workmanship</u>. The materials used in the work under the Contract shall conform to the requirements of the Plans, Technical Specifications and Standard Details and Specifications, as the same may be applicable. The workmanship shall be equal to the best standard practices. Work of reconstruction and restoration of privately-owned structures adjacent to the Project site shall be as set forth in the Plans and Technical Specifications or otherwise by written agreement with the owner or owners of such structures. Where no requirements are specified for materials or for the methods of testing materials or equipment, such materials or methods shall at least equal the latest standard or tentative specifications of nationally recognized standardizing agencies, such as the American Society of Mechanical Engineers, the latest codes of the National Board of Fire Underwriters or, as they apply, any regulations of the City.

63. <u>Inspection</u>. All of the work of the Contract shall be subject to general direction and inspection of the Project Manager or the Project Manager's designated representatives, and the Contractor shall afford every opportunity for the inspection of materials and workmanship. Authorized representatives of the City shall be permitted access at all reasonable times to all portions of the work, and to such portions of the place of manufacture of fabricated materials as may be necessary for complete inspection. Before beginning work the Contractor shall notify the Project Manager of the type and source of supply of the principal materials which the Contractor proposes to furnish, and, as soon as possible thereafter, shall furnish samples of materials, fixtures, and appliances for approval by the Project Manager. Before removal of any excess excavated material, waste, refuse,

or rubble, etc., from the site, the Contractor shall furnish to the Project Manager a list of certified dump site or landfill locations that are to be utilized for disposal of such waste materials and written verification that permission for the disposal of the waste materials has been obtained. Before beginning the fabrication of materials, equipment or systems, and before shipping materials, equipment or systems of a specified type, the Contractor shall notify the Project Manager in ample time to permit inspection at the place of manufacture or shipping, should the Project Manager so desire. Such materials, equipment or systems shall be delivered to the Project site properly marked for identification, and shall be subject to re-inspection and final acceptance or rejection at the Project site by the City. The Contractor shall deliver materials, equipment and systems to be inspected at the Project site in ample time for such inspection and testing. No materials, equipment or systems shall be incorporated into or used in connection with the work until accepted by the Project Manager, and all materials, equipment or systems rejected by the Project Manager as unsuitable or not in conformity with the Plans or Technical Specifications shall be immediately removed from the work. Unless otherwise specifically provided for, the City shall bear the cost of inspection and testing. All work shall be prosecuted in the presence of the City's Inspector ("Inspector"), and conformity with the requirements of the Contract Documents. The Contractor shall provide for inspection and testing to be carried out during regular working hours unless specifically authorized or directed otherwise by the Project Manager. The presence of the Inspector shall not affect in any way the duty of the Contractor to complete the work in accordance with the Contract Documents, nor be deemed a defense on the part of the Contractor for default or violation of the Contract. The Inspector is not authorized to waive, amend, revoke, alter, enlarge, relax, or release any of the requirements of the Contract Documents.

64. <u>Investigation of Work</u>. If the Project Manager at any time has reason to suspect that the Contractor may have delivered any unsuitable, unfit or otherwise defective work, the Project Manager may order an investigation thereof, and the Contractor shall furnish the necessary labor and equipment for such investigation. If the City finds that any part of the work is defective, the Contractor shall repair, replace or reconstruct such work to the satisfaction of the Project Manager, and the cost thereof and of such investigation shall be the sole responsibility of the Contractor. If the work is found to be in accordance with the Contract Documents, the City will reimburse the Contractor, in accordance with Paragraph 51 above, for the expense of the examination.

65. <u>Defective Work or Material</u>. The Contractor shall remove, at its own expense, any work or material rejected by the Project Manager as unsuitable, unfit, or otherwise defective and not in accordance with the Contract Documents, and shall repair, replace or reconstruct the same without additional compensation. Failure to do so shall be deemed a violation of Contract and shall be subject to the provisions of the Contract concerning violations and defaults. Any omission or failure on the part of the Project Manager to disapprove or reject any work or material shall not be construed to be an approval or acceptance of any such defective work or material. For any work or material that is determined to be defective and not in accordance with the Contract Documents, but which in the sole determination of the Project Manager cannot be remedied or does not require total replacement, the Project Manager shall determine an appropriate credit due the City from the Contractor.

### F. <u>CONSTRUCTION REQUIREMENTS</u>

66. Prosecution and Performance of Work. The Contractor's methods for the performance of the work must be those best adapted for the safe, efficient, and expeditious prosecution of the work, with a minimum of interference to adjoining work sites, to adjoining properties, and to public traffic and convenience. The Contractor shall prosecute the work vigorously, without delay, and with such workforces and equipment as shall be satisfactory to the Project Manager. The Contractor shall furnish and supply all labor and materials, in the quantity and of the quality required for the proper and timely performance of the work under the Contract; all such materials shall be of the best kind and quality and subject to the inspection and approval of the Project Manager. The Contractor shall strictly conform to the orders, instructions and directions given by the Project Manager, it being expressly understood and agreed that the decision of the Project Manager on any questions arising in connection with the performance of the work, and Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of its work under the Contract. Before commencing the work, the Contractor, when required by the Project Manager, shall submit for approval its proposed methods of prosecution of the work, including the maintenance

of both vehicular and pedestrian traffic; underpinning, bulk heading, shoring; sinking foundations; handling spoil; lighting; fencing; street surfaces; drainage; and all other branches of its work operation. Such approval is intended to safeguard the City's interest, but such approval will not be deemed to relieve the Contractor of its obligation or responsibility for the safe and proper conduct of the work. The Contractor shall at all times ensure that its work site, and its Subcontractors' personnel, while performing any part of the work under this Contract, are and remain free of the influence of alcohol or illegal drugs. The Contractor shall at all times enforce good discipline and order among its employees, and shall not employ any unfit Person or anyone not skilled in the task assigned. Any contact by the Contractor or its employees with adjacent property owners, passing motorists or pedestrians, and the general public shall at all times be professional, courteous, and respectful.

67. <u>Right of Way.</u> Where work is constructed on private property in the lines of an unopened street, the City guarantees the Contractor, for access and construction purposes, the area only within the lines of said street. Where work is constructed over private property, not within the lines of any street upon the City plan, the City guarantees the Contractor right-of-way between lines not more than twenty-five (25) feet, each side, beyond the outside lines of the structure to be built, unless otherwise provided for, with right of access only within the lines of this strip and subject to the limitations of existing structures. Where work is constructed within the lines of an open street, the City guarantees the Contractor use of the area only within the lines of the street, and subject to the requirements of the Standard Contract Requirements and Technical Specifications for maintenance of travel, existing structures, and access to abutting properties.

68. Maintenance of Traffic and Access to Property. Traffic of all kinds shall be maintained continuously and access to buildings shall be provided for at all times, except where otherwise specifically permitted by the Contract Documents, or where temporary interference is authorized by the Project Manager, in which case it shall be interrupted only for such time as is necessary to provide temporary substitutes for surfaces disturbed by the construction and to restore street and sidewalk surfaces after the completion of the work. Suitable bridges or other means of access shall be built and maintained to permit owners and occupants to reach their premises. Where necessary, the Contractor shall maintain proper and easy means for passengers to enter or exit public transportation. Where partial occupation of the street is allowed, materials and equipment shall be so placed as to ensure a minimum of interference with traffic; no materials shall be placed on the sidewalk within one foot of the curb line, and a clear sidewalk passage not less than four (4) feet in width shall be maintained at all times. The work shall be so conducted that annoyance to residents and interference with the normal use of the properties will be reduced to a minimum. The flow in gutters and inlets shall be maintained. When access to any adjacent property is temporarily cut off, owing to occupancy of the street by the Contractor, the Contractor shall render every assistance to the owner or occupant in handling materials of every description that must be delivered to or removed from such property, including recyclables, rubbish, and garbage, and such materials shall be taken to or from the nearest accessible point that, in the opinion of the Project Manager, is convenient for handling. No additional compensation will be allowed for the various items of expense noted above in this Paragraph 68.

69. <u>Maintenance of Waterways</u>. In navigable streams all work shall be carried on in full compliance with the requirements of the United States Department of the Army, the Commonwealth, the City and any other governmental or quasi-governmental agency, authority or commission having jurisdiction under Applicable Law. Movement of boats and vessels of all kinds shall be maintained unless the United States Department of the Army or any other governmental or quasi-governmental agency, authority or commission having jurisdiction under Applicable Law shall permit interference, and then only within the limits and times specified. Should the Contractor, during the progress of the work, sink, lose, or throw overboard any material, plant, equipment, machinery, etc., which may be dangerous to or obstruct navigation, the Contractor shall forthwith recover and remove the same. The Contractor shall give immediate notice to the proper authorities of such obstructions until the same are removed. Upon the completion of any work affecting waterways of any character, all equipment and materials deposited in such waterways shall be removed unless otherwise ordered or permitted, so as to leave an unobstructed channel of the same width and depth and with the banks, retaining structures, or wharves in a condition equal to that existing before the beginning of work.

70. <u>Access to Fire Hydrants and Fire Alarm Boxes</u>. Fire hydrants shall be left at all times clear of obstructions and readily accessible to fire apparatus. No material or other obstructions shall be placed within ten

(10) feet of a fire hydrant. Fire alarm boxes shall be supported and protected and maintained so as to be readily accessible and open to view. Excavation shall be decked or bridged, where necessary, to permit the safe passage of fire apparatus and to give access to fire hydrants and to adjacent buildings for the extinguishing of fires. Where necessary, branch pipes shall be extended from the nozzles of the fire hydrants to the mains. Fire hydrants and any branch pipes shall be protected from freezing, and the fire hydrants (particularly the high pressure type) shall, where necessary, be braced or tied to the connecting pipes to prevent movement under water pressure.

71. <u>Temporary Buildings</u>. Buildings, fences, trailers, and equipment erected or provided by the Contractor shall be neat in appearance. Except as provided in Paragraph 74 below, no advertising matter, other than Project information and the name and address of the Contractor, shall be displayed on the work or any such buildings, fences, trailer or equipment.

72. <u>Danger Signals</u>. The Contractor, at Contractor's own expense, shall erect and maintain all necessary barricades, and danger signs and signals. The Contractor shall keep adequate lights burning from sunset until sunrise, and shall provide security personnel as necessary for the safety of the public. The Contractor shall observe such rules relative to signals and safeguards as the police regulations, harbor regulations, and other Applicable Laws require.

73. <u>Street Closings and Detour Signs</u>. In the event that the work requires the closing of a street or roadway, the Contractor shall first obtain a permit from the City's Department of Streets. When the Department of Streets gives permission to close a street or roadway during Contract operations and to divert the traffic therefrom, the Contractor, at the Contractor's sole expense, shall erect and maintain appropriate traffic and highway barricades, detour signs, and any other necessary traffic signs in order to safely protect vehicular and pedestrian traffic. The Contractor shall notify the Department seven (7) days prior to the date of starting work and one (1) day prior to the date of completion. Copies of these notices shall be sent to the Traffic Engineer of the Department of Streets.

74. <u>Contract Identification Signs.</u> The Contractor shall, unless specified otherwise in the Technical Specifications, at Contractor's own expense, erect and maintain in a prominent position upon the Project site at a location approved by the Project Manager, a suitable sign, plainly lettered with the name and address of the Contractor, the character of the work and the name of the Department under which the Contract is being carried out. No advertising matter other than the signs above noted shall be displayed on the work.

**75.** <u>Safety and Sanitary Provisions</u>. The Contractor shall provide means and appliances and shall enforce suitable rules for the safe prosecution of the work and for the safety and health of the work force employed on it. The completed portions of the work shall be kept clean and in a sanitary condition. The Contractor shall provide and maintain properly secluded sanitary conveniences, in accordance with existing regulations of the Department of Public Health, for the use of Contractor's work force, and the Contractor shall strictly enforce the exclusive use of them by its work force.

76. <u>Storage Space</u>. Buildings, yards, or sidings that may be required for the delivery or storage of materials shall be provided by and at the cost of the Contractor. The Contractor may not use streets for storing materials unless otherwise specifically authorized in writing by a permit issued by the City's Department of Streets. Upon request of the Project Manager, the Contractor shall furnish a copy of any agreement for the use of a property or building for construction purposes, except where owned by the Contractor.

77. <u>Night Work</u>. Work during the night shall be carried on with due regard to the comfort of, and so as to minimize any disturbance to, nearby residents, and the methods to carry out such work shall be subject to the approval of the Project Manager, who may, if conditions so require, order that no night work be done in specific localities. The Contractor's work force shall refrain from loud noises, calls, whistles, and the operation of air compressors, rock drills, riveting machinery, and blasting between the hours of 7:00 p.m. and 7:00 a.m. unless specifically permitted by the Project Manager.

78. <u>Power and Light</u>. In developed portions of the City, and elsewhere when ordered by the Project Manager, the Contractor shall use either electric, compressed air or internal combustion engine power. When compressed internal combustion engines are used the exhaust shall be muffled. None but electric lights

shall be used in or under buildings or anywhere on the work below the surface of the street.

79. <u>Use of Water</u>. Permission for the use of City water shall be obtained directly from the Philadelphia Water Department. Water may be obtained through a hydrant attachment or as otherwise specified in the Technical Specifications. In all cases, the Contractor shall obtain and use such water in accordance with regulations of the Water Department. If the Contractor shall, at any time, waste water (as determined by the Project Manager) obtained from the Water Department, the Project Manager shall revoke permission for such use. No charge will be made for the use of water actually used for the construction work, unless specifically set forth elsewhere in the Technical Specifications.

# 80. <u>Prevention of Dust and Smoke</u>.

a. The Contractor shall keep the surface of the sidewalks and streets affected by its work, including decking and temporary paving, in a clean, neat condition. The Contractor shall sprinkle with water or otherwise treat the surface sufficiently to keep down any dust generated during the progress of work. Piles of dirt or other material shall not be left on the surface. The aforementioned requirements are not intended to take the place of the usual duties of the Department of Streets but to supplement them. No fires of any kind or burning of debris on the site or adjacent to it will be permitted; the debris shall be disposed of off the Project site.

b. The Contractor shall comply strictly with the provisions of the Air Pollution Code (Title 3 of The Philadelphia Code, as amended).

**81. Explosives.** If any blasting is involved in the performance of the Contract, the Contractor must obtain a blasting permit from the Department of Licenses and Inspections. Such permits will be issued only upon approval of the Fire Marshal and posting of bond or Certificate of Insurance covering personal injuries and property damage. Blasting may be done only by blasters duly licensed by the City. Storage of explosives and transportation of explosives to the site also require permits, which are issued by the Department of Licenses and Inspections, subject to prior approval of the Fire Marshal.

82. <u>Work in Freezing Weather</u>. Masonry of all kinds, pointing, grouting, plastering, and other work subject to the action of frost shall not be done when exposed to freezing weather, except under conditions where the Project Manager may specifically direct or permit such work, subject to the heating of materials, the protection of finished work and such other measures as may be deemed necessary. If operations are suspended on account of freezing weather, the entire work shall be properly protected until the resumption of work is permitted. If a suspension of the work on account of freezing weather or from any other cause is necessary, the site shall be cleaned up, left in good order, and continuously maintained by the Contractor during the period of such suspension.

# G. <u>SURFACE, SUBSURFACE, AND OVERHEAD STRUCTURES</u>

83. <u>Completeness of Data</u>. The term "structures" used in these Standard Contract Requirements shall apply to all surface, underground, and above-ground structures of whatever character within the Project site or immediately adjacent thereto, including buildings situated in or adjacent to the excavation. Where these structures are shown or indicated on the Plans, the information provided is in accordance with the information in the possession of the Department, but is approximate only. Such data are not warranted or guaranteed by the Department to be either complete or correct, and the Contractor shall and must assume, and adjust its Quote to account for, all risks resulting from conditions in the field that differ from the approximation shown.

**84.** <u>Support and Protection</u>. All structures, unless specifically designated by the Project Manager to be abandoned or relocated, shall be supported and protected at all times from destruction or injury, including damage from freezing, and maintained continuously in service. Should any injury occur while the work is in progress and the structures are under the protection of the Contractor, the Contractor shall fully restore such structures to as good condition as existed before the injury was done. All such support and protection work, and also such alterations of any structures as the Contractor may carry out for the Contractor's own convenience in executing the work, shall be done without additional compensation, unless otherwise specifically provided for in the Contract Documents. The City makes no covenant, representation or warranty as to the right of the

City or the Contractor to carry out any such support or protection work, or any alterations of any structures for the Contractor's own convenience; all such work being in any and all events subject to the consent and approval of the owner or owners of such structures.

Structures Interfering with Construction. If, in the course of the work, the Contractor 85 determines that any of the existing structures occupy space required by the structure or its appurtenances to be constructed under the Contract, or that such structures are so situated as to render it impracticable, in the opinion of the Project Manager, to do the work called for under the Contract in the manner specified, the Contractor shall excavate and uncover the portions of such structures in service and shall notify the Project Manager, who will, if reasonably practicable, arrange for the alteration, relocation or removal of the interfering structures or appurtenances within a reasonable time. The Contractor shall not move nor disturb such structures in any way without prior approval by the owners thereof, and the approval of the Project Manager. Any such action by the Contractor shall be at the Contractor's sole cost, risk and expense. Structures belonging to the public utility companies, which are ordered by the Project Manager to be removed or relocated, will be so removed or relocated and permanent supports placed, in general by their owners without cost to the Contractor. The Contractor, however, shall support and protect them up to the time of their removal, shall co-operate with such owners during the process of relocation, and shall maintain and protect such structures if and when such structures are relocated within the Project site or immediately adjacent thereto. Such work shall be done without additional compensation. Sewers, water pipes, electrical conduits, and other City-owned structures shall be altered, relocated, or reconstructed as shown on the Plans or as may be ordered in the course of the work. Payment for this work will be made at the applicable prices in the Contract unless otherwise specifically provided for. If the Project Manager approves a request by the Contractor to effect a temporary or permanent relocation of structures for Contractor's own convenience, and satisfactory arrangements can be made with the owners thereof, the Contractor may carry out such work at its own expense.

**86.** <u>Abandonment of Structures</u>. In the case of structures the service of which is permanently abandoned, the Project Manager will designate which such structures or portions of such structures the Contractor may salvage and which the Contractor may abandon in place on the Project site, including in the trench. The Contractor shall remove and deliver to a designated point of storage materials salvaged, and payment therefor will be made at the appropriate prices of the Contract, unless otherwise specifically provided. The Contractor shall allow owners of privately owned structures reasonable facilities for salvaging their property. Structures designated as abandoned shall become the property of the Contractor, and shall be removed from the work, unless the Project Manager has approved abandonment of such structures in place on the Project site.

# 87. <u>Co-operating with Public Utility Companies and City Departments</u>.

a. The Contractor shall at all times during the performance of the work fully comply with the Underground Utility Line Protection Law (Act 287 of 1974, as amended by Act 121 of 2008), 73 P.S. § 176 et seq., otherwise known as the PA One Call System.

b. The Contractor shall co-operate with other contractors and with the employees, officers, and agents of the City Departments or the various public utility companies which own, operate, or have supervision over the underground or above-ground structures encountered by the Contractor, and shall conform to the requirements of the owners of such structures in regard to their safe maintenance. The Contractor shall give to authorized representatives of the City Departments and public utility companies unrestricted access at all times to the excavation and site to inspect the condition and support of their structures at no additional cost to the City. Suitable arrangements shall be provided to facilitate access to valves and manholes if necessary. Ventilation openings shall be provided where gas is likely to accumulate. Where structures are to be constructed by the Contractor under the facilities of any public utility, the Contractor shall make suitable arrangements with the public utility company for the removal or support and maintenance of such facilities at no additional cost to the City.

**88.** <u>Gas Pipes</u>. Philadelphia Gas Works ("PGW") will make any necessary alterations to the gas mains or gas service pipes, without expense to the Contractor, unless specifically indicated elsewhere in the Contract Documents. PGW will by-pass the gas service in temporary pipes laid outside such excavation, in advance of the construction work. The mains and services that have been removed may be replaced in their permanent position

after the backfilling has been sufficiently compacted.

89. Traffic Control Apparatus. The Contractor acknowledges that the underground location of conduit and cables for traffic signals at intersecting streets is not ordinarily shown on the Plans for the work. Where traffic signals are indicated on the Plans, but the location of connecting conduit or cables for the signals is not shown, the Contractor shall nonetheless assume that there are underground conduits and cables that may affect or interfere with the performance of its work and the Contractor shall adjust its Quote accordingly. The Contractor shall support and maintain in their present locations, or in approved temporary locations, any existing traffic control masts, signals, apparatus, and their connecting underground or above-ground conduits and cables, in such condition as to permit the uninterrupted functioning of the signals during the progress of the work, on temporary poles if necessary, and in a manner satisfactory to the Department of Streets. If the existing signal apparatus is supported on poles and these poles are moved to a temporary location during the progress of the work, the Contractor shall either erect temporary signal poles in the approximate locations of the original poles and erect the signals thereon, or shall extend the electrical connection to the poles as relocated as may be ordered by the Project Manager. Upon the restoration of surface conditions, the Contractor shall restore the equipment, including underground or above-ground conduits and cables and electrical connections, to its original position and condition. This work, except new masonry, shall be done without additional compensation to the Contractor. Masonry piers will be paid for at the applicable unit prices.

**90.** <u>Vaults</u>. The City will secure the vacating of vaults interfering with the work without expense to the Contractor; but reasonable time shall be allowed the owners for the removal of materials and of any mechanical or other equipment that may be installed therein. These vaults will be vacated to the extent necessary, in the opinion of the Project Manager, to do the work called for under this Contract, including underpinning. The Contractor shall make arrangements with the owners of such vaults in regard to its occupation thereof and shall give the owners at least two (2) weeks' notice of Contractor's intention to remove or break into the walls.

**91.** <u>Street Lighting Units</u>. Whenever it is necessary to remove, relocate, or adjust street lighting units, or poles, the work shall be reviewed and approved by the City's Department of Streets – Street Lighting Division. All such street lighting work shall be performed at the sole expense of the Contractor and at no additional cost to the City, unless otherwise pre-approved in writing by the Project Manager and the Street Lighting Division.

### H. <u>MISCELLANEOUS PROVISIONS</u>

**92.** <u>Governing Law</u>. The Contract shall be deemed to have been made in Philadelphia, Pennsylvania. The Contract and all disputes arising under the Contract shall be governed, interpreted, construed and determined in accordance with the laws of the Commonwealth, without giving effect to principles of Commonwealth law concerning conflicts of laws.

93. <u>Binding Upon Contractor's Successors, etc.</u> The Contract shall be binding upon the Contractor's heirs, executors, administrators, and successors and assigns and such successors and assigns shall be responsible for the faithful performance and completion of the Contract work.

94. <u>Amendments; Waiver</u>. The Contract may not be amended, supplemented, altered, modified or waived, in whole or in part, except by a written Amendment, or other writing, signed by the Parties, or as provided in Paragraphs 20 and 21 above concerning cancellation of the Contract by the Contractor and termination for convenience by the City, or as provided in Paragraphs 48 and 49 concerning Change Orders and Disputed Change Orders, respectively. Except to the extent that the Parties may have otherwise agreed in writing in an Amendment, or other writing, no waiver, whether express or implied, by either Party of any provision of the Contract shall be deemed: (a) to be a waiver by that Party of any other provision in the Contract; or (b) to be a waiver by that Party of any breach by the other Party of its obligations under the Contract. Any forbearance by a Party in seeking a remedy for any noncompliance or breach by the other Party shall not be deemed to be a waiver of rights and remedies with respect to such noncompliance or breach.

95. <u>Interpretation and Order of Precedence</u>. If the Technical Specifications, the Proposal, or the

Plans expressly modify any of the terms, conditions, or requirements of these Standard Contract Requirements, or of the Department's Standard Details and Specifications, such Technical Specifications, Proposal or Plans shall supersede the portions of these Standard Contract Requirements or the Department's Standard Details and Specifications with which they conflict. The foregoing to the contrary notwithstanding, the City and the Contractor expressly understand that in no event shall the provisions of Paragraph 4 of these Standard Contract Requirements (with respect to test borings, test piles, and existing underground and above- ground structure locations) be superseded by the Technical Specifications, the Proposal, or the Plans.

96. <u>Integration</u>. The Contract Documents, including these Standard Contract Requirements and the exhibits incorporated by reference therein, contain all the terms and conditions agreed upon by the Parties, constitute the entire agreement between the Parties pertaining to the subject matter of the Contract, and supersede all prior agreements, understandings, negotiations and discussions, whether oral or written, of the Parties (except to the extent specifically set forth therein). No other prior or contemporaneous agreements, covenants, representations or warranties, oral or otherwise, regarding the subject matter of the Contract shall be deemed to exist or to bind any Party or vary any of the terms contained in the Contract.

97. <u>No Joint Venture</u>. The Parties do not intend to create, and nothing contained in the Contract shall be construed as creating, a joint venture arrangement or partnership between the City and the Contractor with respect to the work performed by the Contractor under the Contract.

**98.** <u>No Third Party Beneficiaries</u>. Nothing in the Contract, express or implied, is intended or shall be construed to confer upon or give to any Person, other than the Parties, any rights, remedies, or other benefits, including, but not limited to, third-party beneficiary rights, under or by reason of the Contract. The Contract shall not provide any third party with any remedy, claim, liability, reimbursement, cause of action or other right other than any such remedy, claim, etc. existing without reference to the term of or the existence of the Contract.

**99.** <u>Severability and Partial Invalidity</u>. The provisions of the Contract shall be severable. If any provision of the Contract or the application thereof for any reason or in any circumstance shall to any extent be held to be invalid or unenforceable, the remaining provisions of the Contract and the application of such provision to Persons, or in circumstances, other than those to which it is held invalid or unenforceable, shall not be affected thereby, and each provision of the Contract shall be valid and enforceable to the fullest extent permitted by law.

**100.** <u>Survival</u>. Any and all provisions set forth in the Contract which, by its or their nature, would reasonably be expected to be performed after the termination of the Contract or after full performance of the work under the Contract shall survive and be enforceable after such termination. Any and all liabilities, actual or contingent, which shall have arisen in connection with the Contract shall survive the expiration or earlier termination of the Contract, along with the following: the Contractor's warranty of its work, the Contractor's obligation to indemnify, defend and hold harmless the City, its officers, employees and agents; and the Parties' rights and obligations set forth in Paragraph 31 (Proprietary Rights Indemnity).

101. <u>Controlling and Pertinent Statutes</u>. All statutory citations in the Contract shall refer to the pertinent statute as it may be amended hereafter from time to time.

**102.** Forum Selection Clause; Consent to Jurisdiction. The Parties irrevocably consent and agree that any lawsuit, action, claim, or legal proceeding involving, directly or indirectly, any matter arising out of or related to the Contract shall be brought exclusively in the United States District Court for the Eastern District of Pennsylvania or the Court of Common Pleas of Philadelphia County. It is the express intent of the Parties that jurisdiction over any lawsuit, action, claim, or legal proceeding shall lie exclusively in either of these two (2) forums. The Parties further irrevocably consent and agree not to raise any objection to any lawsuit, action, claim, or legal proceeding which is brought in either of these two (2) forums on grounds of venue or *forum non conveniens*, and the Parties expressly consent to the jurisdiction and venue of these two (2) forums. The Parties further agree that service of original process in any such lawsuit, action, claim or legal proceeding may be duly effected by mailing a copy thereof, by certified mail, postage prepaid, in the case of the Contractor, to the address specified in the Quote, and in the case of the City, to The City of Philadelphia Law Department, Attention:

City Solicitor at the then-current address of the Law Department.

**103.** <u>Waiver of Jury Trial</u>. The Contractor hereby waives trial by jury in any legal proceeding in which the City is a party and which involves, directly or indirectly, any matter (whether sounding in tort, Contract or otherwise) in any way arising out of or related to the Contract or the relationship created or evidenced thereby. This provision is a material consideration upon which the City relied in entering into the Contract.

**104.** <u>Headings</u>. The titles, captions or headings of Paragraphs, sections, exhibits or schedules in or to the Contract are inserted for convenience of reference only, and do not in any way define, limit, describe or amplify the provisions of the Contract or the scope or intent of the provisions, and are not a part of the Contract.

**105.** <u>Days</u>. Any references to a number of days in the Contract shall mean calendar days, unless the Contract specifies Working Days or business days.

**106.** <u>Notice</u>. All notices, demands, requests, waivers, consents, approvals or other communications which are required or may be given under the Contract shall be in writing and shall be deemed to have been duly made (a) when received or refused if delivered by hand with receipt given or refused; (b) on the next business day if delivered by a nationally recognized overnight courier service (*e.g.*, Federal Express or United Parcel Service); (c) on the date confirmed for receipt by facsimile if delivered by facsimile; and (d) upon receipt or refusal of delivery if sent by certified or registered United States mail, return receipt requested. In each case notices shall be sent, in the case of notices to the Contractor, to the address or addresses set forth in the Contractor's Quote, and in the case of the City, to the address set forth in the City's Notice to Proceed, to the attention of the Project Manager, or to such other address as either Party may specify to the other by a notice complying with the terms of this Paragraph 106.

## I. <u>SPECIFIC LAWS</u>

The following provisions are not intended to limit the applicability of any of the other provisions of the Contract:

**107.** <u>Labor-Management Relationships: Prevailing Wages</u>. The Contract is subject to Section 17-107, as amended, of The Philadelphia Code, "Contractors: Labor-Management Relationships", and all regulations and procedures adopted thereunder.

As required by Section 17-107 of The Philadelphia Code all employees performing work a. under the Contract shall be paid at least the applicable prevailing wages for the respective occupational classifications designated, as set forth in the minimum wage schedule attached as part of the General Bidding and Contract Requirements, and shall be given at least the applicable presently prevailing working conditions during the entire period of work under the Contract. Such working conditions are those which are given to employees pursuant to a bona fide collective bargaining agreement for the applicable craft, trade or industry in the Philadelphia area on the date the General Bidding and Contract Requirements are issued. The occupational classifications for all employees under the Contract shall be only the specific categories of jobs within a given craft, trade or industry for which a separate hourly wage rate for the Philadelphia area is determined by the Secretary of Labor of the United States, in accordance with the provisions of the Davis-Bacon Act, and which are set forth in the applicable schedule attached to the General Bidding and Contract Requirements. In the event that any Contractor believes that work under the Contract should be performed by employees in occupational classifications omitted from the schedule attached to the General Bidding and Contract Requirements, it shall so advise the Managing Director's Office (the "MDO"), Labor Standards Division, which shall remedy the omission if it agrees.

b. The City may withhold from any sums due to the Contractor under the Contract so much as may be necessary to pay the employees the difference between the wages required to be paid under this Paragraph 107 and the wages actually paid to such employees, and the City may make such payments directly to the appropriate employees.

c. Each Contractor shall require all Subcontractors to comply with and be bound by all of the

provisions of this Paragraph of the Contract and of Section 17-107 of The Philadelphia Code, and the Contractor shall insert the requirements of Section 17-107 in all Subcontracts.

d. Every Contractor and Subcontractor shall keep an accurate record preserved on employee time sheets or time cards showing the name, address, social security number, occupational classification, wages and other benefits paid or provided and number of hours worked for each employee assigned to city-work (as "city work" is defined in Section 17-107(1)(b) of The Philadelphia Code), and such record shall be preserved at the current place of business of the employing Contractor or Subcontractor for two (2) years from the date of the Final Estimate on the Contract. The Contractor shall maintain and make his or her accounting and employment records and records relating thereto available for inspection by authorized representatives of the City, at all reasonable hours, and shall permit such representatives to interview employees during the hours on the job, all without prior notice. Neither the Contractor nor any Subcontractor shall allow any employee or other person to interfere with any such inspection or interview.

e. All Contractors and Subcontractors performing city-work shall, upon request of the City, file with the MDO, Labor Standards Division a certified statement setting forth the name, address, occupational classification, wages and other benefits paid or provided and number of hours worked with respect to each employee performing city work. Such statement shall be made weekly for each preceding weekly period. The certification shall affirm that the statement is correct and complete, that the wages set forth therein are not less than those required by the Contract for city-work and that the occupational classification set forth for each employee conforms with the work performed.

f. Nothing herein shall preclude the payment by the Contractor of wages at rates higher than those specified as the minimum in the applicable schedule attached to the General Bidding and Contract Requirements. However, no increase in any Contract price shall be allowed or authorized on account of the payment of wages in excess of those so specified, or on account of wage increases granted hereafter. No increases above the amounts specified in the applicable schedule attached to the General Bidding and Contract Requirements will be required by any Contract during the term thereof except in the case of an error or omission in such schedule. Such an error or omission shall be called to the attention of the MDO, Labor Standards Division as promptly as possible; but the remedying thereof by the Department shall not constitute grounds for withdrawal of a Quote or cancellation of a Contract, nor for an increase in the Contract price or other claim or recovery against the City, nor a ground for failure or refusal to pay the applicable proper minimum to all employees.

g. The minimum wages required hereby shall be paid unconditionally without any subsequent deduction or rebate of any kind except in accordance with Applicable Law governing payroll deductions for taxes, benefits and collective bargaining charges. Any assignment of wages by an employee for the direct or indirect benefit of the Contractor shall constitute a violation of this Paragraph; and any purported release of rights under Section 17-107 of The Philadelphia Code by an employee shall be void and of no effect.

h. The Parties shall refer to Section 17-107 of The Philadelphia Code, and to the regulations to be issued from time to time by the MDO, Labor Standards Division, for further information concerning the administration of the foregoing requirements of this Paragraph 107. In addition, it shall be the responsibility of all Sellers and Contractors to inform themselves as to all prevailing working conditions, including, without limitation, length of work day and work week, overtime compensation, and holiday and vacation rights.

### 108. <u>Non-Discrimination; Fair Practices</u>.

a. The Parties acknowledge that they have entered into and perform the Contract under the terms of the Philadelphia Home Rule Charter, as it may be amended from time to time, and in performing the Contract, the Contractor shall not discriminate or permit discrimination against any individual because of race, color, religion or national origin. In addition, the Contractor shall, in performing the Contract, comply with the provisions of the Fair Practices Ordinance of The Philadelphia Code (Chapter 9-1100, as amended) and the Mayor's Executive Order No. 4-86, as each may be amended from time to time, both of which prohibit, among other things, discrimination against individuals because of race, color, sex, sexual orientation, religion, national origin, ancestry, age, handicap (including but not limited to Human Immunodeficiency Virus infection), marital status, presence of children or source of income, in employment, housing and services in places of public accommodation. In the event of any breach of this Paragraph 108, the City may, in addition to any other rights or remedies available under the Contract, at law or in equity, suspend or terminate the Contract forthwith.

b. In accordance with Act 57 of 1998, 62 Pa.C.S. §3701, as amended, in the hiring of employees for the performance of work under the Contract or any Subcontract, neither the Contractor, nor any of its Subcontractors, nor any Person acting in their behalf shall discriminate, by reason of gender, race, creed, or color, against any citizen of the Commonwealth who is qualified and available to perform the work to which the employment relates. In addition, neither the Contractor, nor any of its Subcontractors, nor any Person acting in their behalf shall in any manner discriminate against or intimidate any employee hired for the performance of work under the Contract on account of gender, race, creed, or color. In addition to any other remedies available to the City, the Contract may be cancelled or terminated by the City and all money due on or to become due under the Contract may be forfeited for a violation of the terms or conditions of this Paragraph 108(b).

**109.** <u>Employment of Low - and Moderate - Income Persons</u>. The Contract is subject to Section 17-1000, as amended, of The Philadelphia Code, "Employment of Low- and Moderate-Income Persons by City Contractors", and all regulations and procedures adopted thereunder.

a. As required by Section 17-1000 of The Philadelphia Code, for all construction and demolition contracts entered into by the City with a total value in excess of \$150,000 (a "Covered Construction Contract"), the Contractor must certify to the Procurement Department that at least forty percent (40%) of the workers who work on a Covered Construction Contract are low- or moderate-income persons. Apprentices and those working in on-the-job training positions shall be considered workers for the purpose of meeting the requirements of Section 17-1000.

b. A low- or moderate-income person is defined under Section 17-1000 as a person whose income does not exceed more than eighty percent (80%) of the median income for the Philadelphia metropolitan area, as determined or adjusted by the Secretary of Housing and Urban Development pursuant to 42 U.S.C. §5302(a)(20), as amended. A person who no longer meets the income eligibility criteria set forth in Section 17-1000 because of employment by a party to a Covered Construction Contract, but who met the criteria on his or her date of hire, shall be deemed a low- or moderate-income person for three years from the date of hire.

c. Each Contractor shall require all Subcontractors to comply with and be bound by all of the provisions of this Paragraph of the Contract and of Section 17-1000 of The Philadelphia Code, and the Contractor shall insert the requirements of Section 17-1000 in all Subcontracts.

**110.** <u>Ethics Requirements</u>. To preserve the integrity of City employees and maintain public confidence in the competitive bidding system, the City intends to vigorously enforce the various ethics laws as they relate to City employees in the bidding and execution of contracts to which the City is a party. Such laws are in three categories:

a. Executive Order No. 02-04, which prohibits City employees from soliciting or accepting anything of value from any Person seeking to initiate or maintain a business relationship with the City, including but not limited to any of its departments, boards, commissions or agencies. All City employees presented with gifts or gratuities as indicated in Executive Order 02-04 have been instructed to report these actions to the appropriate authorities. All Sellers, agents or intermediaries who are solicited for gifts or gratuities by City employees are urged to report these actions to the appropriate authorities.

b. Section 10-102, as amended, of the Philadelphia Home Rule Charter, which prohibits any Quote from being accepted from, or contract awarded to any City employee or official, or any firm in which a City employee or official has a direct or indirect financial interest. All Sellers are required to disclose any current City employees or officials who are employees or officials of the Seller's firm, or who otherwise would have a financial interest in the Contract.

c. The State Ethics Act and the City Ethics Code, which prohibit a public employee from using

his or her public office or any confidential information gained thereby to obtain financial gain for himself or herself, a member of his or her immediate family, or a business with which he or she or a member of his or her immediate family is associated. "Use of public office" is avoided by the employee or official publicly disclosing the conflict and disqualifying himself or herself from official action in the matter, as provided in The Philadelphia Code §20-608, as amended.

## 111. <u>The Philadelphia Code, Chapter 17-400</u>.

a. In accordance with Chapter 17-400 of The Philadelphia Code, as it may be amended from time to time, Contractor agrees that its payment or reimbursement of membership fees or other expenses associated with participation by its employees in an exclusionary private organization, insofar as such participation confers an employment advantage or constitutes or results in discrimination with regard to hiring, tenure of employment, promotions, terms, privileges or conditions of employment on the basis of race, color, sex, sexual orientation, religion, national origin or ancestry, constitutes, without limiting the generality of Paragraph 32 (Default and Remedies), a substantial breach of the Contract entitling the City to all rights and remedies provided herein or otherwise available at law or in equity.

b. The Contractor agrees to include the immediately preceding subparagraph, with appropriate adjustments for the identity of the parties, in all Subcontracts which are entered into for work to be performed pursuant to the Contract.

c. The Contractor agrees to cooperate with the City's Commission on Human Relations in any manner which the Commission deems reasonable and necessary for the Commission to carry out its responsibilities under Chapter 17-400 of The Philadelphia Code. The Contractor's failure to so cooperate shall constitute, without limiting the applicability of Paragraph 32 (default and remedies), a substantial breach of the Contract entitling the City to all rights and remedies provided herein or otherwise available at law or in equity.

**112.** <u>Federal Laws</u>. The Contractor shall comply with the provisions of Title VI of the Civil Rights Act of 1964 (42 U.S.C. §§ 2000d – 200d7), section 504 of the Federal Rehabilitation Act of 1973 (29 U.S.C. § 794), The Age Discrimination Act of 1975, (42 U.S.C. §§ 6101 - 6107), Title IX of the Education Amendments of 1972 (20 U.S.C. § 1681), and 45 C.F.R. Part 92, as they may be amended from time to time, which together prohibit discrimination on the basis of race, color, national origin, sex, handicap, age and religion.

**113.** <u>Americans With Disabilities Act</u>. Contractor understands and agrees that no individual with a disability shall, on the basis of the disability, be excluded from participation in the Contract or from activities or services provided under the Contract. As a condition of accepting and executing the Contract, Contractor shall comply with all provisions of the Americans With Disabilities Act (the "ADA"), 42 U.S.C. §§ 12101 – 12213, as amended, and all regulations promulgated thereunder, as the ADA and regulations may be amended from time to time, which are applicable (a) to Contractor, (b) to the benefits, services, activities, facilities and programs provided in connection with the Contract, (c) to the City, or the Commonwealth, and (d) to the benefits, services, activities, facilities and programs of the City or of the Commonwealth, and, if any funds for payments by the City or otherwise under the Contract are provided by the federal government, which are applicable to the federal government and its benefits, services, activities, facilities and programs. Without limiting the applicability of the preceding sentence, Contractor shall comply with the "General Prohibitions Against Discrimination," 28 C.F.R. Part 35.130, and all other regulations promulgated under Title II of the ADA, as they may be amended from time to time, which are applicable to the benefits, services, programs and activities provided by the City through Contracts with outside contractors.

114. <u>The Philadelphia Code, Section 17-104</u>. In accordance with Section 17-104, as amended, of The Philadelphia Code, the Contractor, by execution of this Contract, certifies and represents that (1) the Contractor (including any parent company, subsidiary, exclusive distributor or company affiliated with Contractor) does not have, and will not have at any time during the term of the Contract (including any extensions thereof), any investments, licenses, franchises, management agreements or operations in Northern Ireland and (2) no product to be provided to the City under the Contract will originate in Northern Ireland, unless the Contractor has implemented the fair employment principles embodied in the MacBride Principles.

a. In the performance of the Contract, the Contractor agrees that it will not utilize any suppliers, Subcontractors or subconsultants at any tier (1) who have (or whose parent, subsidiary, exclusive distributor or company affiliate have) any investments, licenses, franchises, management agreements or operations in Northern Ireland or (2) who will provide products originating in Northern Ireland unless said supplier, subconsultant or Subcontractor has implemented the fair employment principles embodied in the MacBride Principles.

b. The Contractor agrees to cooperate with the City's Director of Finance in any manner which the said Director deems reasonable and necessary to carry out the Director's responsibilities under Section 17-104 of The Philadelphia Code. The Contractor expressly understands and agrees that any false certification or representation in connection with this Paragraph and any failure to comply with the provisions of this Paragraph shall constitute a substantial breach of the Contract entitling the City to all rights and remedies provided in the Contract or otherwise available at law (including, but not limited to, Section 17-104 of The Philadelphia Code) or in equity. In addition, the Contractor acknowledges and understands that false certification or representation is subject to prosecution under Title 18 Pa.C.S. §4904, as amended, concerning unsworn falsification to authorities.

115. Steel Products Procurement Act. The Steel Products Procurement Act, 73 P.S. § 1881, et seq., as amended, shall govern payments to the Contractor under the Contract. In seeking payment under the Contract, the Contractor represents, warrants and covenants that only steel products made in the United States as defined by the Steel Products Procurement Act have been used or supplied in the performance of the Contract and all Subcontracts thereunder. Where unidentified steel products are supplied or used under the Contract, the City will not authorize, provide for, or make any payments to the Contractor for such steel products, unless and until the Contractor shall first provide to the Project Manager documentation, including, but not limited to, invoices, bills of lading, and mill certification, attesting that the steel was melted and manufactured in the United States. Where a steel product is identifiable from its face, the City will authorize, provide for, and make payments to the Contractor for such steel products, only after the Contractor shall have submitted a certification, in a form satisfactory to the Project Manager, that the Contractor has fully complied with the requirements of the Steel Products Procurement Act. Where the Project Manager has determined, in writing that a particular steel product is not produced in the United States in sufficient quantities to satisfy the requirements of the Contract, then this Paragraph shall not apply to payments for that steel product. Failure of the Contractor to comply with the Steel Products Procurement Act shall constitute a violation of the Contract which shall entitle the City to exercise all rights and remedies provided to it by the Steel Products Procurement Act and provided to it under the Contract, either at law or in equity.

**116.** <u>Business, Corporate and Slavery Era Insurance Disclosure</u>. In accordance with Section 17-104, as amended, of The Philadelphia Code, the Seller, after execution of the Contract, will complete an affidavit certifying and representing that the Seller (including any parent company, subsidiary, exclusive distributor or company affiliated with Seller) has searched any and all records of the Seller or any predecessor business entity regarding records of investments or profits from slavery or slaveholder insurance policies during the slavery era. The names of any slaves or slaveholders described in those records must be disclosed in the affidavit.

The Seller expressly understands and agrees that any false certification or representation in connection with this Paragraph and/or any failure to comply with the provisions of this Paragraph shall constitute a substantial breach of this Contract entitling the City to all rights and remedies provided in this Contract or otherwise available in law (including, but not limited to, Section 17-104 of The Philadelphia Code) or equity and the contract will be deemed voidable. In addition, it is understood that false certification or representation is subject to prosecution under Title 18 Pa.C.S.A. Section 4904, as amended, concerning unsworn falsification to authorities.

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NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

Dept. Code: PLM

Rev. #: 0



### **BATTA LABORATORIES, LLC**

A Certified MBE Company

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#### EPA LAB ID #DE004

AIHA LAP, LLC ACCREDITED LABORATORY NOUSTRIAL HIGHE & ENVIRONMENTAL LEAD ISONED 171025 2015 AIHA LAP, LLC. LAB# 100448 PCM & Metals

NVLAP LAB# 101032 PLM & TEM

5764

## CERTIFICATE OF PLM ANALYSIS

Page 1 of 7

	ch#: N/A								
COC#:		Те	st Method	EPA/600/	R-93/116 in conj	unction wit	h Batta SOP	Report Date:	9/14/2017
Samplin								Date Sampled:	9/7/2017
	BLI Project #: L929517					Sampled By:	A GUILE		
Project N		876417-WATER T						Date Analyzed:	9/12/2017
Sam	ple ID	Client-sup	plied Da	ta	Analytica	Data		eported Results	
Lab Sample#	Client Sample#	Sample Description	Material Type	Friable?	Texture/ Gross	Color	Non-asbestiform Components Asbestiform Component		nponents
943737	090701A	ALL WINDOWS 3RD FL & UP- FRONT STAIRWELL	Putty	Yes	Firm	White	100% Non-fibrous Material	No Asbestos Found	
		STAILWELL		5	Homogeneous				
943738	090701B	ALL WINDOWS 3RD FL & UP- 2ND FLR	Putty	Yes	Firm	White	100% Non-fibrous Material	No Asbestos Found	
		TE G OF 2ND TER			Homogeneous		material		
943739	090701C	ALL WINDOWS 3RD FL & UP- TOP FLR	Putty	Yes	Firm	White	100% Non-fibrous Material	No Asbestos Found	
					Homogeneous				
943740	090702A	ALL WINDOWS 3RD FL & UP- 2ND FLR	Putty	Yes	Firm	Gray White	100% Non-fibrous Material	No Asbestos Found	
					Homogeneous				
943741	090702B	ALL WINDOWS 3RD	Putty	Yes	Firm	White	100% Non-fibrous	No Asbestos Found	
343741		FL & UP- TOP FLOOR	3 		Homogeneous		Material		
Note 1 Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.									

Note 2 Otherwise specified, Tr=Trace or < 0.1% based on visual estimate.

ANALYST:

M. COLLINS

**REVIEWED BY:** 

QA/QC Officer/Signatory

\*This report does not constitute endorsement by NVLAP and/or any other US government agencies.

\*The test data pertain only to the items tested. No assumptions or conclusions should be made to materials or samples not analyzed. Furthermore, Batta Laboratories, LLC assumes no responsibility for the accuracy of results influenced by the use of improper collection techniques or equipment.

\*Organically-bound, nonfriable material may interfere with the accurate quantification of asbestos. In these cases, the EPA recommends further analysis by a matrix-reduction method. Batta recommends the NY Item 198.6/198.4 over the Chatfield method. When point count techniques are utilized on organically-bound, nonfriable materials without the EPA-recommended matrix reduction steps, Batta Laboratories assumes no responsibility regarding the accuracy or precision associated with these results. In these cases, Batta employs a modified version of the EPA point count method.



NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

Dept. Code: PLM



### **BATTA LABORATORIES, LLC**

A Certified MBE Company

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EPA LAB ID #DE004

AIHA LAP, LLC ACCREDITED LABORATORY **HOENEA ENVIR** 

AIHA LAP, LLC. LAB# 100448 PCM & Metals

NVI AP LAB# 101032 PLM & TEM

Rev. #: 0 **CERTIFICATE OF PLM ANALYSIS** Page 2 of 7 Batch#: N/A COC#: N/A Test Method: EPA/600/R-93/116 in conjunction with Batta SOP Report Date: 9/14/2017 Sampling Data Date Sampled: 9/7/2017 BLI Project #: L929517 Sampled By: A GUILE 876417-WATER TOWER PLANT- 3110 W QUEEN LN Project Name: Date Analyzed: 9/12/2017 Sample ID **Client-supplied Data Analytical Data Reported Results** Lab Client Material Texture/ Non-asbestiform Sample Description Friable? Color Sample# Sample# Asbestiform Components Type Gross Components ALL WINDOWS 3RD Firm Putty 943742 090702C FL & UP- 4TH FL 100% Non-fibrous Yes White No Asbestos Found FRONT Material Homogeneous VARIES Fibrous Firm Caulk 943743 090703A THROUGHOUT-90% Non-fibrous Yes White 10% Chrysotile WINDOWS LEDGE Material Heterogeneous VARIES THROUGHOUT-Caulk 943744 090703B Sample Not Analyzed LOWER ROOF (positive stop rules) SOUTH VARIES Caulk 943745 090703C \*\* Sample Not Analyzed THROUGHOUT (positive stop rules) < 1% Fiber Glass Roofing Fibrous Firm 943746 090704A LOWER SOUTH Silver 15% Synthetic Fiber Field No 5% Chrysotile Black 80% Non-fibrous Heterogeneous Material

Note 1 Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.

Note 2 Otherwise specified, Tr=Trace or < 0.1% based on visual estimate.

ANALYST: M. COLLINS

**REVIEWED BY:** 

QA/QC Officer/Signatory

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	) [							AIHA LAP, LLC	AIHA LAP, LLC
	-T		1	BATTA	LABORA	TORIES	S, LLC	ACCREDITED LABORATORY	LAB# 100448
		lı.		AC	Certified MBE	Compar	лy	180/80 17025 2005	PCM & Metals
Ц		III.u.	[	Delaware	Industrial Park	, 6 Garfie	ld Way	4	NVLAP
NY EL	AP LAB# 119	993 for PCM,		N	ewark, DE197	13-5817	-	NVLAD	LAB# 101032
	PLM, TEM &			rei. (302)	737-3376 Fax	(302) 73	7-5764	T	PLM & TEM
Dept.	Code: PL	M	/eb: http://v	ww.batta	env.com E-m	ail: battae	nv@battaenv.com		
Rev. #	: 0		CER	TIFIC			NALYSIS		_
Batch#							NAL 1 515		Page 3 of 7
COC#:	N/A ing Data		Test Method	: EPA/600	/R-93/116 in cor	njunction w	ith Batta SOP	Report Date:	9/14/2017
BLI Pro		L929517			George States			Date Sampled:	9/7/2017
Project		876417-WATER	TOWER P	LANT- 31	10 W QUEEN	IIN		Sampled By:	CLIENT
	nple ID	Client-su	pplied Da	ta	Analytica		R	Date Analyzed: ported Results	9/12/2017
Lab Sample	Client # Sample#	Sample Description	Material Type	Friable?	Texture/ Gross	Color	Non-asbestiform Components	Asbestiform Co	omponents
944722	090704A LAYER	LOWER SOUTH	Insulation	Yes	Fibrous Homogeneous	Gray White	25% Perlite 75% Cellulose	No Asbestos Found	
943747	090704B	** LOWER NORTH	Roofing Field					Sample Not Analyzed (positive stop rules)	1
944723	090704B LAYER	LOWER NORTH	Insulation	Yes	Fibrous Homogeneous	Gray White	25% Perlite 75% Cellulose	No Asbestos Found	
943748	090704C *	* TOP ROOF	Roofing Field					Sample Not Analyzed (positive stop rules)	1
944724	090704C LAYER	TOP ROOF	Insulation	Yes	Fibrous Homogeneous	Gray White	25% Perlite 75% Cellulose	No Asbestos Found	

batta

Note 2 Otherwise specified, Tr=Trace or < 0.1% based on visual estimate.

ANALYST: M. COLLINS

Dedicated to a Cleaner

Environment Since 1982

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QA/QC Officer/Signatory

EPA LAB ID #DE004

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NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

Dept. Code: PLM

Rev. #: 0

# batta

**BATTA LABORATORIES, LLC** 

A Certified MBE Company

Delaware Industrial Park, 6 Garfield Way

Newark, DE19713-5817

Tel. (302)737-3376 Fax (302) 737-5764

### EPA LAB ID #DE004



AIHA LAP, LLC. LAB# 100448 PCM & Metals

NVLAP LAB# 101032 PLM & TEM

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

### CERTIFICATE OF PLM ANALYSIS

Page 4 of 7

Samplin									Date Sampled:	9/7/2017
BLI Proje			L929517	and the second se					Sampled By:	A GUILE
Project N			876417-WATER T						Date Analyzed:	9/12/201
Sam	ole ID		Client-sup		ta	Analytica	Data		eported Results	
Lab Sample#	Client Sample#		Sample Description	Material Type	Friable?	Texture/ Gross	Color	Non-asbestiform Components	Asbestiform Co	mponents
943749	090704D	**	TOP ROOF	Roofing Field					Sample Not Analyzed (positive stop rules)	
944725	090704D LAYER		TOP ROOF	Insulation	Yes	Fibrous	Gray White	25% Perlite 75% Cellulose	No Asbestos Found	
						Homogeneous				
943750	090704E	**	TOP ROOF	Roofing Field					Sample Not Analyzed (positive stop rules)	
943751	090705A		LOWER SOUTH	Flashing	No	Fibrous Soft	Silver Black	15% Synthetic Fiber 75% Non-fibrous		
						Bla Heterogeneous		Material		
943752	090705B	**	LOWER NORTH	Flashing					Sample Not Analyzed (positive stop rules)	

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Rev # 0

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### **CERTIFICATE OF PLM ANALYSIS**

Page 5 of 7

Rev. #: Batch#:			CER				VALYSIS		Page 5 0
COC#:	N/A	Те	est Method	: EPA/600/	/R-93/116 in con	junction wit	h Batta SOP	Report Date:	9/14/201
Samplin BLI Proje Project N	ect #:	L929517 876417-WATER T	OWER P	LANT- 31	10 W QUEEN	LN		Date Sampled: Sampled By: Date Analyzed:	9/7/2017 A GUILE 9/12/201
	ole ID				Analytica		Re	ported Results	
Lab	Client Sample#	Sample Description	Material Type	Friable?	Texture/ Gross	Color	Non-asbestiform Components	Asbestiform Co	mponents
943753	090705C **	* TOP ROOF	Flashing					Sample Not Analyzed (positive stop rules)	I
943754	090706A	LOWER SOUTH	Caulk	No	Fibrous Soft Heterogeneous	Silver Black	10% Cellulose 90% Non-fibrous Material	No Asbestos Found	
943755	090706B	90706B LOWER NORTH <sup>Cau</sup>	Caulk	No	Fibrous Soft	Silver Black	10% Cellulose 90% Non-fibrous Material	No Asbestos Found	
					Heterogeneous				
943756	090706C	TOP ROOF	Caulk	No	Fibrous Soft	Black	80% Non-fibrous Material	20% Chrysotile	
					Heterogeneous				
943757	090707A	LOWER SOUTH	Caulk	No	Soft	Off-white Black	< 1% Cellulose 100% Non-fibrous	No Asbestos Found	
					Heterogeneous	DIACK	Material		

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### EPA LAB ID #DE004



AIHA LAP, LLC. LAB# 100448 PCM & Metals

**NVLAP** 

AB# 101032

PLM & TEM



NY ELAP LAB# 11993 for PCM. PLM, TEM & Lead

### Dept. Code: PLM

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### CERTIFICATE OF PLM ANALYSIS

Page 6 of 7

Rev. #: Batch#:			CER	TIFICA	VIE OF P		NALYSIS		Page 6 of
COC#:		Те	st Method	: EPA/600/	R-93/116 in con	junction wit	h Batta SOP	Report Date:	9/14/201
Samplin BLI Proje Project N	ect #:	L929517 876417-WATER T						Date Sampled: Sampled By: Date Analyzed:	9/7/2017 A GUILE 9/12/201
Sam	ole ID	Client-sup	plied Da	ta	Analytica	Data	R	eported Results	
Lab Sample#	Client Sample#	Sample Description	Material Type	Friable?	Texture/ Gross	Color	Non-asbestiform Components	Asbestiform Co	mponents
943758	090707B	LOWER NORTH	Caulk	No	Soft Heterogeneous	Off-white Black	98% Non-fibrous Material	2% Chrysotile	
943759	090707C **	TOP ROOF	Caulk					Sample Not Analyzed (positive stop rules)	1
943760	090708A	LOWER NORTH	Caulk	No	Soft Homogeneous	Gray Black	100% Non-fibrous Material	No Asbestos Found	
943761	090708B	LOWER NORTH	Caulk	No	Soft Homogeneous	Gray Black	100% Non-fibrous Material	No Asbestos Found	
943762	090709A	LOWER NORTH	Caulk	No	Soft	Black	80% Non-fibrous Material	20% Chrysotile	
					Homogeneous				

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ANALYST: M. COLLINS

DEV/IEV/ED DV-	
	REVIEWED BY:

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### EPA LAB ID #DE004

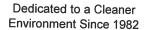
AIHALAP, LLC ACCREDITED LABORATORY HOLENE & EN IRONWEND

AIHA LAP, LLC. LAB# 100448 PCM & Metals

**NVLAP** 

AB# 101032

PLM & TEM





NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

#### Dept. Code: PLM

Rev. #: 0



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### CERTIFICATE OF PLM ANALYSIS

Page 7 of 7

AIHA LAP, LLC.

LAB# 100448

**NVLAP** 

LAB# 101032

PLM & TEM

PCM & Metals

EPA LAB ID #DE004

AIHALAP, LLC

ACCREDITED LABORATORY

HYDIENE & ENVIRONMENTAL LEAD

Batch#:	N/A					AIE OF F		NALYSIS		Page 7 of 7
COC#:	N/A		Τε	est Method	: EPA/600	/R-93/116 in con	junction wi	ith Batta SOP	Report Date:	9/14/2017
Samplin BLI Proje Project N	ect #:		L929517 876417-WATER T						Date Sampled: Sampled By: Date Analyzed:	9/7/2017 A GUILE
Sam	ple ID		Client-sup			Analytica		R	eported Results	9/12/2017
Lab Sample#	Client Sample#		Sample Description	Material Type	Friable?	Texture/ Gross	Color	Non-asbestiform Components	Asbestiform Co	omponents
943763	090709B	**	LOWER NORTH	Caulk					Sample Not Analyze (positive stop rules)	
943764	090710A		4TH FL REAR	Caulk	No	Fibrous Firm Homogeneous	Tan Black	93% Non-fibrous Material	7% Chrysotile	
943765	090710B	**	5TH FL REAR	Caulk				- - -	Sample Not Analyzed (positive stop rules)	1
943766	090710C	**	4TH FL NORTH	Caulk					Sample Not Analyzed (positive stop rules)	1

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M. COLLINS

ANALYST:

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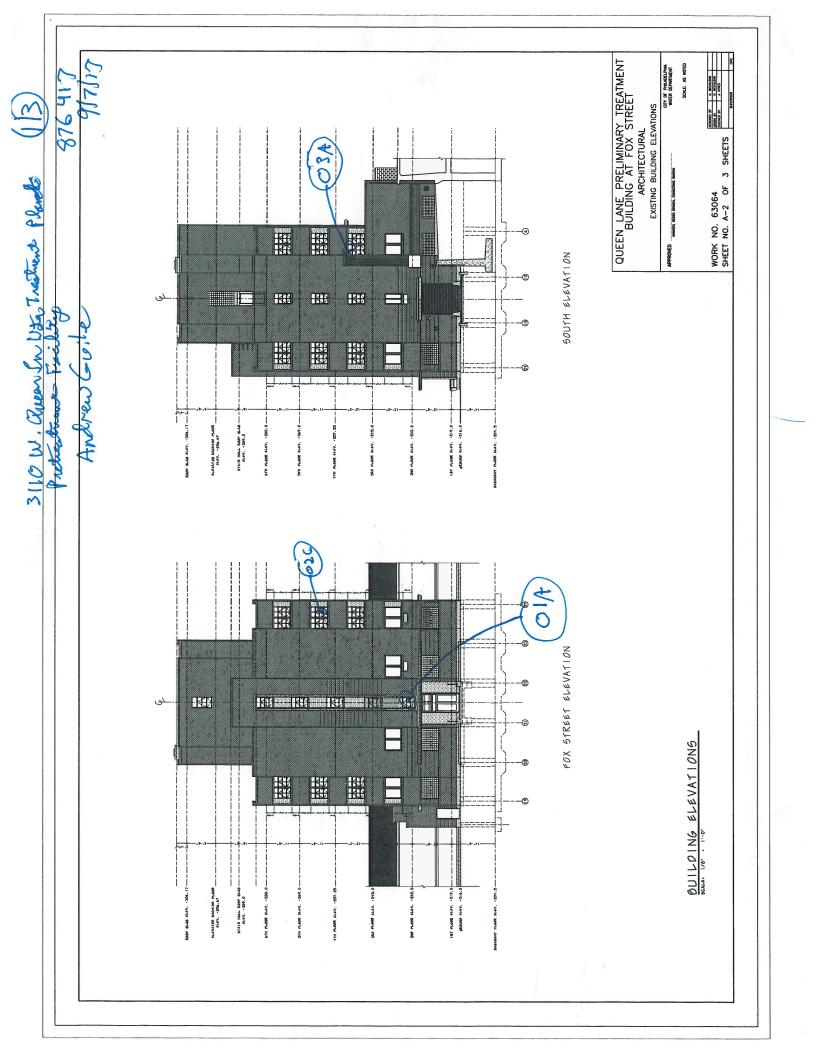
\*Organically-bound, nonfriable material may interfere with the accurate quantification of asbestos. In these cases, the EPA recommends further analysis by a matrix-reduction method. Batta recommends the NY Item 198.6/198.4 over the Chatfield method. When point count techniques are utilized on organically-bound, nonfriable materials without the EPA-recommended matrix reduction steps, Batta Laboratories assumes no responsibility regarding the accuracy or precision associated with these results. In these cases, Batta employs a modified version of the EPA point count method.

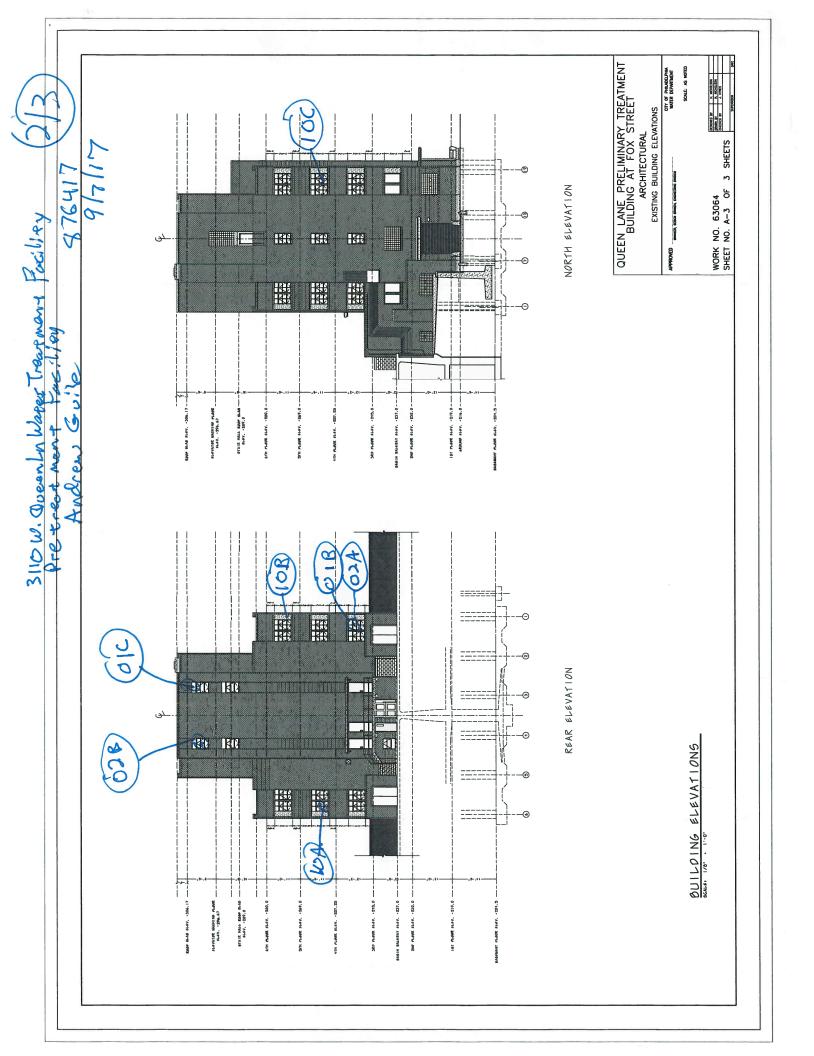


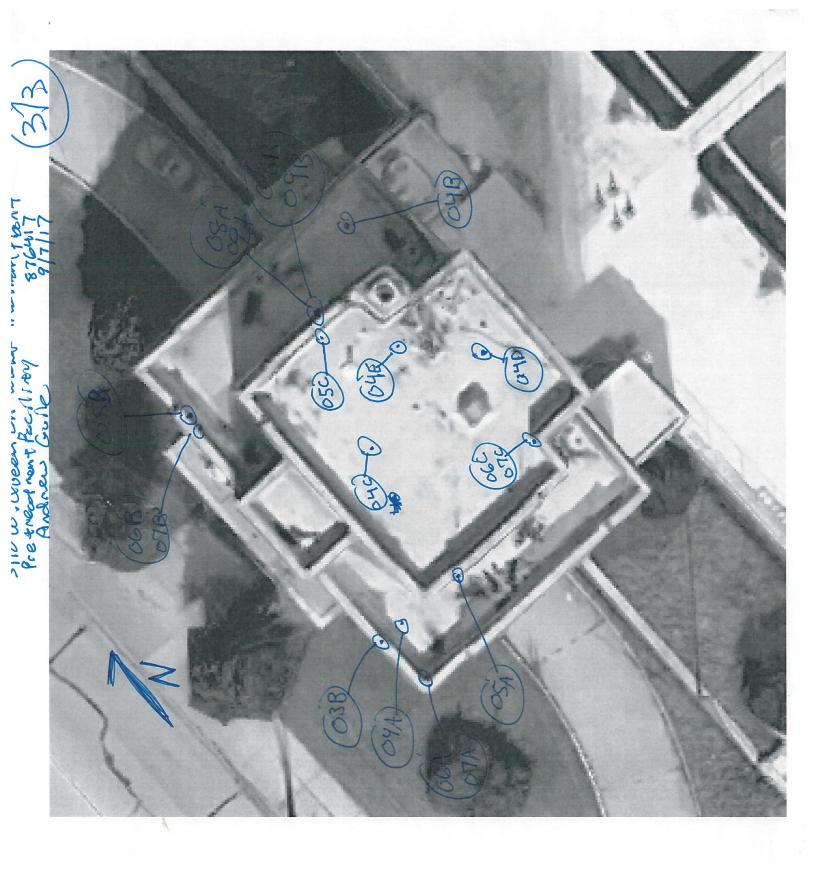
BUL	K SAMPLING RECORD / (	CHAIN OF CUSTODY
Project Name: 3110	W. Queen Ln Water Treatment	Plan 1 BEA#: 876417
Site Inspected:	etreatment Facility	_
Building Inspector:	ndrew Gulle BI#:	Date:
Building Inspector:	BI#:	MO TU WE TH FR SA SU (circle one)
Project Manager:	odd Zeislofy	-
FIELD DATA:		30
0	1. Job safety Analysis	Total # of Samples Submitted
	2. Bulk Sample Data Sheet / Log	
	3. Floor Plan Sketch with Location Diagram	
	4. Materials Inventory Work Sheet	
	5. Events Log	Site Arrival Time: 0830 hrs
	6. Asbestos Survey Data Checklist	Site Departure Time: 1430 hrs
POST ANALYS	S DATA REVIEW / QAQC:	1 /
Project Ma	anager:	Date Reviewed:
		General Office/Forms/Bulk Sample Package 2017/MASTER 7 page REV DATE 5/1

DATTA	BATTA ENVIRONMENTAL	
	Delaware Industrial Park 6 Garfield Way	Ph (302) 737-3376 Fx (302) 737-5764
	Newark, DE 19713-5817	www.battaenv.com
JOB SAFETY AN	<u>IALYSIS</u> 9-7-	17
Prepared by: Andrew Guile	Date: 87641	7-
Project Name: Water Treatmont Plant	<u>BEA</u> #: <u>87641</u>	17
Site Inspected: Pre-treatment facility		
Task Description (Include equipment name and location):	Bulk sampling	
	· · ·	
<b>Instructions:</b> Identify the steps that you will have to perform to complete the assist checkmark next to the ones that apply to this task. Also, place a checkmark next to a <b>Tools &amp; Equipment</b> $-1$ . Do you have the proper tools & equipment condition? 3. Are you trained to safely use the required tools & equipment $-1$ .	ny sub-item that is a concern. ent to safely perform the task?	
Hazardous Energy Control       - 1.       Will you be exposed to hazar         2.       Have all hazardous energy sources been identified?       3.       Do you         4.       Have you verified with the owner or owners representative that all hazardous	ds from equipment movement need a hazardous energy sour	ce(s) locked out / tagged out?
<ul> <li>Fall Protection - 1 Will the task require you to be at heights platform guard rails to perform the task? 3 Will you be using a manlift or scaffolding have they been inspected and approved for use? 5 Voltage?</li> <li>Are there any roof or floor openings in the area where you will be work edge?</li> <li>Is your ladder proper for the task and in safe condition?</li> </ul>	, aerial lift, or scaffolding? 4. Will a qualified ground person	If using a manlift, aerial lift, be present when using a lift?
<u>Confined Space</u> – 1 Will you be working in a permit required equired in the identify any potential safety hazards?Are you knowledgeable continuously monitor the air when in a confined space?		
<u>Hazardous Materiais</u> – 1 Are you familiar with all the haza knowledgeable about any potential chemical exposure that might be created	rds of any chemicals you will by the task? 3 Will you not	be using? 2Are you eed to wear a respirator?
<u>Cutting &amp; Welding</u> - 1. Is a Hot Work Permit required before s each floor level that is exposed to weld sparks? 3. Will the fire watch task? 4. Is there proper ventilation for the task being performed?	remain at the seene for one-ha	ou have a fire watch person on If hour after completion of the
Mobile Equipment Operation – 1 Have you been trained and Mobile equipment? 2 Do you perform a Safety Inspection of the mobile	1 issued a permit (must be disp le equipment before operation?	played) to operate this type of
	id er	ctive Equipment?
Safety Training – 1. Have you been trained in the safety proc space, fall protection, respirator usage, etc.	edures required to perform the	task? Ex: Lockout, confined
Other Safety Hazards         -1.         Are there any other potential safety h           (Hidden electrical / piping / materials behind walls or equipment skins, etc.)		in performing this task?
I/We have reviewed this task for the above safety subjects and m Signed: Date:	ade a plan for all the areas the $q - 7 - 17$	at have been checked.
Signed: Date:		
Date:	S General Office/Forms (Built Samolo Perkene20)	IT MASTER 7 page REV DATE 5/10/17

	NTALA	s, INC.		NOTE TO ANALYST -	BLI# しのののではののではのでのです。 NOTE TO ANALYST - Positive Stop Unless Otherwise Noted on this COC	therwise No	ted on this CO	с Ц	1
Addr	ware industrial Park Ph (302) 73 field Way Fx (302) 73 ark, DE 19713-5817 www.battae Treetment Plant W. Queentn Philad	17-3376 17-5764 PLM EEP	PLMAEPA POINT COUNT ONOB	LE DATA S TEM OVERNO EA# 876410	L Va	Date/Time Results Required: _ Date/Time Cert of Analysis Req: Results to: □Inspector ♥Ma □Client: □Phone:	inage	12,17 12,17 12,17 12,17	1700 HRS 1700 HRS
Inspector(s):	Indrew Guile			Date Inspected	6112	E-mail:		Date	June 1
SAMPLE NUMBER	MATERIAL SAMPLED	AHERA CLASS	Noter CONDITION G / Dam / Sg.Dam	ALL LOCATIONS, Name & Circle Sample Locations (E.1, E.2, 0.1, 1.1, 1.3, 2.2,)	circle Sample Locations	MATERIAL QUANTITY	Note 3 SAMPLE		
7 aug 737	Window Putty	X	6	N All Windows Sulf 14 4	13 up (OTop Ploan Dud Floan		#		554
020000 740-	Window Putty hard)	h	<u>_</u>	N All windows 3rd 1	L FLAUP OHIM FI FONT		t	Grey	Cert
145-	Building cauly	K	6	300	1 Lover ratsound		+	Grand MA	Chris 1
-912 200 HO	Rovting - Field	٤	C B T	10 Lower South	ODE Top rout		#Her	Black 5.CV	in S. Mars with
LIST 1ST	4	Ł	5	K C	C Top roch		1	Black 10	N/PC/MA/12
06 QUANC 754	Parapet Flashing could Top Laver (Lower)	र	5	F B Lower rorth	Otop roof		¥	Blect 30	No No No No
67 (ABC) 757	Parapet Flashing Could	Ł		B Lower Forgh C	Stop ract		#	ten	NAC NO
CS BBE 740	Building penetration cauly	z	5	(1)(1)(1) Lower North			Ŧ	Grey	Que la
	Building penetrarion could		6	NUMB LOVEN NON-H	M		¥	Bleck 20	NA/PS
10 360 77647	Window could	K	3	FO Stor FI rear	C 44 FI North		F	Breed 74	PS NA/PS
A, B, C				ZL		4			
A, B, C				ZLL				•	
A, B, C				ZL					-
A, B, C				ZL					
A, B, C				ZL			1		
Notes 1 AHERA Classification: T=Thermal Instation, S=Surfacing, M=Miscotlaneous Relinquished Byr	ion, S-Surfacing, M-Missofianeous 2. 2. Material Samplet: Pipe Covering, Editor	ler Breeching, Ceiling	Breaching, Ceiling Tae, Floor Taes, Sheet Flooring, etc.	3 Sample Composition: Homogeneous, Mixed, Layered Time: Received E	, Mixed, Layered Received By:	MA	Date: 0/	S / Time:	Stol
	Delivered By:		Date: / /		Received By:		Date: /	/ Time:	-
	Delivered By: Delivered By:	Ď	Date: / / /	Time: Rece	Received By: Received By:		Date: /	/Time:	
				~		ieneral Office/Forms /Bu	S. General Office/Forms /Euli: Semple Puckage2017 MASTER 7 page	IER 7 page REV DATE 5/19/17	11/61/5 B









BATTA ENVIRONMENTAL ASSOCIATES, INC.

Delaware Industrial Park Ph 6 Garfield Way Fx Newark, DE 19713-5817 ww

Ph (302) 737-3376 Fx (302) 737-5764 www.battaenv.com

	MATERIALS INVE	NTORY \	NORK S	HEET		
Project Nam	e: Water Treatment Plant		BE	A#: 87641	7	
Site Inspecte	ed: Pretrectment Facility		Dat	e: <u>9/7</u>	117	
Building Insp	pector (s): Andrew Guile		Wo	rk Sheet	of _1	
Sample #	Locations (1.1, 1.2, 3.5,etc.)		Dimensions	all a serie	Total	units
01	Exterior whether 3 d FI	Large winder	ug 16pano	5 195 × 15%		
	and up, plug stairwell Exterior windows and Fl	stair well	s Spane	5 1913 <sup>°</sup> x151 <u>3''</u>		
02	and which blues stair well	V-		+		
63	and up, plug stairwell Var:es throughout			17 (g. 3) dag		
04	Allroofs					
05	Anraots	tur.				
06						
07						
04	Lower root north slob					
09	Lower root non-sh side					
10	Interior winder Frame 3nd Florup	7*5%				
				L I - 5		
	L		/ /ou' imp c ?	14	D	



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	EVENTS LOG	
Project Nam	e: Wayer Treatment Plana BEA#: 876417	
Site Inspecte	ed: Pretreatment Facility Date: 9/7/17	
Building Insp	pector (s): Events Log Sheet of	
Time <sub>(24hr)</sub>	Event	
0700	Load truck	
0715	Depart free Water Treatment Plant	
OC 30	anine at Water Treatment Plant, neet with	
	site representatives, sign in. Waiter for	
	anival of Jeff Noumick. Start poperwork,	
	cellect tools for mensmont + Armolin.	
0900	Jeff Naunich anides drine one to protestment	
	facility go over scope at unit. There	
	appears. To he some miscommenication within	
	clients affices, Unsure of areas to be soupled	
	and scrometers of set. Butto not report	
	to collect and same chips on scrasings.	
	No rader availables, exterior hunderes	1
	unt some caulting molesselle (Ruiding Caultson	d
	Walk stronger of protreatment facility, begin	
1200	arlesment & tuella sampling.	
1300	Jeff raunich departs for another Job siter d	
	continue moto hub sampling some offices/	
	areas in accesseble. All interior + esteron	
	unindresses a perting and camp assumed to he	
	hanogeneraux.	
1430	Depart from lab	
1600	anine at lab, unload truck	
9/8/17 -	Couplete paperurarky release souples to	1
/	lab for Englypip	
	arios/on îkan bran bran bran bran bran bran bran br	I.



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	ASBESTOS SURVEY DATA CHECKLIST								
Project Name: Site Inspected: Building Inspector(s)	retreatment			BEA#: <u>876417</u> Date: <u>9</u> <u>7</u> <u>7</u> <u>17</u> Checklist Sheet <u>1</u> of <u>1</u>					
Instructions:	'Strikethrough' i	f not observed, n	ot present or not	included, 'X' box if present and inspected					
Scope of Work:	Renovation	Demolition							
an a she a farma	Limited Renovat	ion (list areas)	act/win	daus					
	Roof Included	Exterior Included							
Number of structures	Sec								
Structure #	Type or U	sage of structure:	Commercia						
Structure Description	n: 🗌 one ste	ory 🗌 two sto	ory three s	tory split level X 75+07					
Elements of the strue									
Roof	Shingles		Built-up(flat)	Membrane Multiple layers					
	Transite	Metal	Tar Paper						
Flashing	Chimney	Edge	<b>Y</b> wall	Parapet/Cap Datch					
M	Vent	Mechanical	Drain	Pitch Pocket					
Exterior	Wood		Alum./Steel						
	Brick	Block	Stone	Stucco					
		Dormers	Multiple layers						
Structure	Wood Frame	Steel Frame	Full Masonry						
Foundation	Slab		Basement	Dirt Floor Concrete Floor					
	Debris	Bearing Plates							
Attic									
Fireproofing	Beams								
- Insulation	Attic/Roof		Walls						
			Duct Board	Wiring					
				Water Heater					
	Heat Shield	Wood Stove	Fireplace	Flue Packing					
Vibration Dampe									
		Window	Door	Tel/Elec Entry					
	Putty Window	Rubber/Vinyl	None						
HVAC units	Duct Insul.	Pipe Insul.							
Cooling Tower			Pipe Insul.						
Ceiling	Plaster	Drywall/JC							
	Glued Tiles	Stapled Tiles	Splined Tiles	Drop in tiles					
Watts	Drywall/ JC			Ceramic, metal or plastic tile mastic					
	Paneling/nails	Paneling/mastic							
Floors-		Stone/Slate							
	Wood		Sheet Floor	□ Floor Tile □					
	Sheet mastic	Tile mastic		Stone/Slate mastic					
Sinks	Sound deadene		Stone-like Utility						
Electrical Panel									
		nastics, glues, roofin	g coatings						
other	g		other						

City of Ph lad Air Management Services, 32 University e	nd Asbestos Contr	a collection of the	e Only	Date Received L	&I:	Date Received AN	IS:
Asbestos nsp o		rt	Office Use Only	Date Inspected		Inspector No.	
1. Name of Building / Property: Water Treatment Plant - Pre-Tre	eat Building		Addro 311	ess 0 W. Queen L	n Philad	elnhia PA 19	9107
Water Treatment Plant - Pre-Treat Building         2. Name of Building / Property Owner:			Addr			Phone	
3. Name of Philadelphia Certified Investigator:       Certification No.       Contact Information / Email / Phone No.         Andrew Guile       AIC17-000031       Andrew.Guile@battaenv.com         L&I Commercial Activity No. (Former Business Privilege License No.)       Business Tax ID No.         3702058392/423867       5703079							
4. Name of Philadelphia Licensed Labora	itory:		Licen	se No.		Phone	No.
Batta Laboratories			ALL	-112		302 73	37-3376
result in the disturbance of the identified Asbestos Containing Materials (ACMs) (e.g. demolition, asbestos abatement, and / or renovation activities.) Replacement of Roof, Renovation / Replacement of Windows, exterior surface water intrusion prevention							
6. Property has been declared to be in i Attached is a copy of the L&I Notic							
<ol> <li>7. (ACMs) identified?  Yes (List Belo</li> <li>8. Suspected ACM's sampled?  Yes (</li> </ol>		e laborat	ory cl	nain of custody a	nd bulk sam	ple results.) 🔲	No (Why?)
9. List all identified ACM's located in tremoved prior to renovation. You (Invest							
Location	Description	Type (Code		Amour	nt Linear	Condition (Code 2)	Action (Code 3)
roof	Fields,Flashings,Caulks	NF			23111011	ND	REM
Exterior Walls	Building Caulks	NF	-1			ND	REM
Interior Windows	Interior Window Caulks	NF	-1			ND	REM
		9					
NF1 - Non-Friable, Cat. 1	FRI - FriableDD - Deteriorated orREM - Removal necessary prior to Demo/RenoNF1 - Non-Friable, Cat. 1DelaminatedNRN - No removal necessary, label ACM						I
10. I hereby certify that the foregoing statements are true and the information contained in this report is true. This certification is made subject to the penalties set forth in 18 PA. C.S. S4904 relating to unsworn falsification to authorities. Furthermore I certify that the inspection, sampling, and labeling requirements of section X of the Asbestos Control Regulation (ACR) have been met. The building owner has been notified of the ACR requirements and given a copy of this report. If the inspection has revealed ACM which will be disturbed by the proposed work or if it has revealed ACM in bad condition, the building owner has been notified to remove or repair the ACM in accordance with the ACR prior to renovation or demolition activity.							
11. Signature of Certified Asbestos Investigator:							



NVLAP LAB# 101032 PLM & TEM



Delaware Industrial Park, 6 Garfield Way Newark, DE19713-5817 Tel. (302)737-3376 Fax (302) 737-5764 **Newark, DE - Georgetown, DE - Philadelphia, PA** Web: http://www.battaenv.com E-mail: battaenv@battaenv.com EPA LAB ID#: DE004

AIHA LAP, LLC ACCREDITED LABORATORY INDUSTRIAL HYGIENE & ENVIRONMENTAL LEAD ISO/IEC 17025:2005 www.eihaacoreditedlabs.org

LAB# 100448 PCM & LEAD NY ELAP# 11993 PCM, PLM, TEM & LEAD

Page 1 of 2

### Test Method: SOP EPA 3050B/7000B

REPORT OF ANALYSIS

**Report Revision#:** Original **Project Number:** L932917 **Project Name:** 876417A-2110 W QUEEN LN-WATER TREAMENT - 09-29-17P1-TOAA800 **Project Location:** 3110 W QUEEN LANE PHL PA **Date Received:** 9/26/2017 **Date Sampled:** 9/25/2017 **Date Analyzed:** 9/29/2017 Sampled By: **J PANCOSKI** Analyte Requested: PAINT-Pb (LEAD) Date Report Issued: 9/29/2017

Lab Sample #	Field Sample #	Sample Description	Result in mg/kg	Result in % by Weight		ting Limit % Weight
999090	09-25-01	PAINT-METAL SUBSTRATE INT SIDE OF FRONT DOOR	39,000	3.9		
999091	09-25-02	PAINT-METAL SUBSTRATE EXT SIDE OF FRONT DOOR	30,000	3.0		
999092	09-25-03	PAINT-METAL SUBSTRATE HANDRAIL BY FRONT DOOR	1,500	0.15		
999093	09-25-04	PAINT-METAL SUBSTRATE EAST SIDE 2ND FL DOOR FRAME	66,000	6.6		
999094	09-25-05	PAINT-METAL SUBSTRATE 2ND FL EXT EAST SIDE	29,000	2.9	63	0.0063
999095	09-25-06	PAINT-CONCRETE SUBSTRATE 2ND FL EAST SIDE WALKWAY	46,000	4.6		0.0000
999096	09-25-07	PAINT-METAL SUBSTRATE 2ND FL S. SIDE WINDOW FRAME	100,000	10		
999097	09-25-08	PAINT-METAL SUBSTRATE W. SIDE BTWN 2ND & 3RD FL	69,000	6.9		
999098	09-25-09	PAINT-METAL SUBSTRATE S. SIDE 4TH FL EXT DOOR	< 63	< 0.0063		
999099	09-25-10	PAINT-METAL SUBSTRATE 4TH FL S. SIDE DOOR	< 63	< 0.0063		

Note: 1. EPA guidelines require identification of paint samples as "lead based paint" when concentrations are found to be greater than 0.5% by weight (5000 mg/kg); 2. Quality control results in this report are acceptable; 3. Results relate only to the items tested; Batta Laboratories, Inc. is not responsible for sample collection, nor interpretations made by others; 4. This report does not constitute endorsement by AIHA LAP, LLC., NVLAP and/or any other U.S. governmental agencies; and 5. Lab results/calculations are reported in 2 significant figures. Clients data/measurements are reported as they were submitted. 6. Samples received in acceptable condition unless otherwise noted. 7. The designation of "CL" as the Analyst on this report denotes that there are samples listed above which were submitted to an accredited partner lab for analysis.

Batta Lab strives on customer feedback to improve the quality of our services. Please e-mail your feedback to feedback to more the quality of our services.

Analyst: T Okavage

QA/QC By:

N.C. Batta/R. Shumate (QA/QC Officer)



NVLAP LAB# 101032 PLM & TEM



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Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

## REPORT OF ANALYSIS

Test Method: SOP EPA 3050B/7000B

EPA LAB ID#: DE004

AIHA LAP, LLC ACCREDITED LABORATORY INDUSTRIAL HYGIENE & ENVIRONMENTAL LEAD ISO/IEC 17025:2005 www.sihasocreditedlabs.org

LAB# 100448 PCM & LEAD NY ELAP# 11993 PCM, PLM, TEM & LEAD

Lab Sample #	Field Sample #	Sample Description	Result in mg/kg	Result in % Weight	by Reporting Lim mg/kg % Weig	
Analyte Rec	quested:	PAINT-Pb (LEAD)	Date Rep	ort Issued:	9/29/2017	
Date Analyz	zed:	9/29/2017	Sampled	By:	J PANCOSKI	
Date Received: 9		9/26/2017	Date Sampled:		9/25/2017	
Project Loc	ation:	3110 W QUEEN LANE PHL PA				
Project Nan	ne:	876417A-2110 W QUEEN LN-WATER TREA	AMENT - 09-29	-17P1-TOAA80	00	
Project Nun	nber:	L932917				
Report Revi	ision#:	Original			-	
					Page 2 of 2	

999100 09-25-11 METAL FLASHING- 4TH FL S. SIDE ROOF < 63 < 0.0063 63 0.0063 WALL < 63 < 0.0063 63 0.0063

Note: 1. EPA guidelines require identification of paint samples as "lead based paint" when concentrations are found to be greater than 0.5% by weight (5000 mg/kg); 2. Quality control results in this report are acceptable; 3. Results relate only to the items tested; Batta Laboratories, Inc. is not responsible for sample collection, nor interpretations made by others; 4. This report does not constitute endorsement by AIHA LAP, LLC., NVLAP and/or any other U.S. governmental agencies; and 5. Lab results/calculations are reported in 2 significant figures. Clients data/measurements are reported as they were submitted. 6. Samples received in acceptable condition unless otherwise noted. 7. The designation of "CL" as the Analyst on this report denotes that there are samples listed above which were submitted to an accredited partner lab for analysis.

Batta Lab strives on customer feedback to improve the quality of our services. We appreciate your feedback.

Analyst:

T. Okavage

QA/QC By: N.C. Batta/R. Shumate (QA/QC



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BULK SAMPLING RECORD / C	HAIN OF CUSTODY				
Water Treatment Plant Project Name: 3110 W. Queen Lana Phila Pa Site Inspected: Preliminory Treatment Bldg					
Building Inspector: J. Pancople, BI#:					
Building Inspector:  Bl#:    Project Manager:  Todd	_ TU WE TH FR SA SU (circle one)				
Project Manager: / O C C · · · · · · · · · · · · · · · · ·					
FIELD DATA: Included Not Applicable	11 Lead Bulle				
1. Job safety Analysis	Total # of Samples Submitted				
2. Bulk Sample Data Sheet / Log					
3. Floor Plan Sketch with Location Diagram					
4. Materials Inventory Work Sheet					
5. Events Log	Site Arrival Time:hrs				
6. And Survey Data Checklist	Site Departure Time: <u>ノ<b>メ</b>のう</u> hrs				
POST ANALYSIS DATA REVIEW / QAQC:					
Project Manager:	Date Reviewed: /0/4/17				

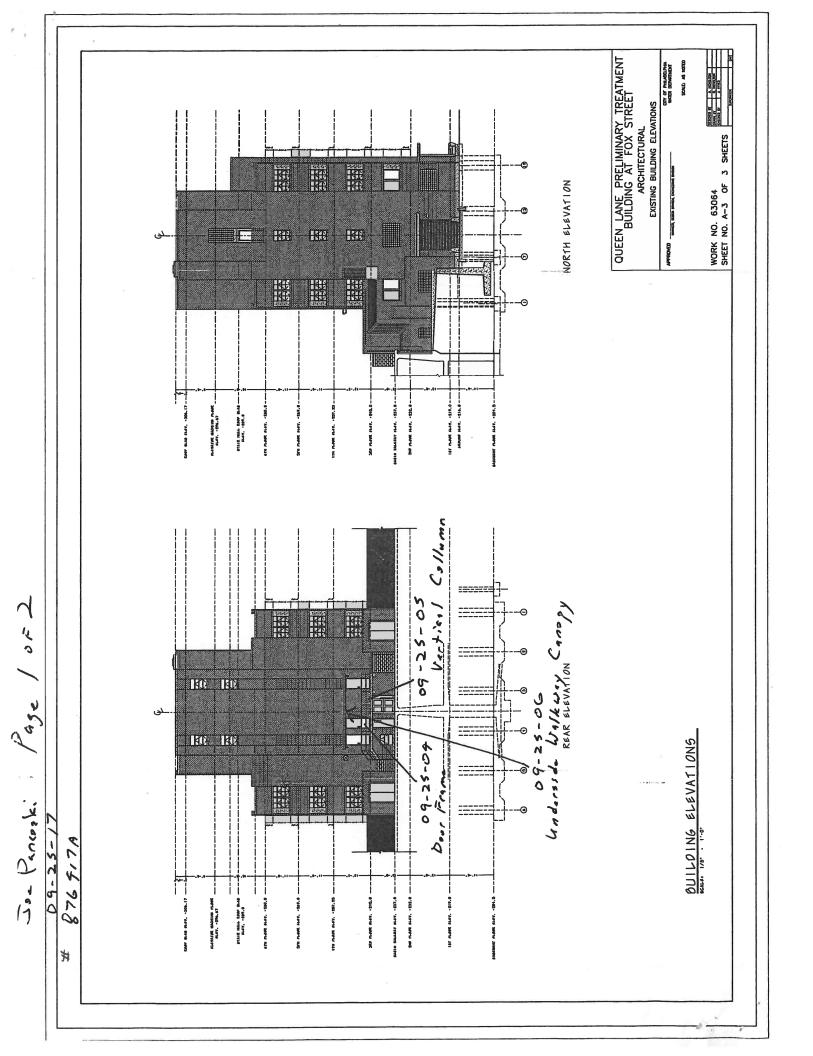
S General Office/Forms/Bulk Sample Package 2017MASTER 7 page

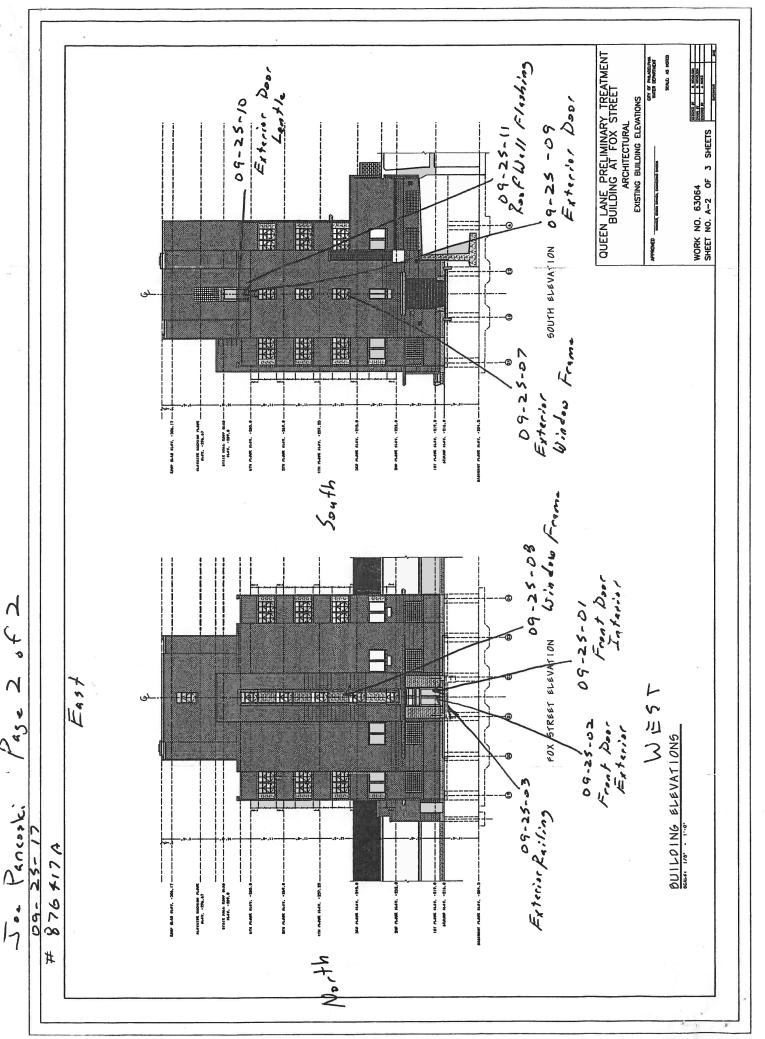
REV DATE 5/19/17

BATTA	BATTA ENVIRONMENTAL . Delaware Industrial Park 6 Garfield Way Newark, DE 19713-5817	ASSOCIATES, INC. Ph (302) 737-3376 Fx (302) 737-5764 www.battaenv.com
<u>IOB SAFETY A</u>	NALYSIS	
Prepared by: Jos Pancoski	Date: 09-25-0 BEA#: 876 41	/7
Project Name: 3110 W. Quan St. Phila PA	<u>BEA</u> #: 876 41	70
Site Inspected: Preliminery Treatment Bldg		8
Task Description (Include equipment name and location) as instructed By Seff Mannick Equipment - Chizzle, leagsies, half Face leap-	Leid Gint of Hazer & blowns Sherpie 12	Bulk Sampling
<b>Instructions:</b> Identify the steps that you will have to perform to complete the as checkmark next to the ones that apply to this task. Also, place a checkmark next to	signed task. Review the following	
Tools & Equipment       - 1 Do you have the proper tools & equip condition?         3 Are you trained to safely use the required tools & equip		2 Are your tools in safe
<u>Hazardous Energy Control</u> – 1. <u>Will you be exposed to haz</u> <u>2.</u> Have all hazardous energy sources been identified? 3. Do you <u>4.</u> Have you verified with the owner or owners representative that all has a source of the provided of the provid	ou need a hazardous energy source	e(s) locked out / tagged out?
<ul> <li><u>Fall Protection</u> - 1 Will the task require you to be at height platform guard rails to perform the task? 3 Will you be using a manifor scaffolding have they been inspected and approved for use? 56 Are there any roof or floor openings in the area where you will be we edge? 8 Is your ladder proper for the task and in safe condition?</li> </ul>	ift, aerial lift, or scaffolding? 4 Will a qualified ground person b	_If using a manlift, aerial lift, be present when using a lift?
<u>Confined Space</u> 1 Will you be working in a permit required to identify any potential safety hazards? 3 Are you knowledgeable continuously monitor the air when in a confined space?	confined space? 2. <u>Have you</u> of all the confined space entry pr	inspected the confined space ocedures? 4 Will you
Hazardous Materials – 1 Are you familiar with all the haz knowledgeable about any potential chemical exposure that might be created		
Cutting & Welding 1 Is a Hot Work Permit required before each floor level that is exposed to weld sparks? 3 Will the fire wate task? 4 Is there proper ventilation for the task being performed?		
Mobile Equipment Operation – 1. <u>Have you been trained a</u> Mobile equipment? 2. Do you perform a Safety Inspection of the mol		ayed) to operate this type of
Personal Protective Equipment – 1 Will performing this task Eye Face Face He Clothing Face Hand Clours Or Foot Shoes Respiratory Face Or	require the use of Personal Protect ead //a.d //d.f ther ther	ive Equipment?
Safety Training – 1 Have you been trained in the safety pro- space, fall protection, respirator usage, etc.		ask? Ex: Lockout, confined
Other Safety Hazards - 1Are there any other potential safety     (Hidden electrical / piping / materials behind walls or equipment skins, etc.		n performing this task?
I/We have reviewed this task for the above safety subjects and	made a plan for all the areas that $O 9 \sim 25 \sim 17$	t have been checked.
Signed: Date: Date:		
Date:	S General Office/Forms /Bulk Sample Package2017	MASTER 7 page REV DATE 5/19/17

1.9329 BASED SAMPLE ANALYSIS LEAD Water Treatment Plant SITE: 3110 W. Queen Lana PhilA PA DATE COLLECTED: 09/23/17 BUILDING: Kreliminary Treatment Bldg \_\_ SAMPLED BY: J. Pancosk. RETURN RESULTS TO Todd Zeigloft PHONE DESK SITE FAX TY EN TRACKING # 876 417A LAS PROJECT # 876 417 A AREA FILE #\_ LOCATION OF SAMPLE(S): 3110 W. Queen Lane Phila PA ATTACH FLOOR PLAN INDICATING SPECIFIC GEOGRAPHIC LOCATION OF SAMPLES SAMPLE CHARACTERIZATION: CONDITION, COLOR ug/g \* FIELD - LAB SUBSTRATE AND SPECIFIC LOCATION by wg (PPM) SAMPLE # SAMPLE # Paint- Good Condition - Metal Þъ Substrate - Front Door AT Fox Streef Black 09-25-01 99909D interior Side of Door Paint - Good Condition - metal Substrate. Pb White 09-25-02 Front Door at Fox Stract -:091 Exterior Side of Door Paint - Peeling Condition - metal Рb Gray Substrate - Handrailing By Front 09-25-03 -092 Poor AT Fox Streat - Outside Paint - Good Condition - metal ÞЬ Gray. Substante - Fast Side 2Nd Floor 09-25-04 -093 Door Frame Paint - Good Condition - 2Nd Floor ÞЪ Exterior East Side - matal Substrate Gray -094 09-25-05 Vartical Collumn Paint - Peeling Condition - Concrete 09-25-06 Substrate- 2Nd Floor - East Side Pb · Gray -095 Walkway Canopy Underside РЭ Paint - Good Condition - Matel Gray 09-25-07 Substrate - 2Nd Floor - South Side í. -096 Window Frame - Exterior Paint - Peeling Condition - Mater <u>\$</u>5 09-25-09 Griy Substrate - West Side - Between 2Nd & 3rd Floors - Stairway Window Frame-Interior + Exterior FIELD NOTES: lurn Around PHONE NUMBER: Joz LAS NAME: AIHA=: / 500 NVLAP#: ANALYST: CHAIN OF CUSTODY 1800 9-25-17 DATE / TIME: TRANSPORTED BY: Joe Farcesk DATE / TIME: O **a**( . . . RECEIVED BY: DATE / TIME: RELEASED TO:

BASED SAMPLE ANALYSIS LEAD Water Treatment Plant. SITE: 3110 W-Queen Lane Phila PA DATE COLLECTED: 09,25,17 BUILDING: Preliminary Treatment Bldg SAMPLED BY: J. Pancoski BUILDING: <u>Treliminary Treatment</u> Told Zeisloft PHONE Desk SITE RETURN RESULTS TO \_\_\_\_\_\_\_ FAX EY EN \_\_\_\_\_\_ TRACKING # 876417A LOCATION OF SAMPLE(S): 3110 W. Queen Lane Phila PA ATTACH FLOOR PLAN INDICATING SPECIFIC GEOGRAPHIC LOCATION OF SAMPLES SAMPLE CHARACTERIZATION: CONDITION, COLOR <u>''g/g</u> \* FIELD - LAB SAMPLE # SAMPLE # SUBSTRATE AND SPECIFIC LOCATION (PPM) by wg Paint- Good Condition- Matel РЪ Gray 09-25-09 Substeate - South Side - 4TH 999098 Floor Exterior Door Paint - Peeling Condition - 474 Pb 09-25-10 Floor South Side - Matal Substrate Oray -099Door Lentle Matal Flashing - Whole Sample - Copper р'n 09-25-11 ATH Floor South Side -100Root Wall Floshing Рb ŻЪ Pb · 35 Ρ̈́⊃ 20 FIELD NOTES: Day Turn Around 3 PHONE NUMBER: 30273737376 LAS NAME: AI::A=: 100999 NVLAP#:\_ ANALYST: CHAIN OF CUSTODY 9-25-18 1800 DATE / TIME:\_ TRANSPORTED BY: Joe Penceste DATE / TIME:\_ RECEIVED BY:\_ DATE / TIME:\_ RELEASED TO:







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	EVENTS LOG					
Site Inspected	: 3110 W. Queso 3t. Philp Pa d: Prestminery Treatment Bldg ector (s): Jee Pageosk:	BEA#: <u>876417A</u> Date: <u>09 / 25 / 17</u> Events Log Sheet <u>/</u> of				
Time <sub>(24hr)</sub>	Event					
	Jee Paperski at Bette ant S	. F.F. Noumick of				
1500	Je Pancosli of B. H. met J Hozen & Sower at 3110 W. Ru We dreve to the near by 12 building where Jee Pancosli somples where Jer Namme 11 samples where Jer Namme 11 samples where taken. Completed with octast samp 1et Jef Naumick know has about one hour of out, report diagram, JSA, Jef Naumick is offs. Jee Pancoski will drive to in Newerle to complete po somples offe Arrived at Batte office in Perverk completed.	er lan at Phile Pa. celiminary Transmost toolo paint bufk ick instructed. ling. Joe Paneoste: The t Joe still peper work to Kill etc. the Bette office aper work & drop				
	Gene Heme					



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ASBESTOS SURVEY DATA CHECKLIST					
Project Name: 3// Site Inspected: 2/- Building Inspector(s	Timinery	Bide Bide	la Por	BEA#: Date:_∠ Checklist	
Scope of Work:	Renovation Limited Renova <del>Roof Inclu</del> ded s included in surve	tion (list areas) ///	1) Floor	, Limited	present and inspected
Structure Descriptio Elements of the stru Frashing		Rolled	rythree Built-up(flat) Tar Paper Wall Drain Alum./Steel	story split leve	Multiple tayers
Structure	Brick Peaks Wood Frame Slab Debris	<ul> <li>Block</li> <li>Dormers</li> <li>Steel Frame</li> <li>Crawlspace</li> <li>Bearing Plates</li> </ul>	Stone Multiple layers Full Masonry Basement	Stucco  Dirt Floor	Transite
	Beams Attic/Roof Pipe Boiler Heat Shield	Decking Ceilings Duct Heater Wood Stove	Columns Ualls Ualls Gaskets Fireplace	Floors Viring Wirer Heater Flue Packing	Flue Pipe
Vibration Dampe	Insulated Building Putty		Door None	Tel/Elec Entry	
Cooling Tower	Duct Insul.  Exterior  Plaster Glued Tiles Drywall/ JC	Pipe Insul. In-Fill Drywall/JC Stapled Tiles Plaster	Pipe Insul. Textured Splined Tiles Textured		plastic tile mastic
Floors	Paneling/nails Concrete Wood Sheet mastic	<ul> <li>Paneling/mastic</li> <li>Stone/Slate</li> <li>Carpet</li> <li>Tile mastic</li> </ul>	Baseboard mas Ceramic Sheet Floor Ceramic mastic	tic Terrazzo Floor Tile Stone/Slate mastic	
Sinks Electrical Panel H Containers of As other	bestos containing n	nastics, glues, roofing	_ Stone-like Utilit <del>g coatin</del> gs ☐ other	// Laundry	

Dedicated to a Cleaner Environment Since 1982



NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

#### Dept. Code: PLM 0

Rev. #:



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A Certified MBE Company

Delaware Industrial Park, 6 Garfield Way Newark, DE19713-5817 Tel. (302)737-3376 Fax (302) 737-5764

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

### **CERTIFICATE OF PLM ANALYSIS**

Batch#: N/A COC#: N/A Test Method: EPA/600/R-93/116 in conjunction with Batta SOP 09/30/18 Report Date: **Sampling Data** Date Sampled: 09/20/18 BLI Project #: L976518 Sampled By: N.MARICON Project Name: 876417B 3110 W. QUEEN LN Date Analyzed: 09/28/18 Sample ID **Client-supplied** Data **Reported Results** Analytical Data Lab Client Sample Material Texture/ Non-asbestiform Sample# Sample# Description Type Friable? Gross Color Components Asbestiform Components Firm Caulk 100% Non-1021162 01A Roll Up Door Interior No Clear No Asbestos Found fibrous Material Homogeneous Firm Caulk 100% Non-1021163 01B Roll Up Door Interior No Clear No Asbestos Found fibrous Material Homogeneous 40% Cellulose 30% 2x2 Ceiling Fibrous Tan Mineral Wool 1021164 Tile 02A Kitchen/Offices No No Asbestos Found White 30% Non-fibrous Material Heterogeneous 40% Cellulose 30% Fibrous 2x2 Ceiling Tan Mineral Wool 1021165 Tile 02B Kitchen/Offices No No Asbestos Found White 30% Non-fibrous Material Heterogeneous Interior Firm 6% Fibrous Talc Window 1021166 03A Windows No Gravish 92% Non-fibrous 2% Chrysotile Caulk Material Homogeneous Note 1 Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends

further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.

Note 2 Otherwise specified, Tr=Trace or < 0.1% based on visual estimate.

ANALYST: ARY

REVIEWED BY:

QA/QC Officer/Signatory

\*This report does not constitute endorsement by NVLAP and/or any other US government agencies.

\*The test data pertain only to the items tested. No assumptions or conclusions should be made to materials or samples not analyzed. Furthermore, Batta Laboratories, LLC assumes no responsibility for the accuracy of results influenced by the use of improper collection techniques or equipment.

\*Organically-bound, nonfriable material may interfere with the accurate and reproducible quantification of asbestos. In these cases, the EPA recommends further analysis by a matrix-reduction method. Batta recommends the NY ELAP Item 198.6/198.4 over the Chatfield method. When point count techniques are utilized on organically-bound, nonfriable materials without the EPA-recommended matrix reduction steps, Batta Laboratories assumes no responsibility regarding the accuracy or precision associated with these results. In these cases, Batta employs a modified version of the EPA point count method.

\*WRTA refers to a group of fibrous Amphiboles typically associated with 'Libby Amphibole'. Within this classification are: winchite, richterite, tremolite, and actinolite.



Lab Code: 101032-0

Page 1 of 5

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### Dept. Code: PLM 0

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Delaware Industrial Park, 6 Garfield Way Newark, DE19713-5817 Tel. (302)737-3376 Fax (302) 737-5764

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

## **CERTIFICATE OF PLM ANALYSIS**

Batch#: N/A COC#: N/A Test Method: EPA/600/R-93/116 in conjunction with Batta SOP Report Date: 09/30/18 Sampling Data Date Sampled: 09/20/18 BLI Project #: L976518 Sampled By: N.MARICON **Project Name:** 876417B 3110 W. QUEEN LN Date Analyzed: 09/28/18 Sample ID Analytical Data **Reported Results Client-supplied Data** Lab Client Sample Material Texture/ Non-asbestiform Sample# Description Sample# Friable? Type Gross Color Components Asbestiform Components Interior Window Sample Not Analyzed 1021167 03B Windows n/a Caulk (positive stop rules) Interior Window Sample Not Analyzed 1021168 03C Windows n/a Caulk (positive stop rules) Interior Firm Window 100% Non-1021169 04A Windows Black No Asbestos Found No Glazing fibrous Material Homogeneous Interior Firm Window 97% Non-1021170 04B Windows No Gray 3% Chrysotile Glazing fibrous Material Homogeneous Interior Window Sample Not Analyzed 1021171 04C Windows n/a Glazing (positive stop rules) Note 1 Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.

Note 2 Otherwise specified, Tr=Trace or < 0.1% based on visual estimate.

ANALYST:

**REVIEWED BY:** 

QA/QC Officer/Signatory

\*\* This sample was not analyzed for reasons noted in the far right column. Batta Labs, LLC will not charge clients for samples not analyzed. Please contact Batta if charged in error.

\*This report does not constitute endorsement by NVLAP and/or any other US government agencies.

ARY

\*The test data pertain only to the items tested. No assumptions or conclusions should be made to materials or samples not analyzed. Furthermore, Batta Laboratories, LLC assumes no responsibility for the accuracy of results influenced by the use of improper collection techniques or equipment.

\*Organically-bound, nonfriable material may interfere with the accurate and reproducible quantification of asbestos. In these cases, the EPA recommends further analysis by a matrix-reduction method. Batta recommends the NY ELAP Item 198.6/198.4 over the Chatfield method. When point count techniques are utilized on organically-bound, nonfriable materials without the EPA-recommended matrix reduction steps, Batta Laboratories assumes no responsibility regarding the accuracy or precision associated with these results. In these cases, Batta employs a modified version of the EPA point count method.

\*WRTA refers to a group of fibrous Amphiboles typically associated with 'Libby Amphibole'. Within this classification are: winchite, richterite, tremolite, and actinolite.



Lab Code: 101032-0

Page 2 of 5

Dedicated to a Cleaner Environment Since 1982



NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

#### Dept. Code: PLM

Rev. #: 0 Batch#: N/A



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A Certified MBE Company

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## CERTIFICATE OF PLM ANALYSIS

COC#: N/A Test Method: EPA/600/R-93/116 in conjunction with Batta SOP Report Date: 09/30/18 Sampling Data Date Sampled: 09/20/18 BLI Project #: L976518 Sampled By: N.MARICON 876417B 3110 W. QUEEN LN Project Name: Date Analyzed: 09/28/18 Sample ID **Client-supplied Data** Analytical Data **Reported Results** Lab Client Sample Material Texture/ Non-asbestiform Sample# Sample# Description Friable? Туре Gross Color Components Asbestiform Components Soft Interior Door 100% Non-1021172 05A Caulk Doors No No Asbestos Found Gray fibrous Material Homogeneous Soft Interior Door 100% Non-1021173 05B Doors Caulk Gray No No Asbestos Found fibrous Material Homogeneous Exterior Soft Window Off-100% Non-1021174 06A Windows No No Asbestos Found Caulk White fibrous Material Homogeneous Exterior Soft Window Off-100% Non-1021175 06B Windows No No Asbestos Found Caulk White fibrous Material Homogeneous Exterior Soft Window Off-100% Non-1021176 06C Windows No No Asbestos Found Caulk White fibrous Material Homogeneous Note 1 Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.

Note 2 Otherwise specified, Tr=Trace or < 0.1% based on visual estimate.

ANALYST:

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**REVIEWED BY:** 

QA/QC Officer/Signatory

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Page 3 of 5

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NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

#### Dept. Code: PLM

Rev. #: 0 Batch#: N/A

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Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

## **CERTIFICATE OF PLM ANALYSIS**

COC#: N/A Test Method: EPA/600/R-93/116 in conjunction with Batta SOP Report Date: 09/30/18 Sampling Data Date Sampled: 09/20/18 BLI Project #: L976518 Sampled By: N.MARICON Project Name: 876417B 3110 W. QUEEN LN Date Analyzed: 09/28/18 Sample ID **Client-supplied Data** Analytical Data **Reported Results** Lab Client Sample Texture/ Material Non-asbestiform Sample# Sample# Description Туре Friable? Gross Color Components Asbestiform Components Exterior Soft 100% Non-1021177 07A Door Caulk Doors No Black No Asbestos Found fibrous Material Homogeneous Soft Exterior 100% Non-1021178 07B Door Caulk Doors No Black No Asbestos Found fibrous Material Homogeneous Interior Soft Window 100% Non-1021179 08A Windows No Cream No Asbestos Found Caulk fibrous Material Homogeneous Interior Soft Window 100% Non-1021180 08B Windows No Cream No Asbestos Found Caulk fibrous Material Homogeneous Exterior Soft Window 100% Non-1021181 09A Exterior Windows No Brown No Asbestos Found Caulk fibrous Material Homogeneous Note 1 Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.

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ANALYST:

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Page 4 of 5

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NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

#### Dept. Code: PLM

Rev. #: 0 Batch#: N/A



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Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

## CERTIFICATE OF PLM ANALYSIS

	N/A		Test Meth	od: EPA/600	0/R-93/116 in conju	unction with I	Batta SOP	Report Date:	09/30/18
Sampling								Date Sampled:	09/20/18
BLI Projec		L976518						Sampled By:	N.MARICON
Project Na		876417B 3110 W.						Date Analyzed:	09/28/18
Sam	ple ID	Client-su	pplied Da	ta	Analytica	I Data	R	eported Results	
Lab	Client	Sample	Material		Texture/		Non-asbestiform		
Sample#	Sample#	Description	Туре	Friable?	Gross	Color	Components	Asbestiform Con	nponents
1021182	09B	Exterior Windows	Exterior Window Caulk	No	Soft Homogeneous	Brown	100% Non- fibrous Material	No Asbestos Found	
<b></b>									
1021183	10A	Exterior Doors	Exterior Door Caulk	No	Firm	Off- White	100% Non- fibrous Material	No Asbestos Found	
					Homogeneous	winte	indrous material		
1021184	10B	Exterior Doors	Exterior Door Caulk	No	Soft	Grayish	100% Non- fibrous Material	No Asbestos Found	
					Homogeneous				
1021185	11A	Roll Up Door	Exterior Roll Up Door Caulk	No	Firm	Opaque	100% Non- fibrous Material	No Asbestos Found	
					Homogeneous				

Note 1 Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.

Note 2 Otherwise specified, Tr=Trace or < 0.1% based on visual estimate.

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ANALYST:

REV	IEW	'ED	BY:	

QA/QC Officer/Signatory

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Lab Code: 101032-0

Page 5 of 5





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NY ELAP# 11993 PCM, PLM, TEM & LEAD

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## **REPORT OF ANALYSIS**

### Test Method: SOP EPA 3050B/7000B

Page 1 of 2

<b>Report Revision#:</b>	Original		•
Project Number:	L976518		
Project Name:	876417B 3110 W. QUEEN LN - 9-25-18P1-SA4	A900	
Project Location:	3110 W QUEEN LN		
Date Received:	9/22/2018	Date Sampled:	9/20/2018
Date Analyzed:	9/25/2018	Sampled By:	N.MARICONDA
Analyte Requested:	PAINT-Pb (LEAD)	Date Report Issued:	9/25/2018

Lab Sample #	Field Sample #	Sample Description	Result in mg/kg	Result in % by Weight	-	ting Limit % Weight
1024385	PB01	MAINT BUILDING DARK GRAY INTERIOR	< 63	< 0.0063		
1024386	PB02	MAINT BUILDING ROLL UP FRAME	< 63	< 0.0063		
1024387	PB03	MAINT BUILDING EXTERIOR DOOR	< 63	< 0.0063		
1024388	PB04	MAINT BUILDING DARK GRAY INTERIOR 2	330	0.033		
1024389	PB05	MAINT BUILDING ROLL UP FRAME 2	< 63	< 0.0063	63	0.0063
1024390	PB06	PP BUILDING ROLL UP DOOR	< 63	< 0.0063	03	0.0003
1024391	PB07	PP BUILDING DOORS	< 63	< 0.0063		
1024392	PB08	CHEM PLANT INTERIOR ORANGE	170	0.017		
1024393	PB09	CHEM PLANT EXTERIOR DOOR	< 63	< 0.0063		
1024394	PB10	CHEM PLANT EXTERIOR DOOR 2	350	0.035		

Note: 1. EPA guidelines require identification of paint samples as "lead based paint" when concentrations are found to be greater than 0.5% by weight (5000 mg/kg); 2. Quality control results in this report are acceptable; 3. Results relate only to the items tested (on a dry weight basis); Batta Laboratories, Inc. is not responsible for sample collection, nor interpretations made by others; 4. This report does not constitute endorsement by AIHA LAP, LLC., NVLAP and/or any other U.S. governmental agencies; and 5. Lab results/calculations are reported in 2 significant figures. Clients data/measurements are reported as they were submitted. 6. Samples received in acceptable condition unless otherwise noted. 7. The designation of "CL" as the Analyst on this report denotes that there are samples listed above which were submitted to an accredited partner lab for analysis. 8. This report must not be reproduced without the written approval of BATTA Laboratories.

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Analyst:

Samusi Adediran S.Adediran

QA/QC By: N.C. Batta/R. Shumate (QA/QC Officer)



PCM, PLM, TEM & LEAD



Delaware Industrial Park, 6 Garfield Way Newark, DE19713-5817 Tel. (302)737-3376 Fax (302) 737-5764 Newark, DE - Columbia, MD - Philadelphia, PA

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

Lab Code: 101032-0

EPA Lab ID #DE004

Page2 of 2

## **REPORT OF ANALYSIS**

Test Method: SOP EPA 3050B/7000B

Report Revision#:	Original		U
Project Number:	L976518		
Project Name:	876417B 3110 W. QUEEN LN - 9-25-18P1-SAA	A900	
Project Location:	3110 W QUEEN LN		
Date Received:	9/22/2018	Date Sampled:	9/20/2018
Date Analyzed:	9/25/2018	Sampled By:	N.MARICONDA
Analyte Requested:	PAINT-Pb (LEAD)	Date Report Issued:	9/25/2018

Lab Sample #	Field Sample #	Sample Description	Result in mg/kg	Result in % by Weight	Repor mg/kg	ting Limit % Weight
1024395	PB11	PTB BUILDING ROLL UP DOOR	43,000	4.3	62	0.0002
1024396	PB12	PTB BUILDING ROLL UP DOOR FRAME	28,000	2.8	63	0.0063

Note: 1. EPA guidelines require identification of paint samples as "lead based paint" when concentrations are found to be greater than 0.5% by weight (5000 mg/kg); 2. Quality control results in this report are acceptable; 3. Results relate only to the items tested (on a dry weight basis); Batta Laboratories, Inc. is not responsible for sample collection, nor interpretations made by others; 4. This report does not constitute endorsement by AIHA LAP, LLC., NVLAP and/or any other U.S. governmental agencies; and 5. Lab results/calculations are reported in 2 significant figures. Clients data/measurements are reported as they were submitted. 6. Samples received in acceptable condition unless otherwise noted. 7. The designation of "CL" as the Analyst on this report denotes that there are samples listed above which were submitted to an accredited partner lab for analysis. 8. This report must not be reproduced without the written approval of BATTA Laboratories.

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Analyst:

Samusi Adediran S.Adediran

QA/QC By: N.C. Batta/R. Shumate (QA/QC Officer)

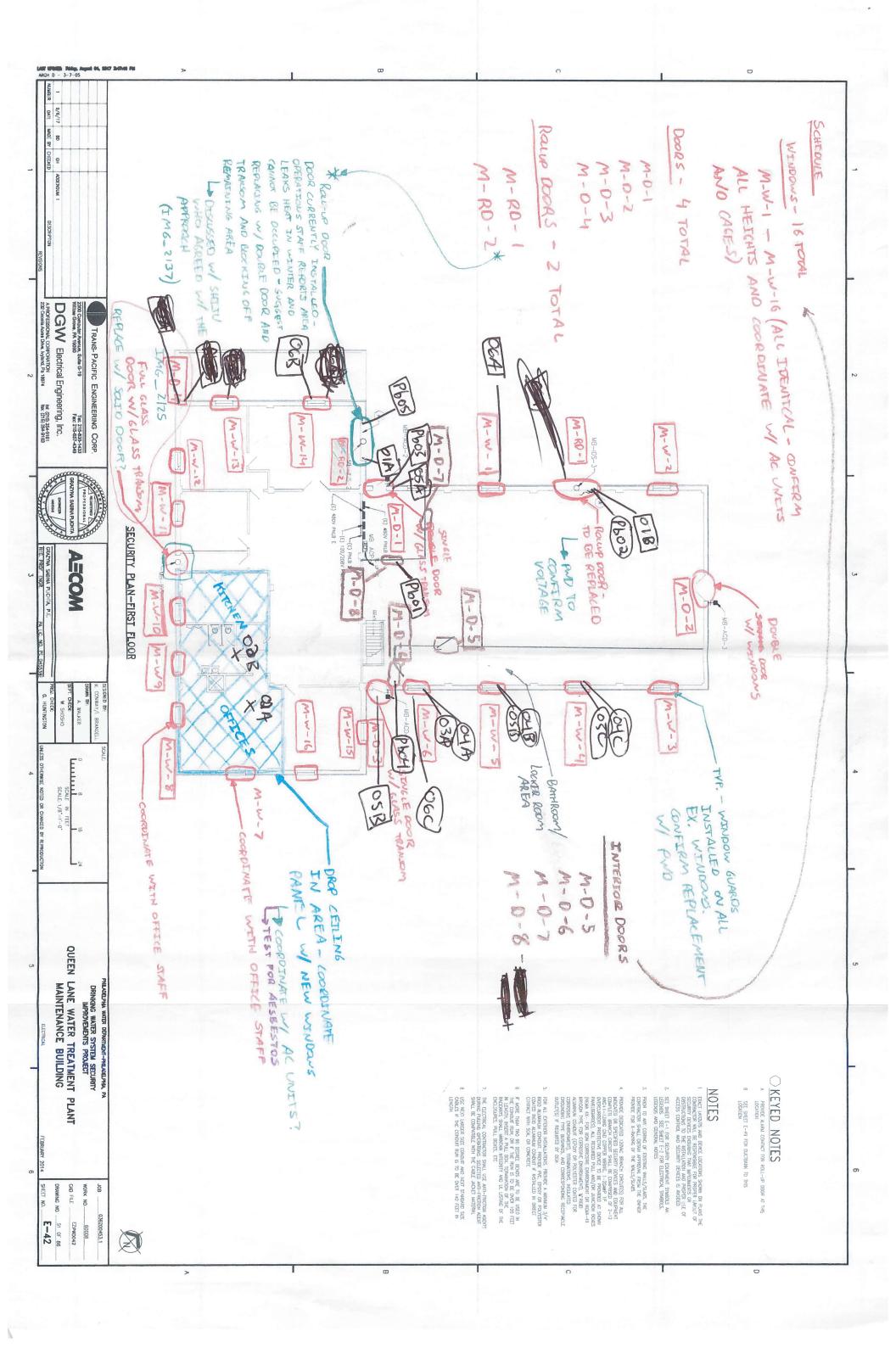


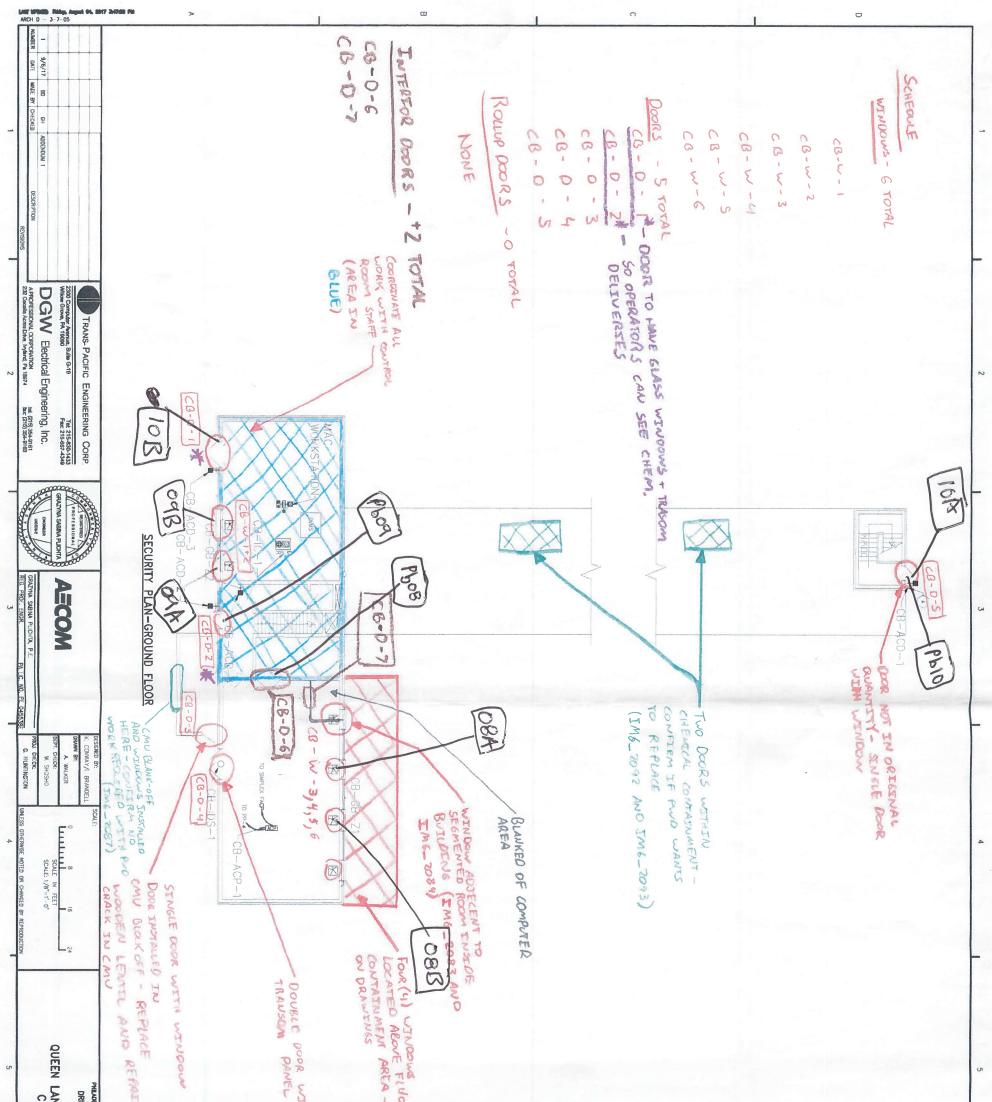
BULK SAMPLING RECORD / CHAIN OF CUSTODY	٦
Project Name: <u>3110 W. Queen Ln - Add+l Buid</u> s BEA#: <u>876417B</u> Hizen 3 Samper Site Inspected: <u>2110 W. Queen Ln</u> PGW Buildings Building Inspector: <u>Alck Marlcondy</u> BI#: Date: <u>9,20,18</u> Building Inspector: <u>Soe fancoski</u> BI#: MO TU WE (TH) FR SA SU (circle one) Project Manager: <u>Todd Zeisloft</u>	
FIELD DATA:       Description         Implementation       1. Job safety Analysis         Implementation       1. Job safety Analysis         Implementation       2. Bulk Sample Data Sheet / Log         Implementation       3. Floor Plan Sketch with Location Diagram         Implementation       4. Materials Inventory Work Sheet         Implementation       5. Events Log         Implementation       Site Arrival Time:         Implementation       6. Asbestos Survey Data Checklist	
POST ANALYSIS DATA REVIEW / QAQC: Project Manager:	

eneral Office/Forms/Bulk Sample Package 2017MASTER 7

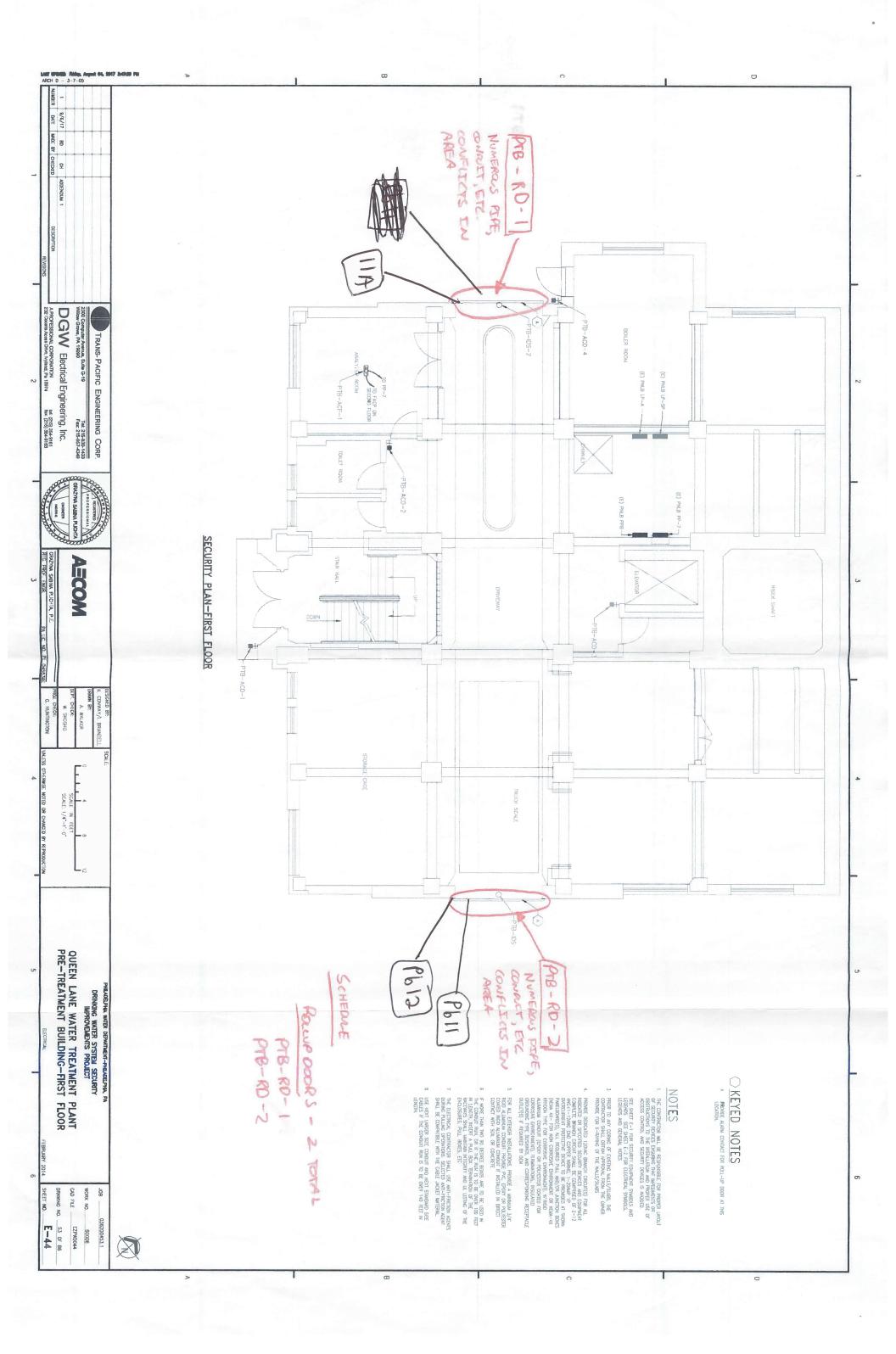
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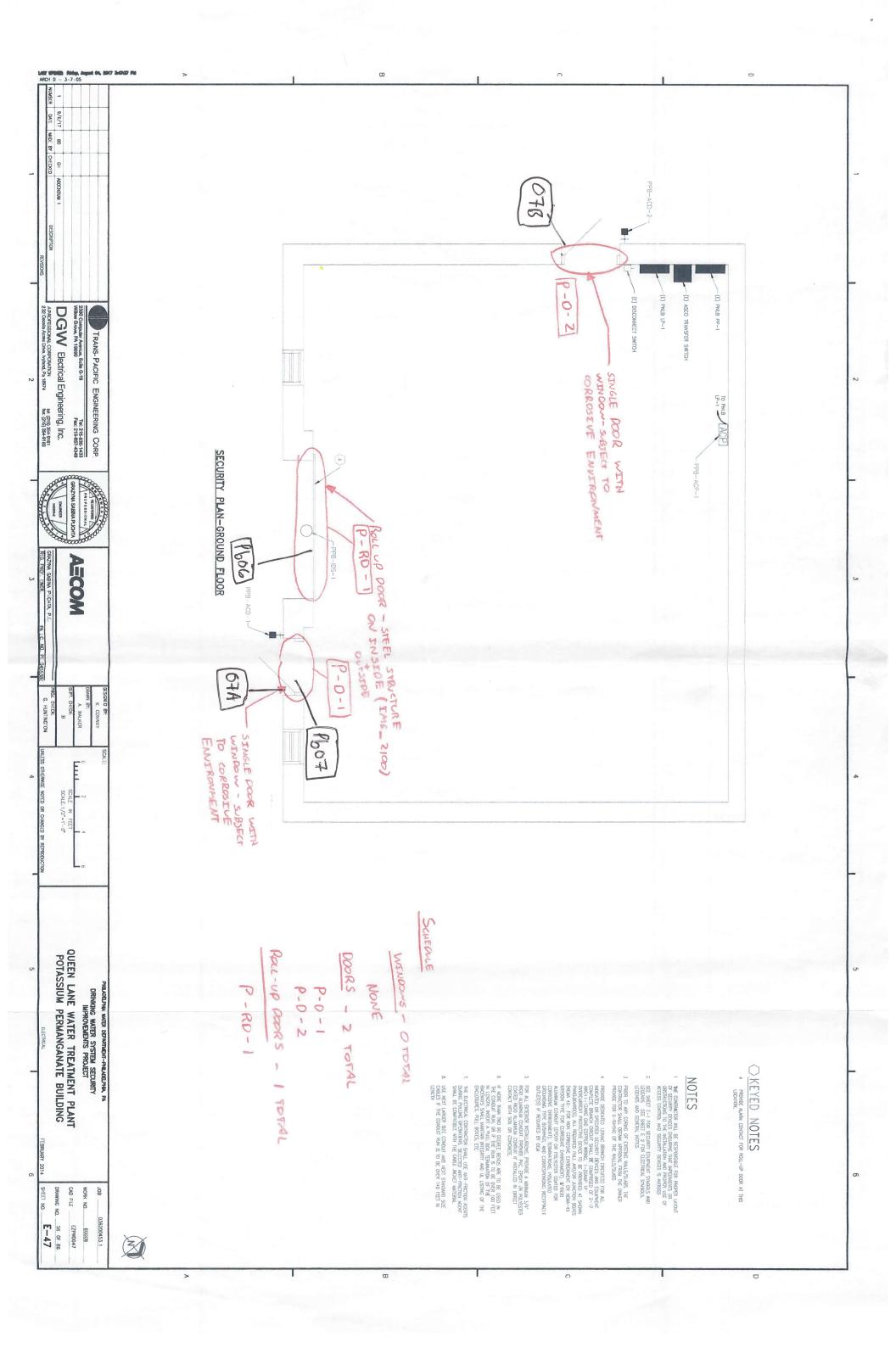
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CUSTODY	Email: <u>battaenv@battaenv.com</u> Web: <u>www.battaenv.com</u>	k one, refer to notes*)	72 Hpurs (Note 5)	5 - 10 days (Note 6)		itezen	- 10 2 Uni	PW 0) 6 Uni	Sampling Info (Air & Surface Samules)	Start Time   Stop Time   Flow Rate										Time:	Time: (SYS	Time:	Time:			Date: WIC	600 R-93/116, and make	For drinking water samples: for results to be valid, lab must receive samples on ice and within 48 hours of collection. For air samples collected by NIOSH 7400 and 7402: in accordance with these NIOSH methods, two field blanks (or 10% of the number of field samples submitted, whichever is greater) must be submitted and be analyzed with field samples.
CHAIN OF CUSTODY	rk k, DE 19713-5817 ix: (302) 737-5764	Turnaround Times (check one, refer to notes*)	3 Hours/Immediate (Note 1)	6 Hours/Same Day (Note 2)	48 Hours (Note 4)	W. Queen Ly	W. Queen L		Sampling Se	Sta	1 31/20/2	-								2/20/18	110/18				y published methods.		Lab Note: When building material layers are not specified by the client on the Chain of Custody, Batta will follow EPA 600 R-93/116, and make those determinations in the lab at the time of analysis. Friability: State/Federal Regulations mandate friability shall not he determined in labe	vithin 48 hours of collection. For air sa cd and be analyzed with field samples.
С С	Delaware Industrial Park 6 Garfield Way, Newark, DE 19713-5817 Tel: (302) 737-3376   Fax: (302) 737-5764	Shipping Information	Picked up by BATTA	Delivered by Customer     Shipped by Customer		Project Name: 31(O	Project Location: 3110		Samila Location / Provinsion	uon / nescription	Park Grey Tak	Roll up Etame	(Mart Build)	are be. Int a	Call up Prune 2	Kaw up Deer		Interior Urance	chem Pr		DE S Date:	Date:	Date:		Note to Client: Batta Laboratories recommends that blanks be supplied by the client when mandated by published methods.	Log-in Date:	e client on the Chain of Cu ty: State/Federal Regulation	For drinking water samples: for results to be valid, lab must receive samples on ice and within 4 (or 10% of the number of field samples submitted, whichever is greater) must be submitted and
		ä	12:	Zei51674		Tel 1:	Tel 2:				Kuld	Sur H	ò	F Build	Munt Build	reip ing	1 11/1	Everin manual	tor Q	Mahar				Special Instructions / Requests From Client (If applicable):	mends that blanks be supplied	Logged-in By:	yers are not specified by the etime of analysis. Friabili	ults to be valid, lab must re es submitted, whichever is
D D D D D D D D D D D D D D D D D D D	A Certified MBE Company A Certified MBE Company Dedicated to a Cleaner Environment Since 1982	Customer Billing Information Tel 1:	Tel 2:	Todd	ss 2:	12			iv Field Samule ID#		T	20		+	2-	- 9.	1204	- a	99	Sample Relinquished By: UM	Sample Received By:	Sample Relinquished By:	Sample Received By:	ictions / Requests Fror	Batta Laboratories recomn	V Logge	en building material lay nations in the	vater samples: for resu number of field sample
2	Dedicated 1	Customer B		Customer Name: Billing Address 1:	Billing Address 2:	Results To:	Results To:	Emails:	BL Use Only		car yes	185	+ 85	20	389	195	162	393	HEE	Sample Relir	Sample I	Sample Relir	Sample I	Special Instru	Note to Client:	BLI Use Only	Lab Note: Wh those determi	For drinking w (or 10% of the





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### BATTA ENVIRONMENTAL ASSOCIATES, INC.

 Delaware Industrial Park
 Ph (302) 737-3376

 6 Garfield Way
 Fx (302) 737-5764

 Newark, DE 19713-5817
 www.battaenv.com

	EVENTS LOG
Project Nam Site Inspecte Building Insp	ed: 31/0 Queen Ln (PWP) / Date: 9/20/18
Time <sub>(24hr)</sub>	Event
0800-	-Arrive onsite / wait for contact
0830	- Contact walks us through
	5 shows areas of renovation
	Environs 3 Doors marked on
1	provided drawings ( 4 building)
0900-	- Nick M. ? Joe conduct
1240	- Bull sampling
1300-	affaite /
X-	- provided drawings marked with
	all sample locations

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	MATERIALS INVE	NTORY WORK	SHEET		
Project Nam	e: 3110 W. Queen Ln		BEA#: 87641	913	
	ed: 3110 W Queen Ln		Date: <u>9</u> / 20	118	
Building Insp	, , ,			of	
Sample #	Locations (1.1, 1.2, 3.5,etc.)	Dimens	ions	Total	units
01	Roll up Doors Maintenance bldg	10 × 10		30	LF
02	& Kitchen Offic ment	blas		320	SF
03	Manterara blds			220	٢F
04	Which by			290	LF
05	There of ears			150	LF
06	Exterior of ) windows Maintegard	2		320	LF
07	PP building			40	LF
00	windows (Chem Bldg)			00	LF
09	Exterior of chan)		-	100	r
10	Eterior of Doors (chem Bld)	)		20 0	F
11	Exterior Of Rolli J			ৰত	CF
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