PRA# 16962

A Public Records Access request has been submitted.

Request By: Judy Rife

Request date: 05/23/2016

Address: [redacted]

Email: [redacted]

Phone number: [redacted]

Personal Information Request: NO

Records seeking: Copies of all documents relating to the repaving of runways 9-27 and 16-34 at Stewart International Airport, including the request for bids and specifications for the project, the bids themselves and the subsequent contract with the successful bidder. The documents most likely date to 2012-2013.

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY PRA #16962
PUBLIC RECORD ACCESS FORM

Action by (print / type name):

William Shalewitz , Freedom of Information Administrator

Signature: Date:

07/25/2016

On behalf of the Secretary of the Port Authority, as Records Access Officer and Custodian of Government Records of the Port Authority.

☐ The requested records are being made available.

☐ Any responsive records that may exist are currently in storage or archived, and a diligent search is being conducted. The Port Authority will respond by:

☐ A diligent search has been conducted, and no records responsive to your request have been located.

☐ The requested records that have been located are not being made available, as they are exempt from disclosure for the following specific reasons:

☑ Some requested records that have been located are being made available. The remainder are exempt from disclosure for the following specific reasons:

Privacy and Security.

☐ The request does not reasonably describe or identify specific records; therefore, the Port Authority is unable to search for and locate responsive records. Please consider submitting a new request that describes or identifies the specific records requested with particularity and detail.

☑ Other:

Material responsive to your request can be found on the Port Authority's website at http://corpinfo.panynj.gov/documents/16962-C/. Paper copies of the available records are available upon request.

This form is promulgated by the Port Authority pursuant to the Port Authority Public Records Access Policy and is intended to be construed consistent with the New York Freedom of Information Law and the New Jersey Open Public Records Act. It is intended to facilitate requests for Port Authority public records and does not constitute legal advice.

THE PORT AUTHORITY OF NY & NJ

CA06-164039
PQLFAA

#
D.H.

STEWART INTERNATIONAL AIRPORT

REHABILITATION OF RUNWAY 9-27 AND RUNWAY 16-34

CONTRACT SWF-164.039

[redacted]

JANUARY 2013

This proposal is not complete unless bidder's Signature appears on page 19

THE PORT AUTHORITY OF NY & NJ

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Appendix A

Schedule of Minimum Wage Rates (FED NY)

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Appendix B

INFORMATION FOR BIDDERS

1. FORM AND SUBMISSION OF PROPOSALS

The Port Authority of New York and New Jersey, hereinafter called "the Authority", invites Proposals in the annexed form. Proposals will be received until 2:30 P.M. on Monday, February 4, 2013 in the office of the Director of Procurement, Attn: Bid Custodian, Two Montgomery Street, 3rd Floor, Jersey City, NJ 07302 at which time they will be opened and publicly read in the Bid Room. Each Proposal must be contained in the envelope furnished by the Authority, which shall be sealed and conspicuously endorsed with the bidder's name and the number of this Contract in the space provided. This Contract booklet shall not be unstapled or taken apart.

The Proposal must be submitted upon the blank form bound herewith and must give all information required. [1] The Proposal must be signed and the acknowledgment taken on the appropriate form following the Proposal.

No effort is made to emphasize any particular provision of the Contract, but bidders must familiarize themselves with every provision and its effect.

The Port Authority of New York and New Jersey, in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.C. 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

In addition, this Contract is subject to the requirements of Part 26 of Title 49 of the Code of Federal Regulations and Part 60-4 of Title 41 of the Code of Federal Regulations, (Department of Labor) Construction Contractors, Affirmative Action Requirements. These documents are available online at http://www.gpoaccess.gov/cfr.

2. PAPERS ACCOMPANYING PROPOSALS

Each Proposal must be accompanied by the following papers, which, unless otherwise indicated, should be enclosed with the Proposal:

A. If the bidder be a corporation, a statement of the names and residences of its officers, which should be included on the page following the Proposal.

If the bidder be a partnership, a statement of the names and residences of its members, indicating which are general and which are special partners, which should be included on the page following the Proposal.

---

1 While two or more copies of this booklet may be furnished to each prospective bidder, only one should be submitted. The extra copies are for the bidders use.

If the bidder be an individual, a statement of his residence, which should be included on the page following the Proposal.

B. Either the Bid Bond bound herewith, duly executed by the bidder as principal and by one or more surety companies duly authorized to carry on the business of suretyship in the state(s) in which the construction site is located, whose names appear on the current list of the Treasury Department of the United States as acceptable as sureties upon federal contracts; or, in lieu of a Bid Bond;

A certified check, payable to the order of The Port Authority of New York and New Jersey, in the same amount appearing in the Bid Bond form, which check shall be placed in an envelope marked "Bid Security" and enclosed with the Proposal.

C.

1.) Certified financial statements, including applicable notes, reflecting the bidder's assets, liabilities, net worth, revenues, expenses, profit or loss and cash flow for the most recent calendar year or the bidder's most recent fiscal year.

2.) Where such certified financial statements are not available, then either reviewed or compiled statements from an independent accountant setting forth the information described in Paragraph 1, above.

3.) Where neither certified financial statements nor financial statements from an independent accountant are available, then financial statements containing the information described in Paragraph 1, above, prepared directly by the bidder. However, such financial statements must be accompanied by a signed copy of the bidder's most recent Federal income tax return and a statement in writing, signed by a duly authorized representative of the bidder, that such statements accurately reflect the current financial condition of the bidder.

Where statements submitted pursuant to either Paragraph 1 or 2, above, show the position of the bidder as of a date more than forty-five (45) days prior to the date on which Proposals are opened, the bidder shall also submit a statement in writing signed by a duly authorized representative of the bidder, that the present financial condition of the bidder is at least as good as that shown on the statements submitted.

4.) A statement of work which the bidder has on hand, including any work on which a bid has been submitted, containing a description of the work, the dollar value, the location by city and state, the current percentage of completion and the expected date for completion.

5.) Fill in below the name and address of the bidder's chief banking representative handling the bidder's account.

Banking Institution:	Bank of America Merrill Lynch
Address:	333 S. Hope Street 13th Floor
	Los Angeles, CA 90071
Bank Representative:	Adam Feit
Telephone Number:	213-621-7163

6.) Fill in below the bidder's Federal Employer Identification Number (i.e., the number assigned to firms by the Federal Government for tax purposes); the bidder's Dun and Bradstreet number, if any; the name of any other credit service to which the bidder has furnished information and the number, if any, assigned by such service to the bidder's account.

[redacted]

Federal Employer Identification No.

006954432

Dun and Bradstreet No.

N/A

Other Credit Service

Account No.

D. The Form of Contract bound herewith, with the bidder's prices inserted in the clause thereof entitled "Unit Prices and Lump Sum". The amounts must be given both in figures and in writing and, in case of discrepancy, the writing shall control. The unit prices must be extended and totaled. The Estimated Total for Classified Work and the Lump Sum must be entered in the recapitulation and totaled. One copy of each addendum, if any, issued during the bidding period shall be initialled and attached to the Proposal, but any Proposal submitted without such addendum initialled and attached will nevertheless be construed as though such addendum had been initialled and attached.

E. The bidder's analysis of bid filled in on the form furnished herewith. The Contractor will be required to furnish a more detailed analysis of bid at a later date in accordance with the requirements of the Section of Division 1 of the Specifications referring to the Analysis of Bid.

F. A Certification of Nonsegregated Facilities and a Certification of Title VI Civil Rights Act of 1964 Compliance filled in on the forms attached hereto in Appendix A.

G. A DBE Goals Statement filled in on the form attached hereto as Appendix A1.

5.) Fill in below the name and address of the bidder's chief banking representative handling the bidder's account.

Banking Institution:	NY Commercial Bank
Address:	1 Jericho Plaza
	Jericho, NY 11753
Bank Representative:	Eric Buchanzhi
Telephone Number:	516-942-6819

6.) Fill in below the bidder's Federal Employer Identification Number (i.e., the number assigned to firms by the Federal Government for tax purposes); the bidder's Dun and Bradstreet number, if any; the name of any other credit service to which the bidder has furnished information and the number, if any, assigned by such service to the bidder's account.

[redacted]

Federal Employer Identification No.

00340073G

Dun and Bradstreet No.

Other Credit Service

[redacted]

Account No.

H. The Form of Contract bound herewith, with the bidder's prices inserted in the clause thereof entitled "Unit Prices and Lump Sum". The amounts must be given both in figures and in writing and, in case of discrepancy, the writing shall control. The unit prices must be extended and totaled. The Estimated Total for Classified Work and the Lump Sum must be entered in the recapitulation and totaled. One copy of each addendum, if any, issued during the bidding period shall be initialled and attached to the Proposal, but any Proposal submitted without such addendum initialled and attached will nevertheless be construed as though such addendum had been initialled and attached.

I. The bidder's analysis of bid filled in on the form furnished herewith. The Contractor will be required to furnish a more detailed analysis of bid at a later date in accordance with the requirements of the Section of Division 1 of the Specifications referring to the Analysis of Bid.

J. A Certification of Nonsegregated Facilities and a Certification of Title VI Civil Rights Act of 1964 Compliance filled in on the forms attached hereto in Appendix A.

K. A DBE Goals Statement filled in on the form attached hereto as Appendix A1.

H. A DBE Participation Plan and Affirmation Statement filled in on the form attached hereto as Appendix A2.

I. An Information on Solicited firms form filled in on the form attached hereto as Appendix A3.

J. If the bidder cannot make the certification required by the clause of the "Information for Bidders" entitled "Buy American Certificate," submit the statement and listing required by such clause.

3. QUALIFICATION INFORMATION

At any time after the opening of Proposals, the Chief Engineer may give oral or written notice to one or more bidders to attend a pre-award meeting and to furnish the Authority with information relating to his qualifications to perform the Work, including the following, which information shall be furnished within seven (7) days thereafter:

A. A detailed list of all anticipated material suppliers and subcontractors and a detailed list of the plant and equipment which the bidder proposes to use, indicating which portions it already possesses.

B. Detailed information relating to work which the bidder has completed for others, including personal and corporate references, sufficient to the Authority to determine the Contractor's responsibility, experience and capacity to perform the Work. If required by the Chief Engineer, the foregoing information shall include information to demonstrate to the satisfaction of the Chief Engineer that the Contractor has within the past five years been a contractor on at least one contract of the same general type, extent and complexity as the Contract on which the Proposal has been submitted, and completed the work skillfully, in a satisfactory manner and on time.

C. Information to supplement a) data shown in the financial statements and the statement of work on hand required to be submitted with the Proposal; and b) any statement submitted under the clauses hereof entitled "Certification of No Investigation (Criminal or Civil Anti-Trust), Indictment, Conviction, Suspension, Debarment, Disqualification, Prequalification Denial or Termination, etc, Disclosure of Other Required Information", "Certification of Participation in a State-Registered Apprenticeship Program" or "Non-Collusive Bidding and Code of Ethics Certification; Certification of No Solicitation Based on Commission, Percentage, Brokerage, Contingent Fee or Other Fee".

D. Moreover, in the event that the bidder's performance on a past Port Authority or PATH contract or contracts has been rated less than satisfactory, the Chief Engineer may give oral or written notice to the bidder to furnish information demonstrating to the satisfaction of the Chief Engineer that, notwithstanding such rating, such performance was, in fact, satisfactory, or that the circumstances which gave rise to such unsatisfactory rating have changed or will not apply to performance of the Contract, and that such performance will be satisfactory.

E. If the bidder has performed a contract for the States of New York or New Jersey, or any governmental entity within such States and has filed a questionnaire or other document required to be submitted in order for the bidder to qualify to perform the contract, the bidder may be requested by the Chief Engineer to submit the most recent completed questionnaire or other such document, or if the most recent completed questionnaire or other such document is not available, to submit a written statement indicating the approximate date of the contract and the name of the governmental entity which awarded them the contract.

F. Any additional information relevant to the bidder's Proposal including information to supplement the bidder's initial analysis of bid.

In the event that any of the foregoing is requested and is not furnished within seven days thereafter or within such additional time as the Chief Engineer, in his sole discretion, may allow, the Authority may not be in a position to determine whether the bidder is qualified, whether the bidder understands the requirements of the contract or whether the bid is responsive and may, in its sole discretion, reject the bidder's Proposal.

The giving of such notice to the bidder in connection with any of the foregoing lists, statement or information shall not be construed as an acceptance of his Proposal. However, the Authority reserves the right in its sole and absolute discretion, to accept the Proposal of a bidder despite the fact that said bidder has not submitted any information, list or statement required pursuant to this Section within the above-stated time period.

4. ACCEPTANCE OR REJECTION OF PROPOSAL

Within ninety (90) days after the opening of the Proposals, the Authority will accept one of the Proposals, if it accepts any. The acceptance of a Proposal will be only by mailing to or delivering at the office designated in the Proposal a notice in writing specifically indicating acceptance signed by an authorized representative on behalf of the Authority who is at present the Authority's Director of Procurement. No other act of the Authority, its Commissioners, officers, agents, or employees shall constitute acceptance of a Proposal. Such notice will state whether or not the Authority elects to require the bidder to furnish a Performance and Payment Bond. Rejection of a Proposal will be only by either (a) a notice in writing specifically stating that the Proposal is rejected, signed by an authorized representative on behalf of the Authority who is at present the Authority's Director of Procurement and mailed to or delivered at the office designated in the Proposal or (b) omission of the Authority to accept a Proposal within ninety (90) days after the opening of Proposals; and no other act of the Authority, its Commissioners, officers, agents or employees shall constitute rejection of a Proposal, including any counter offer or other act of the Authority, its Commissioners, officers, agents or employees.

The Authority reserves the unqualified right, in its sole and absolute discretion, to reject all Proposals or to accept that Proposal if any, which in its judgment will under all the circumstances best serve the public interest and to waive defects in any Proposal.

In the event that a successful bidder defaults upon the Contract by failing to furnish a satisfactory Performance and Payment Bond, if required, and the Authority terminates the Contract, the Authority reserves the option to accept the Proposal of any other bidder within ninety (90) days after the opening of Proposals, in which case such acceptance shall have the same effect as to such other bidder as though he were the originally successful bidder.

5. RETURN OF CERTIFIED CHECKS

Within ten (10) days after the opening of the Proposals the Authority will return all certified checks deposited by bidders, except those deposited by three bidders to be selected by the Authority, which will be returned within three days after one Proposal is accepted by the Authority; or if a Performance and Payment Bond is required, within three days after a satisfactory Performance and Payment Bond is furnished to the Authority; or if all Proposals are rejected, not later than three days after such rejection. The return of a bidder's check shall not, however, be deemed to be a rejection of his Proposal.

6. WEBSITE POSTINGS OF CONTRACT DOCUMENTS

Recipients of Contract documents marked Confidential (Privileged) may not post them or any of them to a website except in accordance with the Authority's prior written approval, which may require a written non-disclosure agreement.

Recipients of Contract documents not marked Confidential (Privileged) may not post them or any of them to a website unless the website (1) is non-public, (2) is password protected and (3) is accessible only to the recipient's prospective subcontractors and suppliers. Recipient's prospective subcontractors and suppliers shall also be deemed recipients and shall be required to conform to the terms of this numbered clause. Recipients shall be deemed to include both bidders and those who do not submit bids.

No later than 180 days after the date of receipt of Proposals, all recipients shall remove all Contract Documents from their websites.

7. DISPOSAL OF CONTRACT DOCUMENTS

All recipients of Contract documents, including bidders and those who do not bid and their prospective subcontractors and suppliers who may receive all or a part of the Contract documents or copies thereof, shall make every effort to ensure the secure and appropriate disposal of the Contract documents to prevent further disclosure of the information contained in the documents. Secure and appropriate disposal includes methods of document destruction such as shredding or arrangements with refuse handlers that ensure that third persons will not have access to the documents' contents either before, during, or after disposal. Documents may also be returned for disposal purposes to the Contract Desk on the 3rd Floor, 3 Gateway Center, Newark, NJ 07102 or the office of the Director of Procurement, Two Montgomery Street, 3rd Floor, Jersey City, NJ 07302.

7A. DBE PROGRAM

This Contract is subject to the United States Department of Transportation regulations on Disadvantaged Business Enterprises (DBE's) contained in Part 26 of Title 49 of the Code of Federal Regulations. The following goal for DBE participation has been set for this Contract:

10% for firms owned and controlled by socially and economically disadvantaged individuals[2] and certified as DBE's by the Authority. Eligible DBE firms are listed on the following Uniform Certification Programs (UCPs) websites:

New York UCP – http://www.nysucp.net/

New Jersey UCP – http://www.njucp.net/

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[2] Individuals who are rebuttably presumed to be socially and economically disadvantaged include women, Blacks, Hispanics, Native Americans, Asian-Pacific Americans, and Asian-Indian Americans. A bidder may meet the DBE goal by using any combination of disadvantaged businesses.

By bidding on this Contract, the bidder assures the Authority that it will meet the foregoing goal and shall submit the DBE Goals Statement form (Appendix A1) with his Proposal. If the bidder determines he cannot make this assurance he may nevertheless submit a bid but in such event he shall note on the DBE Goals Statement form the percentage of DBE participation he anticipates, including documentation supporting the good faith efforts made to achieve the goals set forth in the Contract.

The bidder shall submit with his Proposal the DBE Participation Plan and Affirmation Statement (Appendix A2) for each DBE firm he intends to use on this Contract. The DBE Participation Plan and Affirmation Statement shall provide the name and address of each DBE firm, a description of the work to be performed, the dollar value of each DBE subcontract and the signature affirmation from each DBE firm participating in this Contract.

A bidder who fails to meet the DBE goal for this Contract and fails to demonstrate to the Authority that the bidder has made good faith efforts to meet same shall not be eligible to be awarded the Contract. The following are illustrative of good faith efforts:

A. Attendance at a pre-bid meeting, if any, scheduled by the Authority to inform DBEs of subcontracting opportunities under a given solicitation;

B. Advertisement in general circulation media, trade association publications, and minority-focused media for at least 20 days before bids or proposals are due. If 20 days are not available, publication for a shorter reasonable time is acceptable;

C. Written notification to DBEs that their interest in the Contract is solicited;

D. Efforts made to select portions of the work proposed to be performed by DBEs in order to increase the likelihood of achieving the stated goal;

E. Efforts to negotiate with DBEs for specific sub-bids including at a minimum;

   1.) The names, addresses, and telephone numbers of DBEs that were contacted;

   2.) A description of the information provided to DBEs regarding the plans and specifications for portions of the work to be performed; and

   3.) A statement of why additional agreements with DBEs were not reached;

F. Concerning each DBE, the bidder contacted but rejected as unqualified, and the reasons for the bidder's rejection;

G. Efforts made to assist the DBEs contacted that need assistance in obtaining bonding or insurance required by the bidder or Authority.

The bidder shall submit with his Proposal the completed Information on Solicited Firms form (Appendix A3) listing every firm that provided a quotation to the bidder for any subcontract to be performed under this Contract, whether or not the firms are DBE certified and whether or not the firms' quotes were included in the final Proposal.

8. AVAILABLE DOCUMENTS

Certain documents, specified below, are available for reference and examination by bidders by contacting Gary Greer at (973) 792-3934, 3 Gateway Center, 3rd Floor, Newark, NJ 07102 during regular business hours. These documents were not prepared for the purpose of providing information for bidders upon the present Contract but they were prepared for other purposes, such as for other contracts or for design purposes for this or other contracts, and they do not form a part of this Contract. The Authority makes no representation or guarantee as to, and shall not be responsible for their accuracy, completeness or pertinence, and, in addition, shall not be responsible for the conclusions to be drawn therefrom. They are made available to the bidders merely for the purpose of providing them with such information as is in the possession of the Authority, whether or not such information may be accurate, complete or pertinent or of any value to the bidders. Questions concerning the content of the documents shall be submitted in accordance with the clause entitled "Questions By Bidders".

Said documents are as follows:

SWF-SL	Rehab of the WIP Circuit - Projection site Map, Boring Location Plan, General Notes, Legend, Abbreviations & Symbols, Soil Classifications
SWF-SL-002	Rehab of the WIP Circuit - Presentation of Borings
* NOTE:	For the Bidder's convenience, these documents will be transmitted with the Contract Drawings.

9. INSPECTION OF SITE

Each bidder or his authorized representative must make proper arrangements with the Resident Engineer at the construction site before inspecting the construction site. To make such arrangements call Omar Astacio, at (845) 838-8250.

10. QUESTIONS BY BIDDERS

Questions by prospective bidders concerning the Contract may be addressed to Jessamma Vatakencherry, at (201) 395-3453 or email at jvataken@panynj.gov, who however is authorized only to direct the attention of prospective bidders to various portions of the Contract so that they may read and interpret such portions for themselves. Neither Jessamma Vatakencherry nor any other employee or representative of the Authority is authorized to give interpretations of any portion of the Contract or to give information as to the requirements of the Contract in addition to that contained in the Contract. Interpretations of the Contract or additional information as to its requirements, where necessary, shall be communicated to bidders only by written addendum issued over the name of the Chief Engineer, which addendum shall be considered part of this Contract. Accordingly, nothing contained herein and no representation, statement or promise, oral or in writing, of the Authority, its Commissioners, officers, agents, representatives or employees shall impair or limit the effect of the warranties of the Contractor contained in the clause of the Form of Contract entitled "Contractor's Warranties" or elsewhere in this Contract. The provisions of this clause shall apply to questions addressed by prospective bidders both before and after their receipt of Contract Documents.

11. PREVAILING RATE OF WAGE CERTIFICATION

The bidders' attention is directed specifically to the clause of the Form of Contract entitled "Prevailing Rate of Wage" and to the fact that the Authority requires a certification in writing from the successful bidder, in such form as may be required pursuant to such clause, that he has paid and caused his subcontractors to pay at least the prevailing rate of wage and supplements required by such clause. This certification is required prior to his receipt of any payment from the Authority hereunder as provided in the clauses of the Form of Contract entitled "Monthly Advances" and "Final Payment" or at any other time.

12. CERTIFICATION OF NO INVESTIGATION (CRIMINAL OR CIVIL ANTI-TRUST), INDICTMENT, CONVICTION, SUSPENSION, DEBARMENT, DISQUALIFICATION, PREQUALIFICATION DENIAL OR TERMINATION, ETC; DISCLOSURE OF OTHER REQUIRED INFORMATION

By bidding on this Contract, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, that the bidder and each parent and/or affiliate of the bidder has not (a) been indicted or convicted in any jurisdiction; (b) been suspended, debarred, found not responsible or otherwise disqualified from entering into contracts with any governmental agency or been denied a government contract for failure to meet prequalification standards; (c) had a contract terminated by any governmental agency for breach of contract or for any cause related directly or indirectly to an indictment or conviction; (d) changed its name and/or Employer Identification Number (taxpayer identification number) following its having been indicted, convicted, suspended, debarred or otherwise disqualified, or had a contract terminated as more fully provided in (a), (b) and (c) above; (e) ever used a name, trade name or abbreviated name, or an Employer Identification Number different from those inserted in the Proposal; (f) been denied a contract by any governmental agency for failure to provide the required security, including bid, payment or performance bonds or any alternative security deemed acceptable by the agency letting the contract; (g) failed to file any required tax returns or failed to pay any applicable federal, state or local taxes; (h) had a lien imposed upon its property based on taxes owed and fines and penalties assessed by any agency of the federal, state or local government; (i) been, and is not currently, the subject of a criminal investigation by any federal, state or local prosecuting or investigative agency and/or a civil anti-trust investigation by any federal, state or local prosecuting or investigative agency, including an inspector general of a governmental agency or public authority; (j) had any sanctions imposed as a result of a judicial or administrative proceeding with respect to any professional license held or with respect to any violation of a federal, state or local environmental law, rule or regulation; and (k) shared space, staff, or equipment with any business entity.

The foregoing certification as to "(a)" through "(k)" shall be deemed to have been made by the bidder as follows: if the bidder is a corporation, such certification shall be deemed to have been made not only with respect to the bidder itself, but also with respect to each director and officer, as well as, to the best of the certifier's knowledge and belief, each stockholder with an ownership interest in excess of 10%; if the bidder is a partnership, such certification shall be deemed to have been made not only with respect to the bidder itself, but also with respect to each partner. Moreover, the foregoing certification, if made by a corporate bidder, shall be deemed to have been authorized by the Board of Directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of such certification as the act and deed of the corporation.

In any case where the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the signed bid a signed statement which sets forth in detail the reasons therefor. If the bidder is uncertain as to whether it can make the foregoing certification, it shall so indicate in a signed statement furnished with its bid, setting forth an explanation for its uncertainty.

Notwithstanding that the certification may be an accurate representation of the bidder's status with respect to the enumerated circumstances provided for in this clause as requiring disclosure at the time that the bid is submitted, the bidder agrees to immediately notify the Authority in writing of any change in circumstances during the period of irrevocability, or any extension thereof.

The foregoing certification or signed statement shall be deemed to have been made by the bidder with full knowledge that it would become a part of the records of the Authority and that the Authority will rely on its truth and accuracy in awarding this Contract. In the event that the Authority determines at any time prior or subsequent to the award of the Contract that the bidder has falsely certified as to any material item in the foregoing certification; willfully or fraudulently submitted any signed statement pursuant to this clause which is false in any material respect; or has not completely and accurately represented its status with respect to the circumstances provided for in this clause as requiring disclosure, the Authority may determine that the bidder is not a responsible bidder with respect to its bid on this Contract or with respect to future bids and may, in addition to exercising any other rights or remedies available to it, exercise any of the rights or remedies set forth in the clause of the Form of Contract entitled "Rights and Remedies of Authority". In addition, bidders are advised that knowingly providing a false certification or statement pursuant hereto may be the basis for prosecution for offering a false instrument for filing (see e.g., New York Penal Law, Section 175.30 et seq.). Bidders are also advised that the inability to make such certification will not in and of itself disqualify a bidder, and that in each instance the Authority will evaluate the reasons therefor provided by the bidder.

Under certain circumstances the bidder may be required as a condition of this Contract award to enter into a Monitoring Agreement under which it will be required to take certain specified actions, including compensating an independent Monitor to be selected by the Port Authority. Said Monitor shall be charged with, among other things, auditing the actions of the bidder to determine whether its business practices and relationships indicate a level of integrity sufficient to permit it to continue business with the Port Authority.

As used in this clause, the following terms shall mean:

Affiliate - An entity in which the parent of the bidder owns more than fifty percent of the voting stock, or an entity in which a group of principal owners which owns more than fifty percent of the bidder also owns more than fifty percent of the voting stock.

Agency or Governmental Agency - Any federal, state, city or other local agency, including departments, offices, quasi-public agencies, public authorities and corporations, boards of education and higher education, public development corporations, local development corporations and others.

Employer Identification Number - The tax identification number assigned to firms by the Federal government for tax purposes.

Investigation - Any inquiries made by any federal, state or local criminal prosecuting or investigative agency, including an inspector general of a governmental agency or public authority, and any inquiries concerning civil anti-trust investigations made by any federal, state or local governmental agency. Except for inquiries concerning civil anti-trust investigations, the term does not include inquiries made by any civil government agency concerning compliance with any regulation, the nature of which does not carry criminal penalties, nor does it include any background investigations for employment, or Federal, state, and local inquiries into tax returns.

Officer - Any individual who serves as chief executive officer, chief financial officer, or chief operating officer of the bidder by whatever titles known.

Parent - An individual, partnership, joint venture or corporation which owns more than 50% of the voting stock of the bidder.

Space Sharing - Space shall be considered to be shared when any part of the floor space utilized by the submitting business at any of its sites is also utilized on a regular or intermittent basis for any purpose by any other business or not-for-profit organization, and where there is no lease or sublease in effect between the submitting business and any other business or not-for-profit organization that is sharing space with the submitting business.

Staff Sharing - Staff shall be considered to be shared when any individual provides the services of an employee, whether paid or unpaid, to the bidder and also, on either a regular or irregular basis, provides the services of an employee, paid or unpaid, to one or more other business(es) and/or not-for-profit organization(s), if such services are provided during any part of the same hours the individual is providing services to the bidder or if such services are provided on an alternating or interchangeable basis between the bidder and the other business(es) or not-for-profit organization(s). "The services of an employee" should be understood to include services of any type or level, including managerial or supervisory. This type of sharing may include, but is not limited to, individuals who provide the following services: telephone answering, receptionist, delivery, custodial, and driving.

Equipment Sharing - Equipment shall be considered to be shared whenever the bidder shares the ownership and/or the use of any equipment with any other business or not-for-profit organization. Such equipment may include, but is not limited to, telephones or telephone systems, photocopiers, computers, motor vehicles, and construction equipment. Equipment shall not be considered to be shared under the following two circumstances: when, although the equipment is owned by another business or not-for-profit organization, the bidder has entered into a formal lease for the use of the equipment and exercises exclusive use of the equipment; or when the bidder owns equipment that it has formally leased to another business or not-for-profit organization, and for the duration of such lease the bidder has relinquished all right to the use of such leased equipment.

13. NON-COLLUSIVE BIDDING AND CODE OF ETHICS CERTIFICATION; CERTIFICATION OF NO SOLICITATION BASED ON COMMISSION, PERCENTAGE, BROKERAGE, CONTINGENT FEE OR OTHER FEE

By bidding on this Contract, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, that: (a) the prices in its bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (b) the prices quoted in its bid have not been and will not be knowingly disclosed, directly or indirectly, by the bidder prior to the official opening of such bid to any other bidder or to any competitor; (c) no attempt has been made and none will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition; (d) this organization has not made any offers or agreements, or given or agreed to give anything of value (see definition of "anything of value" appearing in the clause of the Form of Contract entitled "No Gifts, Gratuities, Offers of Employment, etc.") or taken any other action with respect to any Authority employee or former employee or immediate family member of either which would constitute a breach of ethical standards under the Code of Ethics and Financial Disclosure dated as of April 11, 1996 (a copy of which is available upon request to the individual named in the clause hereof entitled "Questions by Bidders"), nor does this organization have any knowledge of any act on the part of an Authority employee or former Authority employee relating either directly or indirectly to this organization which constitutes a breach of the ethical standards set forth in said Code; (e) no person or selling agency, other than a bona fide employee or bona fide established commercial or selling agency maintained by the bidder for the purpose of securing business, has been employed or retained by the bidder to solicit or secure this Contract on the understanding that a commission, percentage, brokerage, contingent or other fee would be paid to such person or selling agency; (f) the bidder has not offered, promised or given, demanded or accepted, any undue advantage, directly or indirectly, to or from a public official or employee, political candidate, party or party official, or any private sector employee (including a person who directs or works for a private sector enterprise in any capacity), in order to obtain, retain, or direct business or to secure any other improper advantage in connection with this Contract.

The foregoing certification as to "(a)", "(b)", "(c)", "(d)", "(e)" and "(f)" shall be deemed to have been made by the bidder as follows: if the bidder is a corporation, such certification shall be deemed to have been made not only with respect to the bidder itself, but also with respect to each parent, affiliate, director and officer of the bidder, as well as, to the best of the certifier's knowledge and belief, each stockholder of the bidder with an ownership interest in excess of 10%; if the bidder is a partnership, such certification shall be deemed to have been made not only with respect to the bidder itself, but also with respect to each partner. Moreover, the foregoing certification, if made by a corporate bidder, shall be deemed to have been authorized by the Board of Directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of such certification as the act and deed of the corporation.

In any case where the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the signed bid a signed statement which sets forth in detail the reasons therefor. If the bidder is uncertain as to whether it can make the foregoing certification, it shall so indicate in a signed statement furnished with its bid, setting forth in such statement the reasons for its uncertainty. As a result of such disclosure, the Port Authority shall take appropriate action up to and including a finding of non-responsibility.

Failure to make the required disclosures shall lead to administrative actions up to and including a finding of non-responsibility.

Notwithstanding that the bidder may be able to make the foregoing certification at the time the bid is submitted, the bidder shall immediately notify the Authority in writing during the period of irrevocability of bids on this Contract or any extension of such period, of any change of circumstances which might under this clause make it unable to make the foregoing certification or required disclosure. The foregoing certification or signed statement shall be deemed to have been made by the bidder with full knowledge that it would become a part of the records of the Authority and that the Authority will rely on its truth and accuracy in awarding this Contract. In the event that the Authority should determine at any time prior or subsequent to the award of this Contract that the bidder has falsely certified as to any material item in the foregoing certification or has willfully or fraudulently furnished a signed statement which is false in any material respect, or has not fully and accurately represented any circumstance with respect to any item in the foregoing certification required to be disclosed, the Authority may determine that the bidder is not a responsible bidder with respect to its bid on this Contract or with respect to future bids on Authority contracts and may, in addition to exercising any other rights or remedies it may have, exercise any of the rights or remedies set forth in the clause of the Form of Contract entitled "Rights and Remedies of Authority".

In addition, bidders are advised that knowingly providing a false certification or statement pursuant hereto may be the basis for prosecution for offering a false instrument for filing (see e.g., New York Penal Law, Section 175.30 et seq.). Bidders are also advised that the inability to make such certification will not in and of itself disqualify a bidder, and that in each instance the Authority will evaluate the reasons therefor provided by the bidder.

Under certain circumstances the bidder may be required as a condition of this Contract award to enter into a Monitoring Agreement under which it will be required to take certain specified actions, including compensating an independent Monitor to be selected by the Port Authority. Said Monitor shall be charged with, among other things, auditing the actions of the bidder to determine whether its business practices and relationships indicate a level of integrity sufficient to permit it to continue business with the Port Authority.

14. BIDDER ELIGIBILITY FOR AWARD OF CONTRACTS - DETERMINATIONS BY AN AGENCY OF THE STATE OF NEW YORK OR NEW JERSEY CONCERNING ELIGIBILITY TO RECEIVE PUBLIC CONTRACTS

Bidders are advised that the Authority has adopted a policy to the effect that in awarding its contracts it will honor any determination by an agency of the State of New York or New Jersey that a bidder is not eligible to bid on or be awarded public contracts because the bidder has been determined to have engaged in illegal or dishonest conduct or to have violated prevailing rate of wage legislation.

The policy permits a bidder whose ineligibility has been so determined by an agency of the State of New York or New Jersey to submit a bid on a Port Authority contract and then to establish that it is eligible to be awarded the contract on which it has bid because (i) the state agency determination relied upon does not apply to the bidder, or (ii) the state agency determination relied upon was made without affording the bidder the notice and hearing to which the bidder was entitled by the requirements of due process of law, or (iii) the state agency determination was clearly erroneous or (iv) the state agency determination relied upon was not based on a finding of conduct demonstrating a lack of integrity or a violation of a prevailing rate of wage law.

The full text of the resolution adopting the policy may be found in the Minutes of the Authority's Board of Commissioners meeting of September 9, 1993.

15. THE EDWARD J. MALLOY CONSTRUCTION INITIATIVE FOR CONSTRUCTION SKILLS - APPRENTICESHIP PROGRAM

The Authority is a participant in the Edward J. Malloy Construction Initiative for Construction Skills (formerly known as Construction Skills 2000), a cooperative program among New York City schools, unions and public agencies. The Edward J. Malloy Construction Initiative for Construction Skills creates career opportunities in the construction industry for high school graduates by providing a systematic pathway into union-sponsored, skilled trade apprenticeship programs. The Authority encourages contractors and their subcontractors to maximize the use of apprentices under the applicable collective bargaining agreements or as contained in the applicable program approved by the New York State Department of Labor. The Contractor's plan for utilizing apprentices will be discussed at the pre-construction meeting.

Each subcontractor proposed for approval under the Contract whose total amount of subcontracts under this Contract is greater than $1 million and each bidder (except as set forth in the certification below) will be required to certify as to their participation in a New York State-registered apprenticeship program.

16. CERTIFICATION OF PARTICIPATION IN A STATE-REGISTERED APPRENTICESHIP PROGRAM

By bidding on this Contract, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, that the bidder participates in an apprenticeship program registered by the New York State Department of Labor. Participation in such an apprenticeship program shall mean that the bidder either (a) is a signatory to a collective bargaining agreement with a labor organization which sponsors an apprenticeship program registered with the New York State Department of Labor or (b) individually sponsors an apprenticeship program registered by the New York State Department of Labor and, in the case of both (a) and (b) above, such apprenticeship program shall be in the trade(s) in which Work is to be performed. This clause shall not apply to bidders who will perform all Work at the construction site through the use of subcontractors.

The foregoing certification, if made by a corporate bidder, shall be deemed to have been authorized by the Board of Directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of such certification as the act and deed of the corporation.

In any case where the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the signed bid a signed statement which sets forth in detail the reasons therefor. If the bidder is uncertain as to whether it can make the foregoing certification, it shall so indicate in a signed statement furnished with its bid, setting forth an explanation for its uncertainty.

Notwithstanding that the certification may be an accurate representation of the bidder's status with respect to the enumerated circumstances provided for in this clause as requiring disclosure at the time that the bid is submitted, the bidder agrees to immediately notify the Authority in writing of any change in circumstances during the period of irrevocability, or any extension thereof.

The foregoing certification or signed statement shall be deemed to have been made by the bidder with full knowledge that it would become a part of the records of the Authority and that the Authority will rely on its truth and accuracy in awarding this Contract. In the event that the Authority determines at any time prior or subsequent to the award of the Contract that the bidder has falsely certified as to any material item in the foregoing certification; willfully or fraudulently submitted any signed statement pursuant to this clause which is false in any material respect; or has not completely and accurately represented its status with respect to the circumstances provided for in this clause as requiring disclosure, the Authority may determine that the bidder is not a responsible bidder with respect to its bid on this Contract or with respect to future bids and may, in addition to exercising any other rights or remedies available to it, exercise any of the rights or remedies set forth in the clause of the Form of Contract entitled "Rights and Remedies of Authority". In addition, bidders are advised that knowingly providing a false certification or statement pursuant hereto may be the basis for prosecution for offering a false instrument for filing (see, e.g., New York Penal Law, Section 175.30 et seq.).

17. JOB MIX SUBMITTAL

A bidder may be directed by the Chief Engineer in writing to proceed with design of the asphalt concrete mix specified in the Section of the Specifications entitled "Asphalt Concrete Paving" prior to acceptance of one of the Proposals. If so directed by the Chief Engineer, the bidder shall immediately prepare the design of the asphalt concrete mix and submit it to the Engineer for approval as specified in the aforementioned Section of the Specifications.

All drawings, data and written materials of any type whatsoever which are prepared in connection with the preparation of such design and submitted to the Authority shall be subject to the Section of the Specifications entitled "Shop Drawings, Catalog Cuts and Samples". All materials submitted to the Authority shall be subject to the Section of the Specifications entitled "Workmanship and Materials" and upon submission to the Authority, they shall become the property of the Authority.

None of the requirements of the Contract shall be altered in any way as a result of a bidder being or not being so directed by the Chief Engineer prior to acceptance of one of the Proposals.

In the event that the Proposal of the bidder who was so directed by the Chief Engineer is accepted then no compensation other than that provided in the Form of Contract shall be paid to said bidder.

In the event design of the asphalt concrete mix has been prepared and for any reason thereafter the Proposal of the bidder who was directed by the Chief Engineer to prepare such design is not accepted, then such bidder shall be reimbursed for the cost of the preparation of the design in the amount to be agreed to by the Chief Engineer and the bidder but not to exceed a total amount of Five Thousand Dollars ($5,000.00) regardless of the actual cost to such bidder connected with the preparation of such design.

As used in this numbered clause the term "cost of the preparation of the design" means the cost to the Contractor of materials submitted, the initial design submitted, any resubmittals required by the Engineer and all testing and analysis of the design.

18. BUY AMERICAN CERTIFICATE

By submitting a bid on this Contract, the bidder certifies that more than 60% (by cost) of the steel and manufactured products for this Contract are produced in the United States (as defined in "Buy American - Steel and Manufactured Products For Construction Contracts" of the clause entitled "Federal Aviation Administration Requirements" of Chapter VII of the Contract) provided that components of unknown origin are considered to have been produced or manufactured outside the United States. A list of articles, materials, and supplies excepted from this provision is included in Chapter VII hereof.

If the bidder cannot make this certification, he shall submit with his bid a signed statement stating that he will not meet the Buy American requirements and shall list below all products which are not produced in the United States. Bidders are advised that failure to meet the Buy American provisions may require the Authority to reject that bidder's proposal.

PRODUCT	COUNTRY OF ORIGIN

It is the intent of the Contract that the products provided under this Contract comply with the Buy American provisions of this Contract. If the Contract documents inadvertently prohibit the bidder from making the above certification, the bidder shall notify by telephone or email the person listed in the clause entitled "Questions by Bidders". Such notification shall be made a minimum of five days prior to the date for receipt of Proposals.

In addition, where the Contract documents permit substitutions in accordance with the clause of Division 1 entitled "Substitution" and where items are specified in the Contract generically without being specifically identified, items that are not produced in the United States will not be approved if the effect of such approval will be a violation of the Buy American provisions by the Contractor.

PROPOSAL

To The Port Authority of New York and New Jersey:

The undersigned[3]

Tutor Perini Corporation, a Corporation organized under the laws of the State of Massachusetts

(hereinafter called "the Contractor") hereby offers to perform all the obligations and to assume all the duties and liabilities of the Contractor provided for in the annexed Contract, at the prices inserted by the undersigned in the clause of the Form of Contract entitled "Unit Prices and Lump Sum".

This offer shall be irrevocable for ninety (90) days after the date on which The Port Authority of New York and New Jersey opens this Proposal.

To induce the acceptance of this Proposal, the undersigned hereby makes each and every certification, statement, assurance, representation and warranty made by the Contractor in said Contract. Moreover as a condition to receipt and consideration by the Authority of the Proposal whether or not it is accepted, the undersigned agrees that all information of any nature whatsoever, regardless of the form of the communication, received from the undersigned (including its officers, agents, or employees) by the Authority, its Commissioners, officers, agents or employees, and notwithstanding any statement therein to the contrary, has not been given in confidence and may be used or disclosed by or on behalf of the Authority without liability of any kind except as may arise under letters patent of the undersigned, if any.

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3 Insert bidder's name at the top of the page. After the bidder's name, insert one of the following phrases:

If a corporation, give state of incorporation, using the phrase, "a corporation organized under the laws of the State of ."

If a partnership, give full names of partners, using also the phrase, "co-partners doing business under the firm name of ."

If an individual using a trade name, give individual name, using also the phrase, "an individual doing business under the trade name of ."

If a joint venture, give the information required above for each participant in the joint venture.

PROPOSAL

To The Port Authority of New York and New Jersey:

The undersigned[3]

CarlLizza III (Managing Member), John Lizza (Member), Estate of CarlLizza, Jr. and John Perrucci, Jr. (Member) – "co-partners doing business under the firm name of Intercounty Paving Associates, LLC"

(hereinafter called "the Contractor") hereby offers to perform all the obligations and to assume all the duties and liabilities of the Contractor provided for in the annexed Contract, at the prices inserted by the undersigned in the clause of the Form of Contract entitled "Unit Prices and Lump Sum".

This offer shall be irrevocable for ninety (90) days after the date on which The Port Authority of New York and New Jersey opens this Proposal.

To induce the acceptance of this Proposal, the undersigned hereby makes each and every certification, statement, assurance, representation and warranty made by the Contractor in said Contract. Moreover as a condition to receipt and consideration by the Authority of the Proposal whether or not it is accepted, the undersigned agrees that all information of any nature whatsoever, regardless of the form of the communication, received from the undersigned (including its officers, agents, or employees) by the Authority, its Commissioners, officers, agents or employees, and notwithstanding any statement therein to the contrary, has not been given in confidence and may be used or disclosed by or on behalf of the Authority without liability of any kind except as may arise under letters patent of the undersigned, if any.

[3] Insert bidder's name at the top of the page. After the bidder's name, insert one of the following phrases:

If a corporation, give state of incorporation, using the phrase, "a corporation organized under the laws of the State of ."

If a partnership, give full names of partners, using also the phrase, "co-partners doing business under the firm name of ."

If an individual using a trade name, give individual name, using also the phrase, "an individual doing business under the trade name of ."

If a joint venture, give the information required above for each participant in the joint venture.

PROPOSAL

To The Port Authority of New York and New Jersey:

The undersigned[3]

Tutor PeriniCorporation / Intercounty Paving Associates LLC, JV

(hereinafter called "the Contractor") hereby offers to perform all the obligations and to assume all the duties and liabilities of the Contractor provided for in the annexed Contract, at the prices inserted by the undersigned in the clause of the Form of Contract entitled "Unit Prices and Lump Sum".

This offer shall be irrevocable for ninety (90) days after the date on which The Port Authority of New York and New Jersey opens this Proposal.

To induce the acceptance of this Proposal, the undersigned hereby makes each and every certification, statement, assurance, representation and warranty made by the Contractor in said Contract. Moreover as a condition to receipt and consideration by the Authority of the Proposal whether or not it is accepted, the undersigned agrees that all information of any nature whatsoever, regardless of the form of the communication, received from the undersigned (including its officers, agents, or employees) by the Authority, its Commissioners, officers, agents or employees, and notwithstanding any statement therein to the contrary, has not been given in confidence and may be used or disclosed by or on behalf of the Authority without liability of any kind except as may arise under letters patent of the undersigned, if any.

[3] Insert bidder's name at the top of the page. After the bidder's name, insert one of the following phrases:

If a corporation, give state of incorporation, using the phrase, "a corporation organized under the laws of the State of ."

If a partnership, give full names of partners, using also the phrase, "co-partners doing business under the firm name of ."

If an individual using a trade name, give individual name, using also the phrase, "an individual doing business under the trade name of ."

If a joint venture, give the information required above for each participant in the joint venture.

Unless expressly stated otherwise, the Information for Bidders, all papers required by it and submitted in connection herewith at any time, said Form of Contract, and all papers made part of the Contract by the terms of the Form of Contract are made part of this Proposal.

The undersigned hereby designates the following as the bidders office[4]: 1000 Main Street
New Rochelle, NY 10801

The telephone number of the bidder is: 914-739-1908

The fax number of the bidder is: 914-739-5101

The E-Mail address of the bidder is: jlaing@perini.com

[4] Insert office address.

Unless expressly stated otherwise, the Information for Bidders, all papers required by it and submitted in connection herewith at any time, said Form of Contract, and all papers made part of the Contract by the terms of the Form of Contract are made part of this Proposal.

The undersigned hereby designates the following as the bidders office[4]:

859 Willow Grove Street
Hackettstown, NJ 07840

The telephone number of the bidder is: (908) 852-5868

The fax number of the bidder is: (908) 852-9015

The E-Mail address of the bidder is: flizza@intercountypaving.com

[4] Insert office address.

SIGNATURE AND CERTIFICATE OF AUTHORITY[5]

Dated, Feb. 4, 2013

(Signature of individual or name of corporation or partnership)

Tutor Perini Corporation

(Signature of agent, partner or corporate officer)

By[6] [7] James M. Laing

James M. Laing, Senior Vice President

(Acknowledgment of signature to be taken on proper form on following page(s))

CERTIFICATE OF AUTHORITY, IF BIDDER IS A CORPORATION

I, the undersigned, as Secretary of the corporation submitting the foregoing Proposal, hereby certify that under and pursuant to the by-laws and resolutions of said corporation, each officer who has signed said Proposal on behalf of the corporation is fully and completely authorized so to do.

(Corporate Seal)

Daniel T. Flanagan

Daniel T. Flanagan, Assistant Secretary

---

5 If bidder is a joint venture, insert signatures as appropriate for one participant of the joint venture on this page and attach and complete an additional signature sheet in the same form as appears on this page for each other participant as required.

6 If Proposal is signed by an officer or agent, give title.

7 NOTE: The foregoing signature shall be deemed to have been provided with full knowledge that the foregoing Proposal, the accompanying Contract booklet, as well as any certification, statement, assurance, representation, warranty, schedule or other document submitted by the bidder with the Proposal will become a part of the records of the Authority and that the Authority will rely in awarding the Contract on the truth and accuracy of such Proposal and each such certification, statement, assurance, representation, warranty and schedule made therein by the Contractor. Knowingly submitting a false statement in connection with any of the foregoing may be the basis for prosecution for offering a false instrument for filing (see, e.g., N.Y. Penal Law, Section 175.30 et seq.).

SIGNATURE AND CERTIFICATE OF AUTHORITY[5]

Dated, February 1, 2013

(Signature of individual or name of corporation or partnership)

Intercounty Paving Associates, LLC

(Signature of agent, partner or corporate officer)

By[6] [7]Frank C. Lizza, Jr.

Frank C. Lizza, Jr., General Manager

(Acknowledgment of signature to be taken on proper form on following page(s))

CERTIFICATE OF AUTHORITY, IF BIDDER IS A CORPORATION

I, the undersigned, as Secretary of the corporation submitting the foregoing Proposal, hereby certify that under and pursuant to the by-laws and resolutions of said corporation, each officer who has signed said Proposal on behalf of the corporation is fully and completely authorized so to do.

(Corporate Seal)

5 If bidder is a joint venture, insert signatures as appropriate for one participant of the joint venture on this page and attach and complete an additional signature sheet in the same form as appears on this page for each other participant as required.

6 If Proposal is signed by an officer or agent, give title.

7 NOTE: The foregoing signature shall be deemed to have been provided with full knowledge that the foregoing Proposal, the accompanying Contract booklet, as well as any certification, statement, assurance, representation, warranty, schedule or other document submitted by the bidder with the Proposal will become a part of the records of the Authority and that the Authority will rely in awarding the Contract on the truth and accuracy of such Proposal and each such certification, statement, assurance, representation, warranty and schedule made therein by the Contractor. Knowingly submitting a false statement in connection with any of the foregoing may be the basis for prosecution for offering a false instrument for filing (see, e.g., N.Y. Penal Law, Section 175.30 et seq.).

SIGNATURE AND CERTIFICATE OF AUTHORITY[5]

Dated, February 4, 2013

(Signature of individual or name of corporation or partnership)

Tutor PeriniCorporation / Intercounty Paving Associates LLC, JV

(Signature of agent, partner or corporate officer)

By[6] [7]James M. Laing, Attorney-In-Fact

(Acknowledgment of signature to be taken on proper form on following page(s))

CERTIFICATE OF AUTHORITY, IF BIDDER IS A CORPORATION

I, the undersigned, as Secretary of the corporation submitting the foregoing Proposal, hereby certify that under and pursuant to the by-laws and resolutions of said corporation, each officer who has signed said Proposal on behalf of the corporation is fully and completely authorized so to do.

(Corporate Seal)

---

5 If bidder is a joint venture, insert signatures as appropriate for one participant of the joint venture on this page and attach and complete an additional signature sheet in the same form as appears on this page for each other participant as required.

6 If Proposal is signed by an officer or agent, give title.

7 NOTE: The foregoing signature shall be deemed to have been provided with full knowledge that the foregoing Proposal, the accompanying Contract booklet, as well as any certification, statement, assurance, representation, warranty, schedule or other document submitted by the bidder with the Proposal will become a part of the records of the Authority and that the Authority will rely in awarding the Contract on the truth and accuracy of such Proposal and each such certification, statement, assurance, representation, warranty and schedule made therein by the Contractor. Knowingly submitting a false statement in connection with any of the foregoing may be the basis for prosecution for offering a false instrument for filing (see, e.g., N.Y. Penal Law, Section 175.30 et seq.).

ACKNOWLEDGMENT[8]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of New York

SS:

County of Westchester

On this 4th day of Feb., 20 , before me personally came and appeared James M. Laing, to me known, who, being by me duly sworn, did depose and say that he resides at [redacted], that he is the Senior Vice President of Tutor Perini Corporation, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

Christine A. Busey
(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of _____

SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known and known to me to be one of the members of the firm of _____, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

_____
(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal)

_____
(Notary Signature)

---

8 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

ACKNOWLEDGMENT[8]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of _____
_____ SS:
County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal)

_____
(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of New York
_____ SS:
County of Westchester

On this 1st day of Feb., 2013 , before me personally came and appeared Frank C. Lizza, Jr., to me known and known to me to be one of the members of the firm of Intercounty Paving Associates, LLC, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

Christine A. Busey
(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____
_____ SS:
County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal)

_____
(Notary Signature)

---

8 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

ACKNOWLEDGMENT[8]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of New York

_____ SS:

County of Westchester

On this 4th day of Feb., 2013, before me personally came and appeared James M. Laing, Attorney-In-Fact, to me known and known to me to be one of the members of the firm of Tutor PeriniCorporation /Intercounty Paving Associates, LLC, JV, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

Christine A. Busey
(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal) _____

(Notary Signature)

[8] If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

STATEMENT ACCOMPANYING PROPOSAL[9]

Names and Residences of Officers, If Bidder is a Corporation

TutorPerini Corporation
Corporate Officers January 2013

Name	Title	Residence[10]
Ronald N. Tutor	Chairman & CEO	[redacted]
Robert Band	President	[redacted]
Kenneth R. Burk	Executive Vice President, CEO-Contractors Specialty Group	[redacted]
James A. Frost	Executive Vice President, CEO-Civil Group	[redacted]
Michael J. Kershaw	Executive Vice President and CFO	[redacted]
William B. Sparks	Executive Vice President, Treasurer, Corporate Secretary & Clerk	[redacted]
James Laing	Senior Vice President	[redacted]
William G. O'Brien	Senior Vice President	[redacted]
Kevin J. Woods	Senior Vice President	[redacted]

Names and Residences of Partners, If Bidder is a Partnership

Name	General or Limited Partner	Residence[11]

Bidder's Residence, If an Individual[12]

---

9 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Statement Accompanying Proposal sheet in the same form as appears on this page for each other participant as required.

10 Give Street and Number of Residence. Do not give business address.

11 Give Street and Number of Residence. Do not give business address.

12 Give Street and Number of Residence. Do not give business address.

STATEMENT ACCOMPANYING PROPOSAL[9]

Names and Residences of Officers, If Bidder is a Corporation

TutorPerini Corporation
Corporate Officers January 2013

Name	Title	Residence[10]
Paul E. Lloyd	Senior Vice President	[redacted]
John D. Barrett	Senior Vice President, Tax	
Kevin W. Cvengros	Asst. Treasurer, Asst. Secretary and Clerk	
Henry Cheung	Vice President, Estimating	[redacted]
Daniel T. Flanagan	Assistant Secretary	
Lisa M. Melonas	Assistant Secretary & Clerk	
Donna E. Tannar	Assistant Secretary & Clerk	
Robert Van Buren	Assistant Secretary & Clerk	

Names and Residences of Partners, If Bidder is a Partnership

Name	General or Limited Partner	Residence[11]

Bidder's Residence, If an Individual[12]

---

9 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Statement Accompanying Proposal sheet in the same form as appears on this page for each other participant as required.

10 Give Street and Number of Residence. Do not give business address.

11 Give Street and Number of Residence. Do not give business address.

12 Give Street and Number of Residence. Do not give business address.

STATEMENT ACCOMPANYING PROPOSAL[9]

Names and Residences of Officers, If Bidder is a Corporation

Intercounty Paving Associates, LLC Road Construction Contractors

Limited Liability Company

Name	Title	Residence[10]
Carl Lizza III	Managing Member	[redacted]
John Lizza	Member	
Estate of Carl Lizza, Jr.		
John Perrucci, Jr.	Member	

Names and Residences of Partners, If Bidder is a Partnership

Name	General or Limited Partner	Residence[11]

Bidder's Residence, If an Individual[12]

---

9 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Statement Accompanying Proposal sheet in the same form as appears on this page for each other participant as required.

10 Give Street and Number of Residence. Do not give business address.

11 Give Street and Number of Residence. Do not give business address.

12 Give Street and Number of Residence. Do not give business address.

STATEMENT ACCOMPANYING PROPOSAL[9]

Names and Residences of Officers, If Bidder is a Corporation

Name	General or Limited Partner	Residence[10]

Names and Residences of Partners, If Bidder is a Partnership Joint Venture

Name	General or Limited Partner	Residence[11]
Ronald N. Tutor	Chairman & CEO	[redacted]
Robert Band	President	
Kenneth R. Burk	Executive Vice President, CEO-Contractors Specialty Group	
James A. Frost	Executive Vice President, CEO-Civil Group	
Michael J. Kershaw	Executive Vice President and CFO	
William B. Sparks	Executive Vice President, Treasurer, Corporate Secretary & Clerk	
James Laing	Senior Vice President	[redacted]
William G. O'Brien	Senior Vice President	
Kevin J. Woods	Senior Vice President	
Paul E. Lloyd	Senior Vice President	
John D. Barrett	Senior Vice President, Tax	
Kevin W. Cvengros	Asst. Treasurer, Asst. Secretary and Clerk	
Henry Cheung	Vice President, Estimating	
Daniel T. Flanagan	Assistant Secretary	
Lisa M. Melonas	Assistant Secretary & Clerk	
Donna E. Tannar	Assistant Secretary & Clerk	
Robert Van Buren	Assistant Secretary & Clerk	
Carl Lizza III	Managing Member	

CONTINUED

John Lizza	Member	[redacted]
Estate of Carl Lizza, Jr.		
John Perrucci, Jr.	Member	

Bidder's Residence, If an Individual[12]

---

9 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Statement Accompanying Proposal sheet in the same form as appears on this page for each other participant as required.

10 Give Street and Number of Residence. Do not give business address.

11 Give Street and Number of Residence. Do not give business address.

12 Give Street and Number of Residence. Do not give business address.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned[13] Tutor Perini Corporation a corporation organized under the laws of the Commonwealth of Massachusetts and Intercounty Paving Associates, LLC a limited liability company organized under the laws of the State Of New Jersey bidding as Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV

as principal(s); and[14] Travelers Casualty and Surety Company of America

as surety are hereby held and firmly bound unto The Port Authority of New York and New Jersey (herein called the "Authority") in the penal sum of Seven Million Eight Hundred Fifty Thousand Dollars ($7,850,000), for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed this 31st day of January , 2013

The condition of the above obligation is such that whereas the above named principal(s) has submitted to the Authority a certain Proposal, bound herewith and hereby made a part hereof, to perform the obligations of the Contractor under a contract in writing, known as Contract SWF-164.039, "Stewart International Airport - Rehabilitate Runways 9-27 and 16-34", now therefore:

A. If said Proposal shall not be accepted, or

B. If said Proposal shall be accepted and the Authority does not require the principal(s) to furnish a Performance and Payment Bond, or

C. If said Proposal shall be accepted and the Authority requires the principal(s) to furnish a Performance and Payment Bond and either the principal(s) furnishes a Performance and Payment Bond satisfactory to the Authority in accordance with the requirements of said Proposal or the Authority does not terminate the Contract as provided therein on account of the failure to furnish such a bond,

Then, this obligation shall be void, otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

---

13 Insert bidder's name. If a corporation, give the state of incorporation using the phrase "a corporation organized under the laws of the ".

If a partnership, give full names of partners, using also the phrase, "co-partners doing business under the firm name of ".

If an individual using a trade name, give individual name, using also the phrase, "an individual doing business under the trade name of ".

If a joint venture, give the information required above for each participant in the joint venture.

14 Insert name of surety.

The surety, for value received, hereby stipulates and agrees that the obligations of said surety and its bond shall be in no way impaired or affected by any extensions of the times within which the Authority may receive or accept such Proposal or within which the principal(s) may furnish a Performance and Payment Bond or by any waiver by the Authority of any of the requirements of said Proposal; and said surety does hereby waive notice of any such extensions or waivers.

IN WITNESS WHEREOF, the principal(s) and surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Tutor Perini Corporation

Principal 15[15]

(Seal)

By[16] James M. Laing

Sr. Vice President

Travelers Casualty and Surety Company of America

Surety

(Seal)

By[17] Eamonn Long

Eamonn Long, Attorney-in-Fact

---

15 If bidder is a joint venture, insert signature and information required as appropriate for one participant of the joint venture on this page and attach and complete an additional sheet in the same form as appears on this page for each other participant as required.

16 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

17 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

The surety, for value received, hereby stipulates and agrees that the obligations of said surety and its bond shall be in no way impaired or affected by any extensions of the times within which the Authority may receive or accept such Proposal or within which the principal(s) may furnish a Performance and Payment Bond or by any waiver by the Authority of any of the requirements of said Proposal; and said surety does hereby waive notice of any such extensions or waivers.

IN WITNESS WHEREOF, the principal(s) and surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Intercounty Paving Associates, LLC

Principal[15]

(Seal)

By[16] Frank C. Lizza, Jr.

General Manager

Travelers Casualty and Surety Company of America

Surety

(Seal)

By[17] Eamonn Long

Eamonn Long, Attorney-in-Fact

---

15 If bidder is a joint venture, insert signature and information required as appropriate for one participant of the joint venture on this page and attach and complete an additional sheet in the same form as appears on this page for each other participant as required.

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17 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

The surety, for value received, hereby stipulates and agrees that the obligations of said surety and its bond shall be in no way impaired or affected by any extensions of the times within which the Authority may receive or accept such Proposal or within which the principal(s) may furnish a Performance and Payment Bond or by any waiver by the Authority of any of the requirements of said Proposal; and said surety does hereby waive notice of any such extensions or waivers.

IN WITNESS WHEREOF, the principal(s) and surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV

Principal[15]

(Seal)

By[16] James M. Laing

Attorney-in-Fact

Travelers Casualty and Surety Company of America

Surety

(Seal)

By[17] Eamonn Long

Eamonn Long, Attorney-in-Fact

---

15 If bidder is a joint venture, insert signature and information required as appropriate for one participant of the joint venture on this page and attach and complete an additional sheet in the same form as appears on this page for each other participant as required.

16 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

17 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

ACKNOWLEDGMENT[18]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of New York

SS:

County of Westchester

On this 4th day of February, 2013, before me personally came and appeared James M. Laing, to me known, who, being by me duly sworn, did depose and say that he resides a[redacted], that he is the Sr. Vice President of Tutor Perini Corporation, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

Christine A. Busey
(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known and known to me to be one of the members of the firm of _____, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

_____
(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

_____ SS:

County of _____

On this _____ day of. _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal)

_____
(Notary Signature)

AFFIX ACKNOWLEDGMENT AND JUSTIFICATION OF SURETY

---

18 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

ACKNOWLEDGMENT[18]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of New York

_____ SS:

County of Westchester

On this 4th day of February, 2013, before me personally came and appeared James M. Laing, to me known and known to me to be one of the members of the Joint Venture of Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

Christine A. Busey

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

_____ SS:

County of _____

On this _____ day of. _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal) _____

(Notary Signature)

AFFIX ACKNOWLEDGMENT AND JUSTIFICATION OF SURETY

18 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

FORM OF CONTRACT

CHAPTER I

GENERAL PROVISIONS

19. DEFINITIONS

To avoid undue repetition, the following terms whenever they occur in this Form of Contract or any of the other papers forming a part of the Contract shall be construed as follows:

"Contract" shall mean, in addition to this Form of Contract, the Information for Bidders, the Proposal, the Authority's acceptance, the Specifications and the Contract Drawings (including written addenda issued over the name of the Chief Engineer), all of which are made part hereof as though herein set forth in full. The Contract as so defined shall constitute the complete and exclusive statement of the terms of the agreement between the parties and the Contract may not be explained or supplemented by course of dealing, usage of trade or course of performance.

The term "days" or "calendar days" in reference to a period of time shall mean consecutive calendar days, Saturdays, Sundays and holidays, included.

The term "construction site" or words of similar import shall mean Runway 9-27 and Runway 16-34 including adjacent Taxiways at Stewart International Airport, Orange County, New York..

"Work" shall mean all structures, equipment, plant, labor, materials (including materials and equipment, if any, furnished by the Authority) and other facilities and all other things necessary or proper for or incidental to performing Rehabilitation of runways and assocuiated taxiways via mill and overlay, including electrical system rehabilitation and upgrades, installation of new duct bank crossings for future electrical/communication requirements, improving the existing fillets, installing 35-foot shoulders to both sides of runway 16-34 and constructing a new high-speed taxiway exit for Runway 9-27.; and "performance of Work" and words of similar import shall mean the furnishing of such facilities and the doing of such things.

"Work required by the Contract Drawings and Specifications in their present form" or words of similar import shall include all Work required by the Specifications in their present form (whether or not shown upon the Contract Drawings), all Work shown upon the Contract Drawings in their present form (whether or not mentioned in the Specifications), and all Work involved in or incidental to the accomplishment of the results intended by the Specifications and Contract Drawings in their present form (whether or not mentioned therein or shown thereon).

"Classified Work" shall mean the items of Work set forth in the Schedule of Unit Prices and shall include any Work hereafter required which is of the same general character as that set forth in any of said items. In determining what is of the same general character, there shall be taken into consideration the provisions for measurement for payment appearing in said clause entitled "Unit Prices and Lump Sum", which provisions shall form a part of the items in said Schedules of Unit Prices.

"Unclassified Work" shall mean Work other than Classified Work.

"Extra Work" shall mean Work required by the Chief Engineer, Assistant Chief Engineer for Construction, Engineer of Construction or Engineer pursuant to the clause hereof entitled "Extra Work Orders", other than Classified Work, which is in addition to that required by the Contract Drawings and Specifications in their present form.

"Estimated Total for Classified Work" shall mean the result obtained by applying the prices quoted by the Contractor in the Schedule of Unit Prices to the estimated quantities given therein and totaling the results, whether or not such results are correctly shown in the Contractor's Proposal.

"Lump Sum" shall mean the Lump Sum for Unclassified Work quoted by the Contractor in the clause hereof entitled "Unit Prices and Lump Sum".

"Estimated Total Contract Price" shall mean the result obtained by adding together the Estimated Total for Classified Work and the Lump Sum, whether or not such result is correctly shown in the Contractor's Proposal.

"Contract Drawings" shall mean the Contract Drawings designated in the clause of the Specifications entitled "Contract Drawings" and, except as used in the phrase "Contract Drawings in their present form", shall include any future alterations and revisions of said drawings.

"Shop Drawings" shall mean all drawings, diagrams, illustrations, schedules, including supporting data, which are specifically prepared for this Contract and submitted by the Contractor pursuant to the requirements of the Specifications or the Engineer to illustrate some portion of the Work. The terms "shop drawings", "placing drawings" and "working drawings" are used interchangeably in this Contract.

"Catalog Cuts" shall mean all standard drawings, diagrams, illustrations, brochures, schedules, performance charts and instructions submitted by the Contractor pursuant to the requirements of the Specifications or the Engineer to illustrate some portion of the Work.

"Director of Procurement" shall mean the Director of Procurement of the Authority for the time being, or her successor in duties, acting either personally or through her duly authorized representatives acting within the scope of the particular authority vested in them.

"Chief Engineer" shall mean the Chief Engineer of the Authority for the time being, or his successor in duties, acting personally.

"Director" shall mean the Director of Aviation of the Authority for the time being, or his successor in duties for the purpose of this Contract, acting personally or through his authorized representative for the purpose of this Contract, who is at present the Authority's Director of Aviation Operations.

"Engineer" shall mean the Chief Engineer, acting either personally or through his duly authorized representatives acting within the scope of the particular authority vested in them.

"Assistant Chief Engineer for Construction" shall mean the Assistant Chief Engineer for Construction of the Authority for the time being, or his successor in duties, acting personally.

"Engineer of Construction" shall mean the designated Engineer of Construction for the facility at which the Work is being performed or his successor in duties, acting personally.

"Inspector" shall mean any representative of the Engineer designated by him as Inspector and acting within the scope of the particular authority vested in him.

The term "permanent construction" shall include all construction, installation, structures, equipment and materials (including materials and equipment, if any, furnished by the Authority) to be constructed, installed or left by the Contractor at or about the construction site (or elsewhere in the possession of the Authority) after the completion of the Work (whether or not they are yet delivered or installed), even though they are subsequently to be removed by others. The terms, "permanent installation", "permanent structure", "permanent materials", and words of similar import shall have the same meaning as the term "permanent construction".

"Subcontractor" shall mean anyone who performs Work (other than or in addition to the furnishing of materials, plant or equipment) at or about the construction site, directly or indirectly for or in behalf of the Contractor (and whether or not in privity of contract with the Contractor), but shall not include any person who furnished merely his own personal labor or his own personal services or who performs Work which consists only of the operation of construction equipment of which he is the lessor.

"Materialman" shall mean anyone who furnishes materials, plant or equipment to the Contractor or any subcontractor for use at or about the construction site in the performance of Work.

"Materialman" or "subcontractor", however, shall exclude the Contractor or any subsidiary or parent of the Contractor or any person, firm or corporation which has a substantial interest in the Contractor or in which the Contractor or the parent or the subsidiary of the Contractor, or an officer or principal of the Contractor or of the parent or the subsidiary of the Contractor has a substantial interest, provided, however, that for the purpose of the clause hereof entitled "Assignments and Subcontracts" the exclusion in this paragraph shall not apply to anyone but the Contractor himself.

"Workingman" or "workman" shall mean any employee of the Contractor or of a subcontractor who performs personal labor or personal services at the construction site.

"Notice" shall mean a written notice.

Whenever they refer to the Work or its performance, "directed", "required", "permitted", "ordered", "designated", "prescribed" and words of similar import shall mean directed, required permitted, ordered, designated or prescribed by the Engineer; and "approved", "acceptable", "satisfactory" and words of similar import shall mean approved by or acceptable or satisfactory to the Engineer; and "necessary", "reasonable", "proper", "correct" and words of similar import shall mean necessary, reasonable, proper or correct in the judgment of the Engineer.

Whenever "including", "such as" or words of similar import are used, the specific things thereafter enumerated shall not limit the generality of the things preceding such words.

20. GENERAL AGREEMENT

The Contractor agrees to perform Rehabilitation of runways and assocuiated taxiways via mill and overlay, including electrical system rehabilitation and upgrades, installation of new duct bank crossings for future electrical/communication requirements, improving the existing fillets, installing 35-foot shoulders to both sides of runway 16-34 and constructing a new high-speed taxiway exit for Runway 9-27. and to furnish all structures, equipment, plant, labor, materials and other facilities and to do all other things necessary or proper therefor or incidental thereto, all in strict accordance with the Contract Drawings and Specifications and any future changes therein; and the Contractor further agrees to assume and perform all other duties and obligations imposed upon him by this Contract.

The Authority agrees to pay to the Contractor and the Contractor agrees to accept from the Authority, in full consideration for the performance by the Contractor of his duties and obligations under this Contract and the whole thereof, a compensation consisting of the following amounts and such amounts only, subject only to the express provisions of this Contract specifically setting forth actual, defined additions to or deductions from such compensation.

A. An amount based upon the Classified Work performed, computed at the rates quoted in the Schedule of Unit Prices, said Classified Work to be measured and said amount to be computed in the manner provided in the clause hereof entitled "Unit Prices and Lump Sum"; and

B. The amount of the Lump Sum quoted in the clause hereof entitled "Unit Prices and Lump Sum".

This Contract is one entire contract for the accomplishment of the results and the doing of the things above specified and is not separable. Similarly, the Contractor's compensation is one entire compensation for entire performance on his part.

The enumeration in this Form of Contract and in the Specifications of particular things to be furnished or done at the Contractor's expense, or without cost or expense to the Authority without additional compensation to the Contractor shall not be deemed to imply that only things of a nature similar to those enumerated shall be so furnished and done, but the Contractor shall perform all Work as required, without other compensation than that specifically provided, whatsoever changes may be made in the Contract Drawings and Specifications whatsoever Work may be required in addition to that required by the Contract Drawings and Specifications in their present form, and whatsoever obstacles or unforeseen conditions may arise or be encountered.

21. AUTHORITY ACCESS TO RECORDS

The Authority shall have access during normal business hours to all records and documents of the Contractor relating to any amounts for which the Contractor has been compensated, or claims he should be compensated, by the Authority by payment determined on any basis other than by payment of a lump sum or unit price amount agreed upon in writing by the Contractor and the Authority; provided, however, such access shall extend to certified payroll records as described in the clause of the Form of Contract entitled "Prevailing Rate of Wage" regardless of the method by which the Contractor is compensated under this Contract. The Contractor shall obtain for the Authority similar access to similar records and documents of subcontractors. Such access shall be given or obtained both before and within a period of three years after Final Payment to the Contractor; provided, however, that if within the aforesaid three year period the Authority has notified the Contractor in writing of a pending claim by the Authority under or in connection with this Contract to which any of the aforesaid records and documents of the Contractor or of his subcontractors relate either directly or indirectly, then the period of such right of access shall be extended to the expiration of 6 years from the date of Final Payment with respect to the records and documents involved.

Upon request of the Authority, the Contractor shall furnish or provide access to the federal Form I-9 (Employment Eligibility Verification) for each individual performing Work under this Contract, including both citizens and non-citizens.

No provision in this Contract giving the Authority a right of access to records and documents is intended to impair or affect any right of access to records and documents which the Authority would have in the absence of such provision.

The Authority (including its Inspector General), the FAA, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers and records of the Contractor which are pertinent to the Contract for the purpose of making audit, examination, excerpts and transcriptions.

22. RENTAL OF CONSTRUCTION EQUIPMENT

The rental of construction equipment shall be subject to all applicable New York sales and use taxes notwithstanding the Authority's status as an Exempt Organization in New York, as such term is defined in section eleven hundred sixteen of the New York State Sales and Compensating Use Tax Act.

The Contractor shall indemnify the Authority against any claim of any kind whatsoever made against the Authority by a lessor of construction equipment and the Contractor assumes the risk of all claims against him by any lessor of construction equipment, including in both cases, claims in connection with a subcontractor.

23. EXEMPTION FROM NEW YORK STATE AND NEW YORK CITY SALES TAXES

The attention of the Contractor and his subcontractors and materialmen, if any, is directed to the New York State and New York City tax laws, as they apply to the Work of this Contract, and the New York State Department of Taxation and Finance (herein called the "Department") Form ST-120.1, Contractor Exempt Purchase Certificate, available on the Department's website: www.tax.ny.gov/forms/.

Subdivision (a) of section eleven hundred fifteen of the New York State Sales and Compensating Use Tax Act (herein called the "Act") provides contractors with an exemption from sales and compensating use taxes (herein called "Sales Tax") for, among other things:

> (15) Tangible personal property sold to a contractor, subcontractor or repairman for use in erecting a structure or building of an organization described in subdivision (a) of section eleven hundred sixteen, or adding to, altering or improving real property, property or land of such an organization, as the terms real property, property or land are defined in the real property tax law; provided, however, no exemption shall exist under this paragraph unless such tangible personal property is to become an integral component part of such structure, building or real property."

The Authority is an exempt organization of the type described in subdivision (a) of section eleven hundred sixteen of the Act.

In view of the foregoing, the Contractor should not include in his price(s) any amounts for Sales Tax on such tangible personal property (herein called "Exempt Purchases"). The Contractor shall execute and provide his vendors with a properly completed Form ST-120.1 when effectuating such Exempt Purchases.

As provided in the clause hereof entitled "Rental of Construction Equipment", the Contractor's rental of equipment and the Contractor's purchases of tangible personal property that does not become an integral component part of the permanent construction are, in all cases, subject to Sales Tax.

If (i) any claim is made against the Contractor by the State of New York or City of New York for such Sales Tax on Exempt Purchases, or (ii) any claim is made against the Contractor by a materialman or a subcontractor on account of a claim against such materialman or subcontractor by the State of New York or City of New York for such Sales Tax on Exempt Purchases, then the Authority will reimburse the Contractor in an amount equal to the amount of such tax required to be paid in accordance with the Act, provided that:

1.) The Contractor's liability for such Sales Tax is caused solely by a finding by the Department that the Authority is not an Exempt Organization of the type described in subdivision (a) of section eleven hundred sixteen of the Act; and

2.) the Contractor, or the Contractor and any such subcontractor, as the case may be, have complied with such rules and regulations as may have been promulgated relating to the claiming of the exemption from such Sales Tax and have furnished to vendors all the forms and certificates required by the applicable laws, rules and regulations in connection therewith; and

3.) the Authority is afforded the opportunity before any payment of tax is made, to contest said claim in the manner and to the extent that the Authority may choose and to settle or satisfy said claim and such attorney as the Authority may designate is authorized to act for the purpose of contesting, settling and satisfying said claim; and

4.) the Contractor, or the Contractor and any such subcontractor, as the case may be, give immediate notice to the Authority of any such claim, cooperate with the Authority and its designated attorney in contesting said claim and furnish promptly to the Authority and said attorney all information and documents necessary or convenient for contesting said claim, said information and documents to be preserved for six years after the date of Final Payment or longer if such a claim is pending or threatened at the end of such six years.

If the Authority elects to contest any such claim, it will bear the expense of such contest.

24. PERFORMANCE AND PAYMENT BOND

If the Authority shall in its sole discretion so elect at the time of accepting the Contractor's Proposal, the Contractor shall furnish a bond for the faithful performance of all obligations imposed upon him by the Contract and also for the payment of all lawful claims of subcontractors, materialmen and workmen arising out of the performance of the Contract. Such bond shall be in the form bound herewith entitled, "Performance and Payment Bond", shall be in a penal sum equal to the Estimated Total Contract Price and such bond shall be signed by one or more sureties[19] satisfactory to the Authority. The bond may be executed on a separate copy of such form not physically attached to this Contract booklet. In any case, both the form of bond bound herewith and any unattached executed copy thereof shall form a part of this Form of Contract as though herein set forth in full.

At any time after the opening of Proposals, the Authority may give notice to one or more bidders to advise the Authority as to the names of their proposed sureties. Within forty-eight hours thereafter each bidder so notified shall so advise the Authority. The giving of such notice to a bidder shall not be construed as an acceptance of his Proposal, and omission to give such notice shall not be construed as an election by the Authority not to require a bond.

If the Authority elects to require the Contractor to furnish a bond, he shall deliver such bond to the Authority within seven days after receipt by him of the acceptance of his Proposal, and the sureties thereon shall be as proposed by him, provided, that if the Authority has theretofore given notice to him that his proposed sureties or any of them are not satisfactory, the bond shall be executed by other sureties satisfactory to the Authority.

The Authority shall give notice to the Contractor within ten (10) days after receipt of the Performance and Payment Bond as to whether or not such bond is satisfactory.

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19 Sureties must be corporations (commonly known as "surety companies"), authorized to do business as sureties in the state(s) in which the construction site is located, whose names appear on the current list of the Treasury Department of the United States in effect at the time of submission of the Performance and Payment Bond to the Authority as acceptable as sureties to the Treasury Department. In addition, the aggregate underwriting limitations on any one risk as set forth in the aforementioned list of the Treasury Department of the sureties shall equal or exceed the penal sum of the Performance and Payment Bond.

In the event of a default by the Contractor in his obligation to furnish a satisfactory bond within seven (7) days after he received an acceptance of his Proposal, such default shall entitle the Authority in its discretion to terminate this Contract at any time within forty-five (45) days after the acceptance of the Proposal, without any liability on the part of the Authority. Inasmuch as the damages to the Authority resulting from a termination by it upon the failure of the Contractor to furnish a satisfactory bond will include items whose accurate amount will be difficult or impossible to compute, such damages shall be liquidated in the sum of the following amounts:

A. The excess, if any, of the Estimated Total Contract Price in the Proposal finally accepted over that in the Proposal of the Contractor; and

B. The expense of such new advertisement of the Contract, if any, as may be deemed necessary by the Authority; and

C. The sum of $0 for each day after the receipt by the Contractor of the acceptance of his Proposal that the performance of the Contract is not commenced by reason of the failure of the Contractor to furnish the required bond.

In the recovery of the damages above specified, the Authority may proceed against the sum represented by the certified check deposited with it or against the Bid Bond and take such other action as it may deem best in the public interest.

If the Contractor furnishes a bond in accordance with the requirements of the Authority under this numbered clause, the Authority shall reimburse the Contractor for the net amount actually paid by him to the surety or sureties as the premium on such bond. The Contractor shall deliver to the Engineer receipts from the surety or sureties evidencing such payment and the amount thereof. Within fifteen days after receipt of such evidence satisfactory to the Engineer, the Authority shall pay to the Contractor by check the amount provided in this numbered clause.

If at any time the Authority shall be or become dissatisfied with any surety or sureties then upon any bond furnished in accordance with the requirements of the Authority, or if for any other reason such bond shall cease to be adequate security to the Authority, the Contractor shall, within five days after notice from the Authority so to do, substitute a new bond in such form and sum and signed by such other sureties as may be necessary in the opinion of the Authority to constitute adequate security.

CHAPTER II

COMPENSATION AND PAYMENTS

25. UNIT PRICES AND LUMP SUM

The following Schedule of Unit Prices for Classified Work does not constitute an outline of the Work required by the Contract Drawings and Specifications in their present form, but is merely a list of all the items of Classified Work to be used in computing the Contractor's compensation insofar as it is based upon Classified Work, together with the rates at which such compensation will be computed. In the case of each item of Classified Work, the Work performed will be measured and the Contractor's compensation will be computed as hereinafter provided in this numbered clause. In case of discrepancy between the prices quoted in writing and those quoted in figures, the writing shall control.

The Estimated Total Contract Price is solely for the purpose of fixing the amount of security to be maintained by the Contractor for the faithful performance of the Work. Prior to the signature of the Contract by the parties, it was for the purpose of facilitating the comparison of Proposals and of computing damages in the event of a default by the successful bidder in the agreement created by the acceptance of his Proposal. The estimated quantities are given solely as a basis for the computation of the Estimated Total Contract Price. The Authority makes no representation as to what the actual quantities will be and shall not be held responsible even though the estimated quantities are not even approximately correct. Insofar as the Contractor's compensation is based upon Classified Work, it will be computed from the actual quantities of Work performed, whether greater or less than the estimated quantities.

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK				
			Figures	
Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Unit Prices	Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD One DOLLARS Seventy five CENTS	$1.75	$928,550.00
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD Two DOLLARS Eighty five CENTS	$2.85	$444,600.00
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD One DOLLARS Zero CENTS	$1.00	$686,600.00
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON Eighty nine DOLLARS Zero CENTS	$89.00	$23,006,500.00
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON Eighty three DOLLARS Zero CENTS	$83.00	$6,191,800.00
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT One DOLLARS Zero CENTS	$1.00	$1,030,200.00
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD One DOLLARS Zero CENTS	$1.00	$421,410.00
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT Zero DOLLARS Ten CENTS	$0.10	$76,420.00

20 The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
Twenty Eight Million One Hundred One Thousand ..... Nine Hundred Twenty .....Dollars zero .....Cents	$28,101,920.00

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	$32,786,080.00
LUMP SUM FOR UNCLASSIFIED WORK	$28,101,920.00
ESTIMATED TOTAL CONTRACT PRICE:	[21] $60,888,000.00

The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

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[21] The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

No quantity of work will be included under more than one item of Classified Work.

In the case of Item No. 1 (MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE), the quantity for payment shall be the number of square yards of existing asphalt concrete pavement actually milled 1" from existing surface prior to asphalt concrete paving, measured on the surface of the pavement after milling.

In the case of Item No. 2 (MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE), the quantity for payment shall be the number of square yards of existing asphalt concrete pavement actually milled 3" below finished grade prior to asphalt concrete paving, measured on the surface of the pavement after milling.

In the case of Item No.3 (TACK COAT), the quantity for payment shall be the number of square yards of surface on which tack coat is actually placed, measured on the surface after placement. No deductions from the measured area will be made for catchbasins, manholes or other horizontal structures, and no vertical surfaces will be measured for payment.

In the case of Item No. 4 (ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22), the quantity for payment shall be the number of tons (2,000 pounds) of asphalt concrete mix 3 with modified asphalt PG 76-22 actually placed. The weight of this item shall be based on the certified scale weight of material in trucks weighed on approved scales, or at the option of the Engineer, on certified automated printouts at plants using an automatic batching and mixing system. In case of conflict between the printout weight and the scale weight, the scale weight shall control. Asphalt concrete used to backfill electrical conduit kerfs will not be measured in this item for payment.

In the case of Item No. 5 (WARM MIX ASPHALT CONCRETE MIX 3 PG 64-22), the quantity for payment shall be the number of tons (2,000 pounds) of warm mix asphalt concrete mix 3 PG 64-22 (including additives) actually placed. The weight of this item shall be based on the certified scale weight of material in trucks weighed on approved scales, or at the option of the Engineer, on certified automated printouts at plants using an automatic batching and mixing system. In case of conflict between the printout weight and the scale weight, the scale weight shall control. Asphalt concrete used to backfill electrical conduit kerfs will not be measured in this item for payment.

In the case of Item No. 6 (AIRFIELD PAVEMENT MARKINGS), the quantity for payment shall be the number of square feet of temporary and permanent airfield pavement markings actually placed, measured on the finished surface of the pavement marking.

In the case of Item No. 7 (AIRFIELD PAVEMENT GROOVINGS), the quantity for payment shall be the number of square yards of asphalt concrete pavement actually grooved, measured on the surface after grooving. No areas occupied by the runway and taxiway lighting, splice boxes or existing cable slots will be included in the area for payment as described herein.

In the case of Item No. 8 (REMOVE AIRFIELD PAVEMENT MARKINGS), the quantity for payment shall be the number of square feet of temporary and permanent airfield pavement markings actually removed, not including temporary and permanent pavement markings removed via full depth pavement removal or milling. The quantity for payment shall be measured on the finished surface of the pavement marking.

The Chief Engineer shall have authority to agree in writing with the Contractor for adjustments by way of reduction in the Lump Sum in lieu of those for which provision is heretofore made in this numbered clause.

27. COMPENSATION FOR EXTRA WORK

The Chief Engineer shall have authority to agree in writing with the Contractor on behalf of the Authority upon lump sum or other compensation for Extra Work in lieu of the compensation for which provision is hereinafter made in this numbered clause.

If such agreement on compensation is not made, and Extra Work be performed, the Contractor's compensation shall be increased by the following amounts and such amounts only:

1.) For Extra Work consisting of refuse container services, an amount equal to the actual net cost in money of the labor and materials required for the provision of such services, plus seven per cent (7%) of such net cost.

2.) For Extra Work consisting of performance of construction work at the construction site, an amount determined as follows:

a. In the case of Extra Work performed by the Contractor personally, an amount equal to the actual net cost in money of the labor and materials required for such Extra Work, plus twenty per cent (20%) of such net cost, plus such rental for equipment (other than small tools) required for such Extra Work as the Engineer deems reasonable.

b. In the case of Extra Work performed by a subcontractor, an amount equal to the actual net cost in money of the labor and materials required for such Extra Work, plus twenty per cent (20%) of such net cost plus such rental for equipment (other than small tools) required for such Extra Work as the Engineer deems reasonable, plus seven per cent (7%) of the sum of the foregoing cost, percentage of cost, and rental.

As used in this numbered clause (and in this clause only):

"Refuse Container Services" means the delivery, removal and emptying of refuse containers as required during the performance of Extra Work subject to approval by the Engineer.

"Labor" means foremen, surveyors, laborers, mechanics and other employees below the rank of superintendent, exclusive of timekeepers, directly employed at the construction site, whether employed by the Contractor or by the subcontractors, subject to the Engineer's authority to determine what employees of any category are "required for Extra Work" and as to the portion of their time allotted to Extra Work; and "cost of labor" means the wages actually paid to and received by such employees; however, all wages actually paid that are in excess of the prevailing wages in the performance of Extra Work shall be subject, on each occasion, to the initial and continuing approval of the Engineer in advance of the performance of such Extra Work; plus a proper proportion of (a) vacation allowances and union dues and assessments which the employer actually pays pursuant to contractual obligation upon the basis of such wages, and (b) taxes actually paid by the employer pursuant to law upon the basis of such wages. "Employees" as used above means only the employees of one employer.

"Materials" means temporary and consumable materials as well as permanent materials; and "cost of materials" means the price (including taxes actually paid by the Contractor pursuant to law upon the basis of such materials) for which such materials are sold for cash by the manufacturers or producers thereof, or by regular dealers therein, whether or not such materials are purchased directly from the manufacturer, producer or dealer (or if the Contractor is the manufacturer or producer thereof, the reasonable cost to the Contractor of the manufacture and production), plus the reasonable cost of delivering such materials to the construction site in the event that the price paid to the manufacturer, producer or dealer does not include delivery and in case of temporary materials, less their salvage value, if any.

"Work day" in reference to an item of equipment means a day other than a Saturday, Sunday or legal holiday except that if the particular item of equipment is actually utilized at the construction site by the Contractor or subcontractors under this or any other Contract with the Authority on a Saturday, Sunday or legal holiday said day shall be deemed a work day.

The rental for equipment, whether owned by the Contractor or subcontractors or rented from others and notwithstanding the actual price of any rental or actual costs associated with such equipment, shall be computed by the Engineer on the basis of the following:

A.

1.) Hourly rental for those items of equipment listed in the "Rental Rate Blue Book" published by Machinery Information Division, K-III Directory Corporation, 1735 Technology Drive, Suite 410, San Jose, California 95110, (hereinafter called "the Blue Book"), shall be 100% of the applicable rates as listed in said book, reduced to an hourly basis (see formula below) except that such applicable rates shall be reduced by 50% for all hours of rental payable hereunder in excess of 8 hours each day. The edition of this publication to be used shall be the one in effect on the date of the actual rental of the equipment. The "Estimated Operating Cost per Hour" as set forth for such item of equipment in the Blue Book shall be added to the hourly rental for each hour that such equipment is actually engaged in performing Extra Work. No amount for operating cost will be allowed during periods when such equipment is not actually engaged in performing Extra Work (i.e., standby rental time). None of the provisions of the Blue Book shall be deemed referred to or included in this Contract except as specifically set forth in this Section.

2.) If no listing of rental rate and/or hourly operating cost for the item of equipment is in the Blue Book, the Engineer shall determine the reasonable rate of rental and/or hourly operating cost of the particular item of equipment by such other means as he finds appropriate.

3.) In the event the Contractor is directed by the Engineer to immediately perform Extra Work within 24 hours of the direction to proceed, the Engineer shall determine the reasonable rate of rental and/all hourly operating cost of the items of equipment necessary to perform such Extra Work by such means as he finds appropriate. However, if the equipment is owned by the Contractor or owned by a subsidiary of the Contractor, the Blue Book rates will apply as set forth in this clause.

B. When utilizing the rental rates appearing in the Blue Book, the Engineer shall determine the applicable rate and the hourly rental determined therefrom by applying the following criteria:

1.) The rate to be applied for an item of equipment used on a particular Extra Work order shall be the monthly rates from the foregoing publication.

The pro rata portion which one hour bears to the applicable rate shall be determined in accordance with the following formula:

Hourly rate based on monthly rental.	1/176 of monthly rental from Blue Book

2.) The rental rate shall be multiplied by the applicable regional adjustment factor shown for such item of equipment in the Blue Book. The adjustment factor shall not apply to the hourly operating cost.

3.) If the Engineer should determine that the nature or size of the equipment used by the Contractor in connection with Extra Work is larger or more elaborate, as the case may be, than the size or nature of the minimum equipment determined by the Engineer to be suitable for the Extra Work, the reasonable rental will not be based upon the equipment used by the Contractor but will be based on the smallest or least elaborate equipment determined by the Engineer to have been suitable for the performance of the Extra Work.

C. In the case of equipment utilized only for Extra Work: (a) in addition to amounts determined as provided in subparagraphs A and B above, there will be added to the rental as computed above the taxes on the rental actually paid by the Contractor or subcontractor and the reasonable cost of transporting such equipment to and from the construction site, including applicable tolls, and (b) notwithstanding the number of hours during which such equipment is utilized, the minimum rental therefor will be for a period of eight hours.

In computing the Contractor's compensation insofar as it is based upon Extra Work, and notwithstanding any provision to the contrary appearing in the Blue Book, no consideration shall be given to any items of cost or expense not expressly set forth above, it being expressly agreed that the costs and percentage additions hereinbefore provided cover items of cost and expense to the Contractor of any type whatsoever, including administration, overhead, taxes (other than those enumerated above), clean-up, consumables including gas and oil, drafting (including printing or other reproduction), coordination, field measurements, maintenance, repairs, insurance, profit to the Contractor and small tools.

Whenever any Extra Work is performed (whether by the Contractor directly or through a subcontractor), the Contractor shall, at the end of each day, submit to the Engineer (a) daily time slips showing the name and number of each workman employed on such Work, the number of hours which he is employed thereon, the character of his duties, and the wages to be paid to him, (b) a memorandum showing the state and federal taxes based on such wages, and vacation allowances and union dues and assessments which the employer actually pays pursuant to contractual obligation upon the basis of such wages (c) a memorandum showing the amount and character of the materials furnished for such Work, from whom they were purchased and the amount to be paid therefor, and (d) a memorandum of equipment used in the performance of such Work, listing the actual hours of operation for each piece of equipment, together with the rental claimed therefor. Such memoranda and time slips are for the purpose of enabling the Engineer to determine the amounts to be paid by the Authority under this numbered clause; and accordingly, they shall constitute a condition precedent to such payment and the failure of the Contractor or his subcontractors to furnish them with respect to any Work shall constitute a conclusive and binding determination on his part that such Work is not Extra Work and shall constitute a waiver by the Contractor of claims for payment for such Work. The Contractor's compensation for Extra Work shall be subject to audit review by the Authority. The Engineer will notify the Contractor that an audit review will be conducted no later than 90 days from the date of such notification. The Engineer will also provide the Contractor with an estimated duration of the audit. During the audit review, the Contractor shall provide records to substantiate the memorandum and time slips submitted to the Engineer. Failure to provide such Contractor or subcontractor records may result in a reduction or total denial of material, equipment and labor costs for Extra Work. Upon completion of the audit review, the Contractor will be provided with the audit findings of the Authority. If the Contractor disagrees in whole or in part with the audit findings, the Contractor shall notify the Authority of such disagreement in writing within 30 days of receipt of said audit findings or the Authority will deem the audit findings to be final and acceptable to the Contractor. In the event that the Chief Engineer and the Contractor shall agree in writing upon a lump sum or other compensation for Extra Work in lieu of compensation as provided in the second paragraph of this clause, the daily time slips and memoranda required by this paragraph shall not be required subsequent to the date on which such agreement has been reached.

28. COMPENSATION FOR PREMIUM TIME

Where the Engineer directs that the Contractor perform Work at times other than those elsewhere specified in the Contract, and the Contractor directly or through a subcontractor is obligated by the provisions of its applicable collective bargaining agreement to pay premium time rates for such Work then, the Contractor shall be compensated for the cost differential between regular time rates and premium time rates at an amount equal to the total of the following:

A. For premium time rates paid by the Contractor to its own forces, an amount equal to the premium time portion of the salaries and wages which the employer is required to pay and actually pays to its employees pursuant to the terms of its applicable collective bargaining agreement for the overtime period or periods described above, plus a proper proportion, if any, computed upon the basis of premium time salaries and wages of (1) taxes actually paid by the employer pursuant to law, (2) vacation allowances, other fringe benefits and union dues and assessments which the employer actually pays pursuant to contractual obligations, and (3) increased premiums paid by the Contractor personally, specifically allocable to the insurance required by this Contract, plus five per cent (5%) of such premium portion.

B. For premium time rates paid by a subcontractor, an amount equal to the premium time portion of the salaries and wages which the employer is required to pay and actually pays to its employees pursuant to the terms of its applicable collective bargaining agreement for the overtime period or periods described above, plus a proper proportion, if any, computed upon the basis of premium time salaries and wages of (1) taxes actually paid by the employer pursuant to law, (2) vacation allowances, other fringe benefits and union dues and assessments which the employer actually pays pursuant to contractual obligations, and (3) increased premiums paid by a subcontractor, specifically allocable to the insurance required by this Contract, plus five per cent (5%) of such premium portion, plus two per cent (2%) of the foregoing cost.

All additions to the Contractor's compensation provided for in this clause require the prior written approval of the Engineer and are conditioned on the Contractor's verifiable by the Authority payment of such amounts to his subcontractor.

The additions to the Contractor's compensation provided in this clause shall not apply where the Engineer directs the Contractor to perform work at times other than those specified elsewhere in the Contract and also determines that such work is required to mitigate previous delays in the Contractor's performance of Work.

29. COMPENSATION FOR EMERGENCY DELAYS

If the Contractor is specifically directed by the Engineer to suspend his operations as stipulated in the Section of Division 1 of the Specifications entitled "Airport Operations And Conditions" or if the Contractor is specifically directed not to start his operations at a time when operations are permitted to start as stipulated in such Section, and if solely because of such suspension or direction not to start any of the Contractor's or subcontractor's employees or equipment then engaged in or about to start such Work are necessarily kept idle at the construction site, during the hours when they would otherwise be engaged in the performance of the Work, then the Contractor's compensation shall be increased by an amount equal to the salaries and wages in amounts approved by the Engineer which the employer is required to pay and actually pays to such employees for the period or periods of such idleness, plus a proper proportion of (a) taxes actually paid by the employer pursuant to law upon the basis of such salaries and wages, and (b) vacation allowances and union dues and assessments which the employer actually pays pursuant to contractual obligations upon the basis of such salaries and wages, and in addition thereto such rental as the Engineer deems reasonable for such equipment during the period or periods of such idleness. The rental for idle equipment shall be computed by the Engineer in accordance with the provisions of the clause of the Form of Contract entitled "Idle Salaried Men and Equipment".

In the event that the Contractor deems that any payment should be made pursuant to this numbered clause, he shall give prompt written notice to the Engineer stating the reasons why he believes such payments should be made and shall moreover, furnish to the Engineer at the end of each day, a memorandum showing the name, payroll title, salary rate and employer of each of the workingmen, and description, owner and claimed rental rate for each item of equipment claimed to have been kept idle. Said notice and memorandum are for the purpose of enabling the Engineer to verify the Contractor's claim at the time. Accordingly, notwithstanding any other provisions hereof, the failure of the Contractor to furnish such notice and memorandum shall constitute a conclusive binding determination on his part that he is not entitled to compensation as provided herein and shall constitute a waiver by the Contractor of all claims for such payment, such notice and memorandum being conditions precedent to payment under this numbered clause.

30. MONTHLY ADVANCES

On or about the first and fifteenth day of each month, the Engineer shall (upon receipt from the Contractor of such information as he may require, including a certification in writing, in such form as may be required pursuant to the clause hereunder entitled "Prevailing Rate of Wage", that he has paid and caused his subcontractors to pay at least the prevailing rate of wage and supplements required by such clause) estimate and certify to the Authority the approximate amount of Work performed and compensation earned by the Contractor up to that time showing separately:

A. The approximate amount of Classified Work performed by the Contractor up to that time and a sum determined from such Work in accordance with the units of measurement and unit prices specified in the Schedule of Unit Prices.

B. The approximate amount of Unclassified Work (other than Extra Work) performed by the Contractor up to that time and a sum bearing the same proportion to the Lump Sum as the Unclassified Work performed (other than Extra Work) bears to the total amount of such Work performed and to be performed (other than Extra Work), and

C. The increases, if any, in the Contractor's compensation for which provision is specifically made elsewhere in this Contract.

As an aid to the Contractor and to facilitate his performance, the Authority shall, within fifteen days after the receipt of each suchmonthly certificate, advance to the Contractor by check the sums so certified, minus, however, five per cent (5%) of the sum certified pursuant to subparagraphs A and B of this numbered clause, and minus all prior advances and payments to the Contractor or for his account.

Within ten calendar days of receipt of any sum attributable to Work performed by a subcontractor or materialman, the Contractor shall advance to the subcontractor or materialman said sum, less such amount, if any, as the Contractor is authorized to retain under the subcontract or purchase agreement.

Within ten calendar days of the satisfactory completion of Work performed by a subcontractor or materialman, the Contractor shall release the amount, if any, the Contractor was authorized to retain under the subcontract or purchase agreement.

Notwithstanding the above, the Authority shall have the right, at its sole discretion, to directly pay the subcontractors and material suppliers who perform Work for or furnish materials to the Contractor in connection with the Work of this Contract.

Prior to certifying any amount for payment hereunder, the Engineer may require that the Contractor submit a certification accurately and fully setting forth the total amount due and payable to each subcontractor and supplier for Work performed or materials provided by such subcontractor or supplier in connection with the Work of this Contract. Any payment made by the Authority to a subcontractor or supplier pursuant to the provisions of this numbered clause shall be made in reliance upon such certification and all such payments shall be considered as advances to the Contractor of the compensation payable hereunder. No such payment shall relieve the Contractor of any of its obligations hereunder.

Furthermore, within fifteen (15) days of the Contractor's receipt of the Authority acceptance of the Contractor's Proposal, the Contractor shall submit to the Engineer a listing of all subcontract and material supply agreements entered into by the Contractor for the performance of Work required by this Contract. Such listing shall include the names and addresses of each such subcontractor and supplier and the amounts payable under each such agreement. As and when any modifications are made to such agreements or any additional subcontracts or supply agreements are entered into, the Contractor shall inform the Engineer of such and shall indicate the amounts payable thereunder.

Nothing contained herein shall be deemed to create any additional rights in such subcontractors or suppliers or to alter the rights of the Authority as such are set forth in the clause hereof entitled "Withholding of Payments".

31. RELEASE OF MONIES PREVIOUSLY WITHHELD FROM MONTHLY ADVANCES UPON RENDITION OF A CERTIFICATE OF SUBSTANTIAL COMPLETION

After the rendition of the Certificate of Substantial Completion and with the approval of the Engineer, an amount up to 80% of the total amount of monies withheld from the Contractor's monthly advances in accordance with the preceding clause may be released to the Contractor. If, in the Engineer's judgment, no monies, or less than 80% of the total amount of monies withheld should be released it will be based on, but not limited to, the estimated value of the remaining Work, unresolved claims by subcontractors, the estimate of possible audit adjustments and an assessment of the risks to the Authority in making such a release of monies. This clause does not create a right to such a release of monies or to any specific percentage release, all of which shall remain purely the discretionary decision of the Engineer.

Prior to the release of any amount withheld from the Contractor's monthly advances by the Authority, the Contractor shall submit to the Engineer a certification of all unresolved requests for additional compensation including all items in dispute and potential claims which the Contractor had actual knowledge of or by reasonable inspection and inquiry should have known of, to the date of the certification. Any such items not made known to the Authority by inclusion in the certification of additional compensation requests submitted by the Contractor will be deemed to have been released by the Contractor. Notwithstanding the above provisions, before making any release of monies the Engineer may require the Contractor to submit further information for the Engineer's review and analysis, and shall require the Contractor to execute a separate written release of claims as described above in a form acceptable to the Authority.

Nothing contained herein shall be deemed to alter or diminish the rights of the Authority as such are set forth in the clauses hereof entitled "Withholding of Payments", "Final Payment", "Monthly Advances" or under any other clause of this Contract relating to compensation to the Contractor, any release of monies hereunder being purely at the discretion of the Engineer.

32. FINAL PAYMENT

After the rendition of the Certificate of Final Completion and upon receipt from the Contractor of such information as may be required, the Engineer shall certify in writing to the Authority and to the Contractor the total compensation earned by the Contractor.

If so required, the Contractor shall thereupon (i) certify to the Authority in writing, in such form as may be required pursuant to the clause hereunder entitled "Prevailing Rate of Wage", that he has paid and caused his subcontractors to pay at least the prevailing rate of wage and supplements required by such clause and (ii) furnish to the Authority a detailed sworn statement of all claims, just and unjust, of subcontractors, materialmen and other third persons then outstanding and which he has reason to believe may thereafter be made on account of the Work.

Within thirty days after issuance of such certificate of total compensation earned (or within thirty days after receipt of the documents provided for in the immediately preceding paragraph, if required), the Authority shall pay to the Contractor by check the amount stated in said certificate, less all other payments and advances whatsoever to or for the account of the Contractor. All prior estimates and payments shall be subject to correction in this payment, which is throughout this Contract called the Final Payment.

The acceptance by the Contractor, or by anyone claiming by or through him, of Final Payment shall be and shall operate as a release to the Authority of all claims and of all liability to the Contractor for all things done or furnished in connection with the Contract and for every act and neglect of the Authority and others relating to or arising out of the Contract, including claims arising out of breach of contract and claims based on claims of third persons, excepting only his claims for reimbursement for certain sales taxes as hereinbefore provided. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations in connection with this Contract or the Performance and Payment Bond.

The Contractor's agreement as provided in the immediately preceding paragraph above shall be deemed to be based upon the consideration forming part of this Contract as a whole and not to be gratuitous; but in any event even if deemed gratuitous and without consideration, such agreement as provided in the immediately preceding paragraph above shall nevertheless be effective. Such release shall include all claims, whether or not in litigation and even though still under consideration by the Authority or the Engineer. Such release shall be effective notwithstanding any purported reservation of right by the Contractor to preserve such claim. The acceptance of any check designated as "Final Payment" or bearing any similar designation shall be conclusively presumed to demonstrate the intent of the Contractor that such payment was intended to be accepted as final, with the consequences provided in this numbered clause, notwithstanding any purported reservation of rights.

The Contractor agrees that he shall not be entitled to, and hereby waives any right he might otherwise have to, and shall not seek any judgment whether under this Contract or otherwise for any such Final Payment or for an amount equivalent thereto or based thereon, or for any part thereof, if such judgment would have the effect of varying, setting aside, disregarding or making inapplicable the terms of this numbered clause or have the effect in any way of entitling the Contractor to accept such Final Payment or an amount equivalent thereto or based thereon or any part thereof other than in the same fashion as a voluntary acceptance of a Final Payment subject to all the terms of this Contract including this numbered clause, unless and until the Contractor should obtain a judgment on any claim arising out of or in connection with this Contract (including a claim based on breach of contract) for an amount not included in said Final Payment. In any case in which interest is allowable on the amount of the Final Payment, such interest shall be at the rate of 6% per annum for the period, if any, in which such interest is due.

33. WITHHOLDING OF PAYMENTS

If (1) the Contractor fails to perform any of his obligations under this Contract or any other agreement between the Authority and the Contractor (including his obligation to the Authority to pay any claim lawfully made against him by any materialman, subcontractor or workman or other person which arises out of or in connection with the performance of this Contract or any other agreement with the Authority) or (2) any claim (just or unjust) which arises out of or in connection with this Contract or any other agreement between the Authority and the Contractor is made against the Authority or (3) any subcontractor under this Contract or any other agreement between the Authority and the Contractor fails to pay any claims lawfully made against him by any materialman, subcontractor, workman or other third person which arises out of or in connection with this Contract or any other agreement between the Authority and the Contractor or if in the opinion of the Chief Engineer any of the aforesaid contingencies is likely to arise, then the Authority shall have the right, in its discretion, to withhold out of any payment (final or otherwise and even though such payment has already been certified as due) such sums as the Chief Engineer may deem ample to protect it against delay or loss or to assure the payment of just claims of third persons, and to apply such sums in such manner as the Chief Engineer may deem proper to secure such protection or satisfy such claims. All sums so applied shall be deducted from the Contractor's compensation. Omission by the Authority to withhold out of any payment, final or otherwise, a sum for any of the above contingencies, even though such contingency has occurred at the time of such payment, shall not be deemed to indicate that the Authority does not intend to exercise its right with respect to such contingency. Neither the above provisions for rights of the Authority to withhold and apply monies nor any exercise or attempted exercise of, or omission to exercise, such rights by the Authority shall create any obligation of any kind to such materialmen, subcontractors, workmen or other third persons.

Until actual payment to the Contractor, his right to any amount to be paid under this Contract (even though such amount has already been certified as due) shall be subordinate to the rights of the Authority under this numbered clause.

In the event that wages and/or supplements have been paid in an amount less than as required by this Contract, the Authority shall also have the right to withhold from the Contractor out of any payment, final or otherwise, on this, or any other open contract that the Contractor has with the Authority, so much as may be necessary to pay to laborers, mechanics, architects, draftsmen, engineers and technical workers, and others employed on the Work, the difference between the sums such persons should have received as wages and/or supplements and the amounts they actually received, and to pay such sums over to such persons. All such payments shall be deemed to be payments for the Contractor's account. In addition, the Contractor shall be required to pay to the Authority an amount equal to the Authority's cost of any investigation conducted by or on behalf of the Authority, that discovers a failure to pay wages and/or supplements as required by this Contract by the Contractor or its subcontractors, the cost of such investigation to be determined by the Chief Engineer personally. If the Contractor fails or refuses to pay for the cost of any such investigation after demand by the Authority, the Authority may deduct from any amount payable to the Contractor by the Authority, under the Contract or under any other open contract between the Contractor and the Authority, an amount equal to the cost of such investigation.

If, however, the payment of any amount due to the Contractor shall be improperly delayed by the fault of the Authority, the Authority shall pay the Contractor interest thereon at the rate of six percent (6%) per annum for the period of delay, it being agreed that such interest shall be in lieu of and in liquidation of any damages to the Contractor because of such delay.

CHAPTER III

PROVISIONS RELATING TO TIME

34. TIME FOR COMPLETION AND DAMAGES FOR DELAY

The Contractor shall complete the performance of all Work under this Contract in accordance with the Division 1 clause entitled "Hours of Work and Construction Staging" and as follows:

I. For Stage I shown on Contract Drawing CS002:

a. Complete all Work in Stage 1A and Stage 1D required for the Work areas to be reopened to Air Operations by 5:30 AM each day.

b. Complete all Work in Stage 1A and Stage 1D required for the Work areas to be reopened to Air Operations by 11:00 PM Sunday at the end of each two-week closure.

c. Complete all Work, except pavement grooving, within 214 calendar days after receipt by him of the acceptance of his Proposal.

II. For Stage 2 shown on Contract Drawing CS003:

a. Complete all Work required for the Work area to be reopened to Air Operations by 5:30 AM each day.

b. Complete all Work required for the Work area to be reopened to Air Operations by 11:00 PM Sunday at the end of each 48-hour weekend closure.

c. Complete all Work within 275 calendar days after receipt by him of the acceptance of his Proposal.

III. Complete all Work in Stage 3 shown on Contract Drawing CS004, except pavement grooving, within 396 calendar days after receipt by him of the acceptance of his Proposal.

IV. For Stage 4 shown on Contract Drawing CS005:

a. Complete all Work required for the Work area to be reopened to Air Operations by 5:30 AM each day.

b. Complete all Work required for the Work area to be reopened to Air Operations by 11:00 PM Sunday at the end of each 48-hour weekend closure.

c. Complete all Work within 730 calendar days after receipt by him of the acceptance of his Proposal.

V. Complete all remaining Work within 730 calendar days after receipt by him of the acceptance of his Proposal.

The Contractor shall not commence the performance of the Work until the later of the following dates:

B. If a Performance and Payment Bond is required, the date of receipt by him of notice from the Authority that the Performance and Payment Bond furnished by him is satisfactory;

C. If Chapter V of the "Form of Contract" contains a clause entitled "Insurance Procured by Contractor", the date of receipt by him of notice from the Authority that the insurance procured by him pursuant to said clause is satisfactory, as evidenced by the certificate to be furnished in accordance with said clause.

The time for completion shall not be extended on account of the time required to furnish the documents referred to in subparagraphs A and B above, but the Authority shall give notice to the Contractor within ten days after receipt of the Performance and Payment Bond or certificate of insurance as to whether or not such bond or insurance is satisfactory.

The Contractor's obligations for the performance and completion of the Work within the time or times provided for in this Contract are of the essence of this Contract. The Contractor guarantees that he can and will complete the performance of the Work within the time hereinbefore stipulated or within the time as extended in accordance with the clause hereof entitled "Extensions of Time". Inasmuch as the damage and loss to the Authority which will result from delay in completing the performance of the Work within the time herein stipulated will include items of loss whose amount will be incapable or very difficult of accurate estimation, the damages to the Authority for each calendar day by which the Contractor does not complete performance of the Work within the time or times above stipulated or within such time or times as extended in accordance with the clause hereof entitled "Extensions of Time", shall be liquidated in the sum of the following amounts:

D. Five Thousand Dollars ($5,000) for each hour by which the Contractor fails to complete the Work in accordance with subparagraphs I a. and I b. above.

E. Twenty Thousand Dollars ($20,000) for each calendar day by which the Contractor fails to complete the Work in accordance with subparagraph I c. above.

F. Five Thousand Dollars ($5,000) for each hour by which the Contractor fails to complete the Work in accordance with subparagraphs II a. and II b. above.

G. Five Thousand Dollars ($5,000) for each calendar day by which the Contractor fails to complete the Work in accordance with subparagraph II c. above.

H. Twenty Thousand Dollars ($20,000) for each calendar day by which the Contractor fails to complete the Work in accordance with subparagraph III above.

I. Five Thousand Dollars ($5,000) for each hour by which the Contractor fails to complete the Work in accordance with subparagraph IV a. and IV b. above.

J. Twenty Thousand Dollars ($20,000) for each calendar day by which the Contractor fails to complete the Work in accordance with subparagraph IV c. above.

K. One Thousand Five Hundred Dollars ($1,500) for each calendar day by which the Contractor fails to complete the Work in accordance with subparagraph V above.

The liquidated damages under subparagraphs A through H above shall be cumulative.

35. EXTENSIONS OF TIME

The time above provided for completion of any part of the Contract shall be extended (subject, however, to the provisions of this numbered clause) only if in the opinion of the Engineer the Contractor is necessarily delayed in completing such part by such time solely and directly by a cause which meets all the following conditions:

A. Such cause is beyond the Contractor's control and arises without his fault;

B. Such cause comes into existence after the opening of Proposals on this Contract and neither was nor could have been anticipated by investigation before such opening.

Variations in temperature and precipitation shall be conclusively deemed to have been anticipated before opening of such Proposals on this Contract except to the extent that the actual monthly average temperature varies from a temperature which is 10 per cent (10%) above or below the monthly normal temperature and except to the extent that the actual number of days of precipitation (of 0.1 inch or more) per month exceeds a number equal to two plus the normal number of days of precipitation per month.

In any case, the variations in temperature and precipitation described in the immediately preceding sentence will be cause for an extension of time only if occurring between the actual time of commencement of the Work at the construction site and the time for completion stipulated in the clause hereof entitled "Time for Completion and Damages for Delay" (or such time as extended as provided for herein). In the case of portions of months the number of days will be pro-rated by the Engineer. Temperature and precipitation shall be as recorded by the U. S. Weather Bureau in its publications, including that entitled "Local Climatological Data with Comparative Data", which is applicable to the area in which the Work is to be performed, and in the case of precipitation, the normal number of days of precipitation (of 0.1 inch or more) per month as abstracted from the aforementioned publications are as follows:

Month	**Normal number of days per month on which precipitation exceeds 0.1 inch**
January	7
February	7
March	8
April	7
May	6
June	6
July	5
August	7
September	6
October	6
November	7
December	7

In any event, even though a cause of delay meets all the above conditions, an extension shall be granted only to the extent that (i) the performance of the Work is actually and necessarily delayed and (ii) the effect of such cause cannot be anticipated and avoided or mitigated by the exercise of all reasonable precautions, efforts and measures (including planning, scheduling and rescheduling), whether before or after the occurrence of the cause of delay, and an extension shall not be granted for a cause of delay which would not have affected the performance of the Contract were it not for the fault of the Contractor or for other delay for which the Contractor is not entitled to an extension of time.

Any reference herein to the Contractor shall be deemed to include subcontractors and materialmen, whether or not in privity of contract with the Contractor, and employees and others performing any part of the Contract and all the foregoing shall be considered as agents of the Contractor.

The period of any extension of time shall be that necessary to make up the time actually lost, subject to the provisions of this numbered clause, and shall be only for the portion of the Contract actually delayed. The Engineer may defer all or part of his decision on an extension and any extension may be rescinded or shortened if it subsequently is found that the delays can be overcome or reduced by the exercise of reasonable precautions, efforts and measures.

As a condition precedent to an extension of time, the Contractor shall give written notice to the Engineer within 48 hours after the time when he knows or should know of any cause which might under any circumstances result in delay for which he claims or may claim an extension of time (including those causes which the Authority is responsible for or has knowledge of), specifically stating that an extension is or may be claimed, identifying such cause and describing, as fully as practicable at the time, the nature and expected duration of the delay and its effect on the various portions of the Contract. Since the possible necessity for an extension of time may materially alter the scheduling, plans and other actions of the Authority, and since, with sufficient opportunity, the Authority might if it so elects attempt to mitigate the effect of a delay for which an extension of time might be claimed, and since merely oral notice may cause disputes as to the existence or substance thereof, the giving of written notice as above required shall be of the essence of the Contractor's obligations and failure of the Contractor to give written notice as above required shall be a conclusive waiver of an extension of time.

It shall in all cases be presumed that no extension, or further extension, of time is due unless the Contractor shall affirmatively demonstrate to the satisfaction of the Engineer that it is. To this end the Contractor shall maintain adequate records supporting any claim for an extension of time, and in the absence of such records, the foregoing presumption shall be deemed conclusive.

36. IDLE SALARIED MEN AND EQUIPMENT

If any salaried men or equipment of the Contractor or any subcontractor are necessarily kept continuously idle and wholly unoccupied at the construction site for a full day on each of two or more full days on which they would be engaged in the performance of the Work but for causes due solely to acts or omissions of the Authority or the Engineer occurring after the opening of Proposals on this Contract, and if such idleness is not due to any cause within the control of the Contractor or of any of his subcontractors or materialmen or his or their employees, then the Authority shall pay to the Contractor and the Contractor shall accept (in addition to any sums otherwise payable under this Contract, and in full satisfaction of and in liquidation of all claims for damages because of such act or omission of the Authority or the Engineer) an amount equal to that which the employer actually pays such salaried employees during such full days of idleness, plus a proper proportion of vacation allowances and union dues and assessments actually paid by the employer pursuant to contractual obligations on the basis of such salaries, and a proper proportion of the taxes actually paid by the employer pursuant to law upon the basis of such salaries and plus such rental for such idle equipment as the Engineer deems reasonable. The rental for idle equipment shall be computed by the Engineer in accordance with the provisions of the clause of the Form of Contract entitled "Compensation for Extra Work"; provided, however, that the seven per cent (7%) of the rental to be paid in accordance with said clause in the case of equipment utilized by subcontractors shall not be payable in connection with such idle equipment; and provided further that the provisions of subparagraph C of said clause shall not be applicable to such idle equipment.

The Contractor shall give written notice to the Engineer before the end of the second of the above mentioned 2 or more full days (whether or not the Authority is aware of the existence of any circumstances which might constitute a basis for payment under this numbered clause), specifically stating that salaried men or equipment have been kept idle under circumstances which might result in payment under this numbered clause; and he shall furnish with such notice, for all the days that have occurred, and shall in addition furnish at the end of each additional day of the above mentioned 2 or more full days, (a) a memorandum showing the name, payroll title, salary rate and employer of each of the salaried men claimed to have been kept idle at the construction site, and taxes based upon their salaries and the holiday and vacation allowances and union dues and assessments which the employer must actually pay pursuant to contractual obligations based on their salaries, and (b) a memorandum of the equipment claimed to be kept idle, together with the amount claimed as rental therefor. Said notice and memoranda are for the purpose of enabling the Engineer to verify the Contractor's claim at the time, and of enabling him to take such steps as may be necessary to remedy the conditions upon which the claim is based. The furnishing of such notice and memoranda shall be a condition precedent to payment under this numbered clause, so that the day on which notice is given shall be counted as not later than the second of the above mentioned 2 or more full days and no subsequent day shall be counted for which the above memoranda are not furnished at the end of such day.

37. DELAYS TO CONTRACTOR

As between the Contractor and the Authority, the Contractor assumes the risk of all suspensions of or delays in performance of the Contract, regardless of the length thereof, arising from all causes whatsoever, whether or not relating to this Contract, including wrongful acts or omissions of the Authority, its officers, agents, employees and contractors, except only to the extent, if any, that compensation or an extension of time may be due as expressly provided for elsewhere in this Contract for such suspension or delays and except to the extent, if any, that compensation may be agreed to by the Chief Engineer in writing pursuant to the clause hereof entitled "Compensation for Extra Work" for impact costs incurred by the Contractor in connection with the performance of Extra Work. Subject only to such exceptions, the Contractor shall bear the burden of all costs, expenses and liabilities which he may incur in connection with such suspensions or delays, and all such suspensions, delays, costs, expenses and liabilities of any nature whatsoever, whether or not provided for in this Contract, shall conclusively be deemed to have been within the contemplation of the parties.

Notwithstanding any provisions of this Contract, whether relating to time of performance or otherwise, the Authority makes no representation or guaranty as to when the construction site or any part thereof will be available for the performance of the Contract or as to whether conditions at the construction site will be such as to permit the Contract to be performed thereon without interruption or by any particular sequence or method or as to whether the performance of the Contract can be completed by the time required under this Contract or by any other time.

Wherever in connection with this Contract it is required, expressly or otherwise, that the Authority shall perform any act relating to the Contract, including making available or furnishing any real property, materials, or other things, no guaranty is made by the Authority as to the time of such performance and the delay of the Authority in fulfilling such requirement shall not result in liability of any kind on the part of the Authority except only to the extent, if any, that an extension of time or compensation may be due as expressly provided for elsewhere in this Contract.

38. CANCELLATION FOR DELAY

If the performance of the Contract or any portion of it shall, in the opinion of the Chief Engineer, be materially delayed, whether or not through the fault of the Contractor, by any cause which affects the Contractor's ability to perform the Contract without affecting to the same degree the Authority's own ability to perform it, either directly or through others, the Authority shall have the right at any time during the existence of such delay to cancel this Contract as to any portion not yet performed, without prejudice to the rights, liabilities and obligations of the parties under this Contract arising out of portions already performed, provided, however, that such right of cancellation shall not exist if the delay be due to any wrongful act or omission of the Authority. In the event of such cancellation, no allowance shall be made for anticipated profits.

CHAPTER IV

CONDUCT OF CONTRACT

39. AUTHORITY OF DIRECTOR

If at any time it shall be, from the viewpoint of the Authority, impracticable or undesirable in the judgment of the Director to proceed with or continue the performance of the Contract or any part thereof, whether or not for reasons beyond the control of the Authority, he shall have authority to suspend performance of any part or all of the Contract until such time as he may deem it practicable or desirable to proceed. Moreover, if at any time it shall be, from the viewpoint of the Authority impracticable or undesirable in the judgment of the Director to proceed with or continue the performance of the Contract or any part thereof whether or not for reasons beyond the control of the Authority, he shall have authority to cancel this Contract as to any or all portions not yet performed and as to any materials not yet installed even though delivered. Such cancellation shall be without prejudice to the rights and obligations of the parties arising out of portions already performed, but no allowance shall be made for anticipated profits.

40. AUTHORITY OF CHIEF ENGINEER

Inasmuch as the public interest requires that the project to which this Contract relates shall be performed in the manner which the Authority, acting through the Chief Engineer, deems best, the Chief Engineer shall have absolute authority to determine what is or is not necessary or proper for or incidental to the portion thereof specified in the clause hereof entitled "General Agreement" and the Contract Drawings and Specifications shall be deemed merely his present determination on this point. In the exercise of this authority, he shall have power to alter the Contract Drawings and Specifications; to require the performance of Work not required by them in their present form, even though of a totally different character from that now required; and to vary, increase and diminish the character, quantity and quality of, or to countermand, any Work now or hereafter required. Such variation, increase, diminution or countermanding need not be based on necessity but may be based on convenience.

To resolve all disputes and to prevent litigation the parties to this Contract authorize the Chief Engineer to decide all questions of any nature whatsoever arising out of, under, or in connection with, or in any way related to or on account of, this Contract (including claims in the nature of breach of Contract or fraud or misrepresentation before or subsequent to acceptance of the Contractor's Proposal and claims of a type which are barred by the provisions of this Contract) and his decision shall be conclusive, final and binding on the parties. His decision may be based on such assistance as he may find desirable. The effect of his decision shall not be impaired or waived by any negotiations or settlement offers in connection with the question decided, whether or not he participated therein himself, or by any prior decision of the Engineer or others, which prior decisions shall be deemed subject to review, or by any termination or cancellation of this Contract provided, however, that notwithstanding the decision reached by the Chief Engineer in a review of determinations by the Assistant Chief Engineer for Construction or Engineer of Construction or Engineer that a particular item of Work is not Extra Work the Contractor shall be compensated therefor as provided in written orders of the Assistant Chief Engineer for Construction or Engineer of Construction or Engineer expressly and unmistakably indicating his intention to treat Work described therein as Extra Work issued in accordance with the provisions of the clause hereof entitled "Extra Work Orders" for amounts not in excess of $250,000.

All such questions shall be submitted in writing by the Contractor to the Chief Engineer for his decision, together with all evidence and other pertinent information in regard to such questions, in order that a fair and impartial decision may be made. In any action against the Authority relating to any such question the Contractor must allege in his complaint and prove such submission, which shall be a condition precedent to any such action. No evidence or information shall be introduced or relied upon in such an action that has not been so presented to the Chief Engineer.

This numbered clause shall be governed by and construed in accordance with the law of the State of New York, without giving effect to its choice of law provisions.

41. AUTHORITY AND DUTIES OF ENGINEER

In the performance of the Contract, the Contractor shall conform to all orders, directions and requirements of the Engineer and shall perform the Contract to the satisfaction of the Engineer at such times and places, by such methods and in such manner and sequence as he may require, and the Contract shall at all stages be subject to his inspection. The Engineer shall determine the amount, quality, acceptability and fitness of all parts of the Work and shall interpret Contract Drawings, Specifications and any orders for Extra Work. The Contractor shall employ no equipment, materials, methods or men to which the Engineer objects, and shall remove no materials, equipment or other facilities from the construction site without permission. Upon request, the Engineer shall confirm in writing any oral order, direction, requirements or determination.

The Contractor is requested to orally advise the Engineer of questions as they arise. Although such advice will not substitute for the written notice and information for which requirements are set forth elsewhere herein, it is anticipated that it will facilitate prompt decisions on the part of the Engineer and others.

The enumeration herein or in the Specifications of particular instances in which the opinion, judgment, discretion or determination of the Engineer shall control or in which the Contract shall be performed to his satisfaction or subject to his inspection, shall not imply that only the matters of a nature similar to those enumerated shall be so governed and performed, but without exception the entire Contract shall be so governed and so performed.

42. NOTICE REQUIREMENTS

No claim against the Authority shall be made or asserted in any action or proceeding at law or in equity, and the Contractor shall not be entitled to allowance of such claim, unless the Contractor shall have complied with all requirements relating to the giving of written notice of the information with respect to such claim as provided in this numbered clause. The failure of the Contractor to give such written notice and information as to any claim shall be conclusively deemed to be a waiver by the Contractor of such claim, such written notice and information being conditions precedent to such claim. As used herein "claim" shall include any claim arising out of, under, or in connection with, or in any way related to or on account of, this Contract (including claims in the nature of breach of Contract or fraud or misrepresentation before or subsequent to acceptance of the Contractor's Proposal and claims of a type which are barred by the provisions of this Contract) for damages, payment or compensation of any nature or for extension of any time for performance of any part of this Contract.

The requirements as to the giving of written notice and information with respect to claims shall be as follows:

A. In the case of any claims for Extra Work, extension of time for completion, idle salaried men and equipment, or any other matter for which requirements are set forth elsewhere in this Contract as to notice and information, such requirements shall apply.

B. In the case of all other types of claim, notice shall have been given to the Engineer, personally, as soon as practicable, and in any case, within 48 hours, after occurrence of the act, omission, or other circumstance upon which the claim is or will be based, stating as fully as practicable at the time all information relating thereto. Such information shall be supplemented with any further information as soon as practicable after it becomes or should become known to the Contractor, including daily records showing all costs which the Contractor may be incurring or all other circumstances which will affect any claim to be made, which records shall be submitted to the Engineer, personally.

The above requirements for notices and information are for the purpose of enabling the Authority to avoid waste of public funds by affording it promptly the opportunity to cancel or revise any order, change its plans, mitigate or remedy the effects of circumstances giving rise to a claim or take such other action as may seem desirable and to verify any claimed expense or circumstances as they occur, and the requirements herein for such notice and information are essential to this Contract and are in addition to any notice required by statute with respect to suits against the Authority.

The above referred to notices and information are required whether or not the Authority is aware of the existence of any circumstances which might constitute a basis for a claim and whether or not the Authority has indicated it will consider a claim.

No act, omission, or statement of any kind shall be regarded as a waiver of any of the provisions of this numbered clause or may be relied upon as such waiver except only either a written statement signed by the Executive Director of the Authority or a resolution of the Commissioners of the Authority expressly stating that a waiver is intended as to any particular provision of this numbered clause, and more particularly no discussion, negotiations, consideration, correspondence, or requests for information with respect to a claim by any Commissioner, officer, employee or agent of the Authority shall be construed as a waiver of any provision of this numbered clause or as authority or apparent authority to effect such a waiver.

Since merely oral notice or information may cause disputes as to the existence or substance thereof, and since notice, even if written, to other than the Authority representative above designated to receive it may not be sufficient to come to the attention of the representative of the Authority with the knowledge and responsibility of dealing with the situation only notice and information complying with the express provisions of this numbered clause shall be deemed to fulfill the Contractor's obligation under this Contract.

43. EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this Contract, the Contractor agrees as follows:

A. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, sex, color or national origin, and will take affirmative action to insure that they are afforded equal employment opportunities without discrimination because of race, creed, sex, color or national origin. Such action shall be taken with reference, but not be limited to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training.

B. The Contractor shall send to each labor union or representative of workers with which he has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commission for Human Rights, advising such labor union or representative of the Contractor's agreement under A. through H. of this numbered clause (hereinafter called "non-discrimination requirements"). If the Contractor was directed to do so by the Authority as part of the bid or negotiation of this Contract, the Contractor shall request such labor union or representative to furnish him with a written statement that such labor union or representative will not discriminate because of race, creed, sex, color or national origin and that such labor union or representative either will affirmatively cooperate, within the limits of its legal and contractual authority, in the implementation of the policy and provisions of these non-discrimination requirements or that it consents and agrees that recruitment, employment, and the terms and conditions of employment under this Contract, shall be in accordance with the purposes and provisions of these non-discrimination requirements. If such labor union or representative fails or refuses to comply with such a request that it furnish such a statement, the Contractor shall promptly notify the State Commission for Human Rights of such failure or refusal.

C. The Contractor shall post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commission for Human Rights setting forth the substance of the provisions of A. and B. herein and such provisions of the State's laws against discrimination as the State Commission for Human Rights shall determine.

D. The Contractor shall state, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, sex, color or national origin.

E. The Contractor shall comply with the provisions of Sections 291-299 of the Executive Law and the Civil Rights Law, shall furnish all information and reports deemed necessary by the State Commission for Human Rights under these non-discrimination requirements and such sections of the Executive Law, and shall permit access to his books, records and accounts by the State Commission for Human Rights, the Attorney General and the Industrial Commissioner for the purposes of investigation to ascertain compliance with these non-discrimination requirements and such sections of the Executive Law and Civil Rights Law.

F. This Contract may be forthwith canceled, terminated or suspended, in whole or in part, by the Authority upon the basis of a finding made by the State Commission for Human Rights that the Contractor has not complied with these non-discrimination requirements, and the Contractor may be declared ineligible for future contracts made by or on behalf of the State, the Authority or other public authority or agency of the State, until he has satisfied the State Commission for Human Rights that he has established and is carrying out a program in conformity with the provisions of these non-discrimination requirements. Such finding shall be made by the State Commission for Human Rights after conciliation efforts by the Commission have failed to achieve compliance with these non-discrimination requirements and after a verified complaint has been filed with the Commission, notice thereof has been given to the Contractor by the Commission and an opportunity has been afforded him to be heard publicly before the State Commissioner of Human Rights or his designee. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law.

G. The Contractor shall include the provisions of A. through F. above in every subcontract or purchase order in such a manner that such provisions will be binding upon each subcontractor or vendor as to operations to be performed within the State of New York. The Contractor shall take such action in enforcing such provisions of such subcontract or purchase order as the Authority may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the Authority, the Contractor shall promptly so notify the General Counsel to the Authority, requesting him to intervene and protect the interests of the Authority.

H. The provisions of this numbered clause which refer to the State Commission for Human Rights, the Attorney General and the Industrial Commissioner are inserted in this Contract for the benefit of such parties, as well as for the benefit of the Authority, and said Commission, Commissioner and the Attorney General shall have a direct right of action against the Contractor to effectuate the intent of this clause.

44. AFFIRMATIVE ACTION PROGRAMS

The Contractor assures that he will undertake an affirmative action program as required by 14 CFR Part 152, Subpart E, to insure that no person shall on the grounds of race, creed, color, national origin, or sex be excluded from participating in any employment activities covered in 14 CFR Part 152, Subpart E. The Contractor assures that no person shall be excluded on these grounds from participating in or receiving the services or benefits of any program or activity covered by this subpart. The Contractor assures that he will require that his covered suborganizations provide assurances to the Contractor that they similarly will undertake affirmative action programs and that they will require assurances from their suborganizations, as required by 14 CFR Part 152, Subpart E, to the same effect.

45. PREVAILING RATE OF WAGE

The Contractor shall pay or provide (and shall cause all subcontractors to pay or provide) to his or their workmen, laborers and mechanics (who are employed by him or them to work on an hourly or daily basis at any trade or occupation at or about the construction site) at least the prevailing rate of wage and supplements for others engaged in the same trade or occupation in the locality in which the Work is being performed as determined by the Engineer.

The provisions of this numbered clause are inserted in this Contract for the benefit of such workmen, laborers and mechanics as well as for the benefit of the Authority; and if the Contractor or any subcontractor shall pay or provide any such workman, laborer or mechanic less than the rates of wages and supplements above described, such workman, laborer or mechanic shall have a direct right of action against the Contractor or such subcontractor for the difference between the wages and supplements actually paid or provided and those to which he is entitled under this clause. If such workman, laborer or mechanic is employed by any subcontractor whose subcontract does not contain a provision substantially similar to the provisions of this clause (requiring the payment or provision of at least the above minimum, and providing for a cause of action in the event of the subcontractor's failure to pay or provide such wages and supplements) such workman, laborer or mechanic shall have a direct right of action against the Contractor. The Authority shall not be a necessary party to any action brought by any workman, laborer or mechanic to obtain a money judgment against the Contractor or any subcontractor pursuant to this numbered clause.

Nothing herein contained shall be construed to prevent the Contractor or any subcontractor from paying higher rates of wages or providing higher supplements than the minimum hereinbefore prescribed; and nothing herein contained shall be construed to constitute a representation or guarantee that the Contractor or any subcontractor can obtain workmen, laborers and mechanics for the minimum herein before prescribed. All wages actually paid that are in excess of the prevailing wages in the performance of Extra Work and Net Cost Work, if applicable, shall be subject, on each occasion, to the initial and continuing approval of the Engineer in advance of the performance of such Extra Work and Net Cost Work, if applicable.

The Contractor shall post at the Work site, in a place that is prominent, accessible and visible to all employees of the Contractor and his subcontractors during the daily time period that the Contractor and/or subcontractor performs Work at the site, the appropriate prevailing wage and supplement schedules. The Contractor must inform all employees, including those of his subcontractors, that they may obtain a copy of the prevailing wage and supplement schedule from the Contractor.

The Contractor and every subcontractor shall make and maintain weekly payroll records during the course of the Work and for the period set forth in the clause hereof entitled "Authority Access to Records" for all employees employed in the Work. Such records shall contain the name, address and last four digits of the social security number of each such employee (Contractors and subcontractors must maintain the full social security number of each employee and shall provide them upon request to the Port Authority Inspector General), the employee's correct payroll classification, rate of pay and supplements, daily and weekly number of hours worked, deductions made and actual wages and supplements paid. The Contractor shall submit these weekly payroll records to the Authority (on forms furnished by the Authority) of all his payroll records and those of each of his subcontractors as the Authority may require with the Contractor's monthly Payment Application, together with an affidavit by the Contractor and by each subcontractor to the effect that such payroll records are correct and complete, the wage and supplement rates contained therein are not less than those required by the provisions of this Contract, and the classifications set forth for each employee conform with the Work performed. Such copies and summaries and the original payroll records shall be available for inspection by the Authority (including its Inspector General), and the Contractor and his subcontractors shall permit such representatives to interview employees during Work hours at the construction site.

The Engineer may at any time request the Contractor to prepare a daily report on the Authority form entitled *Contractor Daily Sign-In Sheet*, copies of which can be obtained from the Engineer. The *Contractor Daily Sign-In Sheet* shall be completed as follows:

1.) At the beginning of each workday the Contractor shall:

a. fill in the top of the *Contractor Daily Sign-In Sheet*, including the location, date, contractor/subcontractor name and contract number;

b. ensure that each employee, including those of subcontractors, has printed and signed his or her name and indicated his or her work classifications, the last four digits of his or her social security number, and his or her starting time;

2.) At the end of each workday, the Contractor shall:

a. ensure that each employee, including those of subcontractors, has signed out and indicated his or her ending time;

b. sign the Certification Statement at the bottom of the form to indicate that the information contained in the *Contractor Daily Sign-In Sheet* is true and accurate; and

c. submit the original completed form to the Engineer's representative.

The Contractor's failure to comply with any provision of this numbered clause shall be deemed a substantial breach of this Contract.

46. MINIMUM WAGE RATES

At the direction of the Federal Aviation Administration, the attention of bidders is directed particularly to the Schedule of Minimum Wage Rates attached to the Contract and made a part hereof.

The minimum wage rates as established by the Secretary of Labor are subject to change at any time before the award of the Contract except that if the change is made within five days after the opening of Proposals and the award is made within thirty days after the Proposals are opened, or ninety days after the date of wage decisions, whichever is earlier, the change is not effective. Such a change is necessary in order to comply with a decision of the U. S. Department of Labor.

47. EXTRA WORK ORDERS

No Extra Work of a cost in excess of $250,000 shall be performed except pursuant to written orders of the Chief Engineer expressly and unmistakably indicating his intention to treat the Work described therein as Extra Work; and, no Extra Work of a cost of $250,000 or less shall be performed except pursuant to written orders of the Chief Engineer, Assistant Chief Engineer for Construction, Engineer of Construction or Engineer expressly and unmistakably indicating his intention to treat the Work described therein as Extra Work.

In the absence of such an order signed by the Chief Engineer in the case of Extra Work of a cost in excess of $250,000 and by the Chief Engineer or Assistant Chief Engineer for Construction or Engineer of Construction or Engineer in the case of Extra Work of a cost of $250,000 or less, if the Engineer shall direct, order or require any Work, whether orally or in writing, which the Contractor deems to be Extra Work, the Contractor shall nevertheless comply therewith, but shall within twenty-four (24) hours give written notice thereof to the Chief Engineer and the Engineer, stating why he deems it to be Extra Work, and shall moreover furnish to the Engineer time slips and memoranda as required by the clause hereof entitled "Compensation for Extra Work". Said notice, time slips and memoranda are for the purpose of affording to the Chief Engineer an opportunity to verify the Contractor's claim at the time and (if he desires so to do) to cancel promptly such order, direction or requirement of the Engineer, of affording to the Engineer an opportunity of keeping an accurate record of the materials, labor and other items involved, and generally of affording to the Authority an opportunity to take such action as it may deem desirable in light of the Contractor's claims. Accordingly, the failure of the Contractor to serve such notice or to furnish such time slips and memoranda shall be deemed to be a conclusive and binding determination on his part that the direction, order or requirement of the Engineer does not involve the performance of Extra Work, and shall be deemed to be a waiver by the Contractor of all claims for additional compensation or damages by reason thereof, such written notice, time slips and memoranda being a condition precedent to such claims.

48. PERFORMANCE OF EXTRA WORK

The provisions of this Form of Contract relating generally to Work and its performance shall apply without exception to any Extra Work required and to the performance thereof. Moreover, the provisions of the Specifications relating generally to the Work and its performance shall also apply to any Extra Work required and to the performance thereof, except to the extent that a written order in connection with any particular item of Extra Work may expressly provide otherwise.

49. TITLE TO MATERIALS

All materials to become part of the permanent construction shall be and become the property of the Authority upon delivery at the construction site or upon being especially adapted for use in or as a part of the permanent construction, whichever may first occur, subject however to the Contractor's assumption of risk under the clause hereof entitled "Risks Assumed by the Contractor", subparagraph A.

The Contractor shall promptly furnish to the Authority such bills of sale and other instruments as may be required by it, properly executed, acknowledged and delivered, assuring to it title to such materials, free of encumbrances and shall mark or otherwise identify all such materials as the property of the Authority.

50. ASSIGNMENTS AND SUBCONTRACTS

Any assignment or other transfer by the Contractor of this Contract or any part hereof or of any of his rights hereunder or of any monies due or to become due hereunder and any delegation of any of his duties hereunder without the express consent in writing of the Authority shall be void and of no effect as to the Authority, provided, however, that the Contractor may subcontract portions of the Work to such persons as the Engineer may, from time to time, expressly approve in writing. For each individual, partnership or corporation proposed by the Contractor as a subcontractor, the Contractor shall submit to the Authority a certification or, if a certification cannot be made, a statement by such person, partnership or corporation to the same effect as the certification or statement required from the Contractor pursuant to the clauses of the "Information For Bidders" entitled "Certification of No Investigation (Criminal or Civil Anti-Trust), Indictment, Conviction, Suspension, Debarment, Disqualification, Prequalification Denial or Termination, Etc; Disclosure of Other Required Information", "Non-Collusive Bidding and Code of Ethics Certification; Certification of No Solicitation Based on Commission, Percentage, Brokerage, Contingent Fee or Other Fee" and "Certification of Participation in a State-Registered Apprenticeship Program". The Certification of Participation in a State-Registered Apprenticeship Program shall only be applicable to each subcontractor whose total amount of subcontract under this Contract is greater than $1 million. All further subcontracting by any subcontractor shall also be subject to such approval of the Engineer. Approval of a subcontractor may be conditioned on (among other things) the furnishing, without expense to the Authority, of a surety bond guaranteeing payment by the subcontractor of claims of materialmen, subcontractors, workmen and other third persons arising out of the subcontractor's performance of any part of the Work. Approval of a subcontractor may be rescinded for, among other things, failure of the Contractor to furnish the subcontractor's certificate of insurance, as required by the Form of Contract clause entitled "Insurance Procured by Contractor", within the time set forth in said clause.

No consent to any assignment or other transfer, and no approval of any subcontractor, shall under any circumstances operate to relieve the Contractor of any of his obligations; no subcontract, no approval of any subcontractor and no act or omission of the Authority or the Engineer shall create any rights in favor of such subcontractor and against the Authority; and as between the Authority and the Contractor, all assignees, subcontractors, and other transferees shall for all purposes be deemed to be agents of the Contractor. Moreover, all subcontracts and all approvals of subcontractors shall be and, regardless of their form, shall be deemed to be conditioned upon performance by the subcontractor in accordance with this Contract; and if any subcontractor shall fail to perform the Contract to the satisfaction of the Engineer, the Engineer shall have the absolute right to rescind his approval forthwith and to require the performance of the Contract by the Contractor personally or through other approved subcontractors.

51. CLAIMS OF THIRD PERSONS

The Contractor undertakes to pay all claims lawfully made against him by subcontractors, materialmen and workmen, and all claims lawfully made against him by other third persons arising out of or in connection with or because of the performance of this Contract and to cause all subcontractors to pay all such claims lawfully made against them.

52. CERTIFICATES OF PARTIAL COMPLETION

If at any time prior to the rendition of the Certificate of Final Completion, any portion of the permanent construction has been satisfactorily completed, and if in the judgment of the Engineer such portion of the permanent construction is not necessary for the operations of the Contractor but will be immediately useful to and is needed by the Authority for other purposes, the Engineer may render to the Authority and to the Contractor a certificate in writing to that effect (herein called a Certificate of Partial Completion), and thereupon or at any time thereafter the Authority may take over and use the portion of the permanent construction described in such Certificate and exclude the Contractor therefrom.

The rendition of a Certificate of Partial Completion shall not be construed to constitute an extension of the Contractor's time to complete the portion of the permanent construction to which it relates in the event that he has failed to complete the same in accordance with the terms of this Contract. Moreover, the acceptance of a Certificate of Partial Completion by the Authority shall not operate to release the Contractor or his sureties from any obligations under or upon this Contract or the Performance and Payment Bond.

53. CERTIFICATE OF SUBSTANTIAL COMPLETION

Prior to the rendition of the Certificate of Final Completion, the Engineer may deem the entire Work to be substantially completed when, in the judgment of the Engineer, the permanent construction has been satisfactorily completed to the point where the Work is fit for its intended purpose and use. The Engineer may, if such a determination of substantial completion is made and at such time, render to the Authority and to the Contractor a certificate in writing to that effect (herein called the Certificate of Substantial Completion), and thereupon or at any time thereafter the Authority may take over and use the permanent construction described in such Certificate and exclude the Contractor therefrom. Whether to make a determination of a substantial completion as to any portion of the Work, and whether to render such a Certificate, shall be the discretionary determination of the Engineer based upon an examination and appraisal of the completed Work, and no right to such a determination or certification is established in the Contractor by this provision.

The rendition of such Certificate of Substantial Completion shall not relieve the Contractor of his obligation hereunder to complete the Work of this Contract nor shall it be construed to constitute an extension of the Contractor's time to complete the portion of the permanent construction to which it relates in the event that he has failed to complete the same in accordance with the terms of this Contract. Moreover, the acceptance of a Certificate of Substantial Completion by the Authority shall not operate to release the Contractor or his sureties from any obligations under or upon this Contract or the Performance and Payment Bond.

When the Contractor is of the opinion that the Work is substantially complete as described above, the Contractor may submit to the Engineer a written request that the Engineer inspect the Work so as to determine, in the Engineer's sole opinion, whether substantial completion has been achieved. The Contractor's written request shall list the specific items of Work that are incomplete. Upon such a request, the Engineer will respond within 30 days with a Certificate of Substantial Completion or provide a written explanation of the reasons why the Work is not substantially complete including a list of open items necessary to achieve substantial completion. Nothing contained herein shall be deemed to preclude the Engineer from making a determination of substantial completion in the absence of a request therefor by the Contractor.

54. CERTIFICATE OF FINAL COMPLETION

After the satisfactory completion of all Work whatsoever required and the making of such tests and inspections as may be necessary or desirable, the Engineer shall render to the Authority and to the Contractor a certificate in writing (herein called the Certificate of Final Completion) certifying that in his opinion all Work under this Contract including Extra Work, has been completed in accordance with the Contract Drawings and Specifications and the requirements of the Engineer, and certifying the date as of which it was so completed.

The rendition of the Certificate of Final Completion shall not be construed to constitute an extension of the Contractor's time for performance in the event that he has failed to complete the Work in accordance with the terms of this Contract. Moreover, the acceptance of the Certificate of Final Completion by the Authority shall not operate to release the Contractor or his sureties from any obligations under or upon this Contract or the Performance and Payment Bond.

55. NO GIFTS, GRATUITIES, OFFERS OF EMPLOYMENT, ETC.

During the term of this Contract, the Contractor shall not offer, give or agree to give anything of value either to an Authority employee, agent, job shopper, consultant, construction manager or other person or firm representing the Authority, or to a member of the immediate family (i.e, a spouse, child, parent, brother or sister) of any of the foregoing, in connection with the performance by such employee, agent, job shopper, consultant, construction manager or other person or firm representing the Authority of duties involving transactions with the Contractor on behalf of the Authority, whether or not such duties are related to this Contract or any other Authority contract or matter. Any such conduct shall be deemed a material breach of this Contract.

As used herein "anything of value" shall include but not be limited to any (a) favors, such as meals, entertainment, transportation (other than that contemplated by the Contract or any other Authority contract), etc., which might tend to obligate the Authority employee to the Contractor, and (b) gift, gratuity, money, goods, equipment, services, lodging, discounts not available to the general public, offers or promises of employment, loans or the cancellation thereof, preferential treatment or business opportunity. Such term shall not include compensation contemplated by this Contract or any other Authority contract.

Where used in this clause, the term "Authority" shall be deemed to include all subsidiaries of the Authority. Currently, those subsidiaries are the Port Authority Trans-Hudson Corporation (PATH), the Newark Legal and Communications Center and the New York and New Jersey Railroad Corporation.

In addition, during the term of this Contract, the Contractor shall not make an offer of employment or use confidential information in a manner proscribed by the Code of Ethics and Financial Disclosure dated as of April 11, 1996 (a copy of which is available upon request to the Office of the Secretary of the Authority).

The Contractor shall include the provisions of this clause in each subcontract entered into under this Contract.

CHAPTER V

WARRANTIES MADE AND LIABILITY

ASSUMED BY THE CONTRACTOR

56. CONTRACTOR'S WARRANTIES

The Contractor represents and warrants:

A. That he is financially solvent, that he is experienced in and competent to perform the type of services contemplated by this Contract, that the facts stated or shown in any papers submitted or referred to in connection with his Proposal are true, and, if the Contractor be a corporation, that it is authorized to perform this Contract;

B. That he has carefully examined and analyzed the provisions and requirements of this Contract and inspected the construction site, that from his own investigations he has satisfied himself as to the nature of all things needed for the performance of this Contract, the general and local conditions and all other matters which in any way affect this Contract or its performance, and that the time available to him for such examination, analysis, inspection and investigations was adequate;

C. That the Contract is feasible of performance in accordance with all its provisions and requirements and that he can and will perform it in strict accordance with such provisions and requirements;

D. That no Commissioner, officer, agent or employee of the Authority is personally interested directly or indirectly in this Contract or the compensation to be paid hereunder; and

E. That, except only for those representations, statements or promises expressly contained in this Contract, no representation, statement or promise, oral or in writing, of any kind whatsoever by the Authority, its Commissioners, officers, agents, employees or consultants has induced the Contractor to enter into this Contract or has been relied upon by the Contractor, including any with reference to: (1) the meaning, correctness, suitability, or completeness of any provisions or requirements of this Contract; (2) the nature, existence or location of materials, structures, obstructions, utilities or conditions, surface or subsurface, which may be encountered at the construction site; (3) the nature, quantity, quality or size of the materials, equipment, labor and other facilities needed for the performance of this Contract; (4) the general or local conditions which may in any way affect this Contract or its performance; (5) the price of the Contract; or (6) any other matters, whether similar to or different from those referred to in (1) through (5) immediately above, affecting or having any connection with this Contract, the bidding thereon, any discussions thereof, the performance thereof or those employed therein or connected or concerned therewith.

Moreover, the Contractor accepts the conditions at the construction site as they may eventually be found to exist and warrants and represents that he can and will perform the Contract under such conditions and that all materials, equipment, labor and other facilities required because of any unforeseen conditions (physical or otherwise) shall be wholly at his own cost and expense, unless specifically provided for elsewhere in this Contract.

Nothing in the Contract Drawings or Specifications or any other part of the Contract is intended as or shall constitute a representation by the Authority as to the feasibility of performance of this Contract or any part thereof. Moreover, the Authority does not warrant or represent either by issuance of the Contract Drawings and Specifications or by any provision of this Contract as to time for performance or completion or otherwise that the Contract may be performed or completed by the times required herein or by any other times.

The Contractor further represents and warrants that he was given ample opportunity and time and by means of this paragraph was requested by the Authority to review thoroughly all documents forming this Contract prior to opening of Proposals on this Contract in order that he might request inclusion in this Contract of any statement, representation, promise or provision which he desired or on which he wished to place reliance; that he did so review said documents, that either every such statement, representation, promise or provision has been included in this Contract or else, if omitted, that he expressly relinquishes the benefit of any such omitted statement, representation, promise or provision and is willing to perform this Contract without claiming reliance thereon or making any other claim on account of such omission.

The Contractor further recognizes that the provisions of this numbered clause (though not only such provisions) are essential to the Authority's consent to enter into this Contract and that without such provisions, the Authority would not have entered into this Contract.

57. RISKS ASSUMED BY THE CONTRACTOR

The Contractor assumes the following distinct and several risks, whether they arise from acts or omissions (whether negligent or not) of the Contractor, of the Authority, or of third persons, or from any other cause, and whether such risks are within or beyond the control of the Contractor, excepting only risks which arise solely from affirmative acts done by the Authority subsequent to the opening of Proposals on this Contract with actual and wilful intent to cause the loss, damage and injuries described in subparagraphs A through D below:

A. The risk of loss or damage to the permanent construction prior to the rendition of the Certificate of Final Completion (other than loss or damage to the portions of the permanent construction with respect to which Certificates of Partial Completion have been issued), and the Contractor shall forthwith repair, replace and make good any such loss or damage to the permanent construction without cost to the Authority;

B. The risk of loss, damage to or alterations of the structures to be demolished occurring prior to completion of demolition by the Contractor (such structures being still included, however, in the term "Work"). In the event of such loss, damage or alterations, the Contractor shall nevertheless complete the performance of the Work, including the demolition, without additional cost to the Authority and without compensation for lost salvage value;

C. The risk of claims, fines or penalties, just or unjust, made by third persons or assessed by courts or governmental agencies or entities against the Contractor or the Authority on account of injuries (including wrongful death), loss, damage or liability of any kind whatsoever arising or alleged to arise out of or in connection with the performance of the Work (whether or not actually caused by or resulting from the performance of the Work) or out of or in connection with the Contractor's operations or presence at or in the vicinity of the construction site or Authority premises, including claims against the Contractor or the Authority for the payment of workers' compensation, whether such claims, fines or penalties are made or assessed and whether such injuries, damage, loss and liability are sustained at any time both before and after the rendition of the Certificate of Final Completion;

D. The risk of loss or damage to any property of the Contractor, and of claims made against the Contractor or the Authority for loss or damage to any property of subcontractors, materialmen, workmen and others performing the Work, occurring at any time prior to completion of removal of such property from the construction site or Authority premises or the vicinity thereof.

The Contractor shall indemnify the Authority against all claims described in subparagraphs C and D above and for all expense incurred by it in the defense, settlement or satisfaction thereof, including expenses of attorneys, except where indemnity would be precluded by New York State General Obligations Law, Section 5-322.1 or by other applicable law. If so directed, the Contractor shall defend against any claim described in subparagraphs C and D above, in which event he shall not without obtaining express advance permission from the General Counsel of the Authority raise any defense involving in any way jurisdiction of the tribunal, immunity of the Authority, governmental nature of the Authority or the provisions of any statutes respecting suits against the Authority . Unless a claim is one which the Contractor is not required to indemnify the Authority against as described in the first sentence of this paragraph, such defense shall be at the Contractor's cost.

The provisions of this numbered clause shall also be for the benefit of the Commissioners, officers, agents and employees of the Authority, so that they shall have all the rights which they would have under this numbered clause if they were named at each place above at which the Authority is named, including a direct right of action against the Contractor to enforce the foregoing indemnity, except, however, that the Authority by action of its Board of Commissioners may at any time in its sole discretion and without liability on its part cancel the benefit conferred on any of them by this numbered clause, whether or not the occasion for invoking such benefit has already arisen at the time of such cancellation.

Neither the issuance of a Certificate of Completion nor the making of Final Payment shall release the Contractor from his obligations under this numbered clause. Moreover, neither the enumeration in this numbered clause nor the enumeration elsewhere in this Contract of particular risks assumed by the Contractor or of particular claims for which he is responsible shall be deemed (a) to limit the effect of the provisions of this numbered clause or of any other clause of this Contract relating to such risks or claims, (b) to imply that he assumes or is responsible for risks or claims only of the type enumerated in this numbered clause or in any other clause of this Contract, or (c) to limit the risks which he would assume or the claims for which he would be responsible in the absence of such enumerations.

58. NO THIRD PARTY RIGHTS

Nothing contained in this Contract is intended for the benefit of third persons, except to the extent that the Contract specifically provides otherwise by use of the words "benefit" or "direct right of action".

59. INSURANCE PROCURED BY THE AUTHORITY

In order to reduce the cost of this Contract, the Authority will procure and will maintain in force and pay the premiums on:

A. A policy of public liability (Comprehensive - Commercial General Liability, including Contractual) insurance on which the Contractor and the subcontractors will be insureds issued by an insurance company satisfactory to the Authority, with current coverage limits of $50 million per occurrence for bodily injury and property damage liability.

B. A policy of workers' compensation and employer's liability insurance fulfilling the Contractor's and the subcontractor's obligations under the applicable State Workers' Compensation Law for those employees of the Contractor and the subcontractors employed pursuant to this Contract in operations conducted at the site of the Work hereunder. Coverage under this policy may, as appropriate, include one or more of the following endorsements:

1.) Longshore and Harbor Workers' Compensation Act Coverage Endorsement. (Applies when performing work on or around navigable waters).

2.) Maritime Coverage Endorsement (Applies to masters or members of the crews of vessels, if vessels are used).

3.) Federal Employer's Liability Act Coverage Endorsement. (May apply to railroad related Work).

Determination in any instance as to the appropriateness of the included coverage described in B.1, 2 and 3 above will be made based upon information to be provided by the Contractor relating to the mode of performance of Work to be done under the Contract.

The policy described in B above will not provide coverage for any workers' compensation for the Contractor and/or subcontractors who perform any asbestos work. In such cases, the Contractor or subcontractors shall procure and maintain, at their own expense, the workers' compensation insurance in accordance with the requirements of law in the state(s) where the Work will take place, including employer's liability insurance (in limits of not less than $1 million per occurrence).

Should the Contractor and/or subcontractors be required to procure the workers' compensation insurance, within ten days after the acceptance of his Proposal the Contractor shall deliver to the General Manager, Risk Financing, The Port Authority of NY & NJ, Treasury Department, 225 Park Avenue South, 12th Floor, New York, N.Y. 10003 (Attn: Contract Insurance Review), an original certificate, stating the Contract number, from the insurer. A duplicate certificate evidencing the above insurance shall also be delivered to the Engineer. With regard to insurance required to be procured by a subcontractor, the Contractor shall deliver the certificate described above at least ten days before the subcontractor commences Work.

The requirements for insurance procured by the Contractor or subcontractors shall not in any way be construed as a limitation on the nature or extent of the obligations of the Contractor or subcontractors.

C. A policy of builder's risk insurance, covering the improvements or other Work to be effectuated by the Contractor and the subcontractors, with coverage limits of $50 million per occurrence for all locations combined (subject to a $50 million annual aggregate for flood and earthquake damage and a limit of $10 million per occurrence for damage to off-site storage and property in-transit). The deductible is $10,000 per occurrence for all losses except those caused by flood and earthquake, where a $50,000 deductible per occurrence with respect to flood, and a $25,000 deductible per occurrence with respect to earthquake are in effect. The policy form contains various exclusions, including but not limited to the following property exclusions: automobiles; aircraft; and Contractor's and subcontractors' machinery, tools, and equipment and property of a similar nature, including forms, shoring, scaffolding, temporary structures, rental property/equipment and similar property, not intended to become a permanent part of a building or structure. The Contractor and the subcontractors must refer to the policy form to determine all properties and perils included and excluded and to determine their rights and responsibilities as insureds under the policy form. The Contractor and the subcontractors are responsible for payment for all losses within the deductibles and losses not covered by the builder's risk policies.

The current policies described in A, B and C of this numbered clause are available for examination by appointment in the office of the General Manager, Risk Financing, The Port Authority of NY & NJ, Treasury Department, 225 Park Avenue South, 12th Floor, New York, N.Y. 10003. The policies under A above are subject to certain liability coverage exclusions, which include, but are not limited to, exclusions from liability from claims arising from pollution and exposure to asbestos.

The Contractor and subcontractors shall comply with all obligations of the insured under or in connection with all of the policies described in A, B and C above.

The Authority shall have the right at any time and from time to time at its option to procure insurance substituting in whole or in part for any or all of the policies described in A, B and C above or to require that the Contractor and the subcontractors themselves obtain insurance substituting in whole or part for that above referred to, provided always, however, that the Contractor and the subcontractors shall be afforded coverage as stipulated by the Authority and the Authority shall either pay the premiums on such substitute insurance or reimburse the Contractor and the subcontractors therefor.

Neither the procurement of the above insurance or any substitute insurance nor the extent of the coverage or the limits of liability thereunder shall be construed to be a limitation on the nature or extent of the Contractor's obligations, or to relieve the Contractor of any such obligations, and the procurement of the above insurance is only for the purpose of reducing the cost of the Contract without constituting any representation by the Authority as to the adequacy of the insurance to protect the Contractor against the obligations imposed on the Contractor by law (except the applicable State Workers' Compensation Law) or by this or any other contract.

Notwithstanding any provision of this clause, however, no subcontractor shall be or have the right to be covered under the policies of insurance above referred to until the subcontractor has been expressly approved in writing by the Engineer, as required under this Contract, and such approval may be withheld, among other reasons, until execution by the subcontractor of agreements affirming his obligations provided in this clause with respect to the above insurance.

The provisions of this numbered clause are not intended to create any rights for the Contractor other than rights which may be available to the Contractor under said policies themselves, whatever such rights may be. Moreover, the Authority makes no representation or guaranty, either by the provisions of this numbered clause or otherwise, as to the effect of or the coverage under said policies, and no employee or agent of the Authority is authorized to make any such representation or guaranty, either by the provisions of this numbered clause or otherwise, as to the effect of or the coverage under said policies, and no employee or agent of the Authority is authorized to make any such representation or guaranty or to offer any interpretation of or information on said policies. The Contractor warrants and represents that he has examined and is familiar with the above stated coverages and that in submitting his Proposal he has relied solely on his own interpretation thereof and not on any representations or statements, oral or written, of the Authority, its Commissioners, officers, agents, employees, consultants or contractors.

All negotiations and adjustments with any insurer concerning payment for any loss, the risk of which is borne by the Contractor under this Contract, shall be the responsibility of and shall be conducted by the Contractor unless the applicable policy provides otherwise. The Contractor shall, however, inform the Engineer of the progress of all such negotiations and notify the Engineer sufficiently in advance of all meetings thereon so that the Engineer or designated representatives may attend said negotiations if they so desire.

The Authority shall be entitled to all returned premiums, dividends and credits which may become payable at any time for any reason whatsoever in connection with the aforementioned insurance. The Contractor hereby assigns to the Authority all such returned premiums, dividends and credits and the subcontractors shall be deemed to have assigned to the Authority all such returned premiums, dividends and credits by becoming subcontractors under this Contract. The Contractor shall execute and cause the subcontractors to execute any instrument necessary or convenient to evidence the Authority's right to such returned premiums, dividends and credits.

Notwithstanding any payment by the Authority of any insurance premiums, the Authority shall not be deemed the employer of any employees hired by the Contractor or any subcontractor covered by such insurance nor shall it be liable for any of the obligations of such employer.

The Contractor and the subcontractors shall cooperate to the fullest extent with the Authority in all matters relating to the aforementioned insurance and shall comply with all requirements of all insurance policies procured by the Authority. They shall also at their own expense furnish the Engineer or a duly authorized representative with copies of all payrolls, correspondence, papers, records and other things necessary or convenient for dealing with or defending against any claims and for procuring or administering the aforementioned insurance including furnishing the name of any of their employees, officers, or agents whose presence or testimony is necessary or convenient in any negotiations or proceedings involving such insurance.

60. INSURANCE PROCURED BY CONTRACTOR

The Contractor, and all subcontractors, shall maintain and pay the premiums on the policy or policies of insurance for coverage(s) as hereinafter described, which shall cover their operations hereunder, shall be effective throughout the effective period of this Contract, and shall afford coverage(s) in not less than the amounts set forth below:

A. Commercial Automobile Liability Insurance: covering "any" vehicles on the broadest commercially available form:

1.) Vehicles operating in the Air Operations Area without an authorized escort require a Combined single limit for bodily injury and property damage liability – $25 million per each accident.

2.) Vehicles operating in the Air Operations Area with an authorized escort require a Combined single limit for bodily injury and property damage liability - $5 million per each accident.

3.) Vehicles operating outside of the Air Operations Area require a Combined single limit for bodily injury and property damage liability - $2 million per each accident.

The Port Authority of New York and New Jersey and its related entities shall be named as an additional insured in the liability policy or policies and evidenced by the certificate(s) of insurance set forth above. The liability policy(ies) and the certificate(s) of insurance shall show coverage for cross-liability/severability of interests as provided under the standard ISO "separation of insureds" condition.

The Contractor shall deliver certified copies of the policy(ies) described above or certificate(s) of insurance evidencing the existence thereof to the Engineer at the location where the Work will be performed, within ten (10) days after the acceptance of his Proposal. Such policy(ies) or certificate(s) shall state the Contract number and shall contain a valid provision or endorsement that the policy(ies) may not be canceled, terminated, changed or modified without giving thirty (30) days written advance notice thereof to the Authority.

Such policy(ies) and certificate(s) of insurance shall contain an additional endorsement providing that "the insurance carrier shall not, without obtaining express advance permission from the General Counsel of the Authority, raise any defense involving in any way the jurisdiction of the Tribunal over the person of the Authority, the immunity of the Authority, its Commissioners, officers, agents or employees, the governmental nature of the Authority or the provisions of any statutes respecting suits against the Authority".

Certified copies of all renewal policies or certificates evidencing their existence shall be delivered to the Engineer at the location where the Work will be performed at least ten (10) days prior to the expiration date of each expiring policy. If at any time any of the certificates or policies shall be or become unsatisfactory to the Authority as to form or substance, or if the carrier issuing any such certificate or policy shall be or become unsatisfactory to the Authority, the Contractor shall promptly obtain a new and satisfactory certificate and policy. Upon request of the General Manager, Risk Financing, the Contractor shall furnish the Authority with a certified copy of each policy stated above.

The requirements for insurance procured by the Contractor shall not in any way be construed as a limitation on the nature or extent of the contractual obligations assumed by the Contractor under this Contract. The insurance requirements are not a representation by the Authority as to the adequacy of the insurance to protect the Contractor against the obligations imposed on him by law or by this or any other contract.

CHAPTER VI

RIGHTS AND REMEDIES

61. RIGHTS AND REMEDIES OF AUTHORITY

The Authority shall have the following rights in the event the Chief Engineer shall deem the Contractor guilty of a breach of any term whatsoever of this Contract:

A. The right to take over and complete the Work or any part thereof as agent for and at the expense of the Contractor, either directly or through other contractors.

B. The right to cancel this Contract as to any or all of the Work yet to be performed.

C. The right to specific performance, an injunction or any other appropriate equitable remedy.

D. The right to money damages.

For the purpose of this Contract, breach shall include but not be limited to the Contractor's failure to procure insurance satisfactory to the Authority within the time limit specified in the Clause hereof entitled "Insurance Procured by Contractor" and the following, whether or not the time has yet arrived for performance of an obligation under this Contract: a statement by the Contractor to any representative of the Authority indicating that he cannot or will not perform any one or more of his obligations under this Contract; any act or omission of the Contractor or any other occurrence which makes it improbable at the time that he will be able to perform any one or more of his obligations under this Contract; any suspension of or failure to proceed with any part of the Work by the Contractor which makes it improbable at the time that he will be able to perform any one or more of his obligations under this Contract; any false certification at any time by the Contractor as to any material item certified pursuant to the clauses of the Information For Bidders entitled "Certification of No Investigation (Criminal or Civil Anti-Trust), Indictment, Conviction, Suspension, Debarment, Disqualification, Prequalification Denial or Termination, Etc; Disclosure of Other Required Information", "Non-Collusive Bidding and Code of Ethics Certification; Certification of No Solicitation Based on Commission, Percentage, Brokerage, Contingent Fee or Other Fee", and "Certification of Participation in a State-Registered Apprenticeship Program", any false certification at any time by the Contractor or a subcontractor pursuant to the clause "Prevailing Rate of Wage Certification" set forth in the Information for Bidders, or the willful or fraudulent submission of any signed statement pursuant to such clauses which is false in any material respect; or the Contractor's incomplete or inaccurate representation of its status with respect to the circumstances provided for in such clauses.

The enumeration in this numbered clause or elsewhere in this Contract of specific rights and remedies of the Authority shall not be deemed to limit any other rights or remedies which the Authority would have in the absence of such enumeration; and no exercise by the Authority of any right or remedy shall operate as a waiver of any other of its rights or remedies not inconsistent therewith or to estop it from exercising such other rights or remedies.

62. RIGHTS AND REMEDIES OF CONTRACTOR

Inasmuch as the Contractor can be adequately compensated by money damages for any breach of this Contract which may be committed by the Authority, the Contractor expressly agrees that no default, act or omission of the Authority shall constitute a material breach of this Contract, entitling him to cancel or rescind it or (unless the Engineer shall so direct) to suspend or abandon performance.

63. PERFORMANCE OF WORK AS AGENT FOR CONTRACTOR

In the exercise of its right to take over and complete Work as agent for the Contractor, for which provision is made in the clause hereof entitled "Rights and Remedies of Authority", the Authority shall have the right to take possession of and use or permit the use of any and all plant, materials, equipment and other facilities provided by the Contractor for the purpose of the Work and the Contractor shall not remove any of the same from the site of the Work without express permission. Unless expressly directed to discontinue the performance of all Work, the Contractor shall continue to perform the remainder thereof in such manner as in no way will hinder or interfere with the portions taken over by the Authority.

In the certificate of total compensation earned, for which provision is made in the clause hereof entitled "Final Payment", the Engineer will separately state the amount of Work performed by the Authority as agent for the Contractor, credit to the Authority the cost thereof, and credit to the Contractor the compensation earned thereby; and the difference between them shall be payable by the Contractor to the Authority, or vice versa as the case may be. If such difference is in its favor, the Authority may deduct it from any moneys due the Contractor, and if such moneys be insufficient, the balance thereof shall be payable to it on demand; if in the Contractor's favor, it shall constitute part of the Final Payment.

The exercise by the Authority of its right to take over the Work shall not release the Contractor or his sureties from any of his or their obligations or liabilities under this Contract or the Performance and Payment Bond.

64. NO ESTOPPEL OR WAIVER

The Authority shall not be precluded or estopped by any acceptance, certificate or payment, final or otherwise, issued or made under this Contract or otherwise issued or made by it, the Engineer, or any officer, agent or employee of the Authority, from showing at any time the true amount and character of Work performed, or from showing that any such acceptance, certificate or payment is incorrect or was improperly issued or made; and the Authority shall not be precluded or estopped, notwithstanding any such acceptance, certificate or payment, from recovering from the Contractor any damages which it may sustain by reason of any failure on his part to comply strictly with this Contract, and any moneys which may be paid to him or for his account in excess of those to which he is lawfully entitled.

Neither the acceptance of the Work or any part thereof, nor any payment therefor, nor any order or certificate issued under this Contract or otherwise issued by the Authority, the Engineer, or any officer, agent or employee of the Authority, nor any permission or direction to continue with the performance of Work, nor any performance by the Authority of any of the Contractor's duties or obligations, nor any aid lent to the Contractor by the Authority in his performance of such duties or obligations, nor any other thing done or omitted to be done by the Authority, its Commissioners , officers, agents or employees shall be deemed to be a waiver of any provision of this Contract or of any rights or remedies to which the Authority may be entitled because of any breach thereof, excepting only a resolution of its Commissioners, providing expressly for such waiver. No cancellation, rescission or annulment hereof, in whole or as to any part of the Work, because of any breach hereof, shall be deemed a waiver of any money damages to which the Authority may be entitled because of such breach. Moreover, no waiver by the Authority of any breach of this Contract shall be deemed to be a waiver of any other or any subsequent breach.

CHAPTER VII

FEDERAL AVIATION ADMINISTRATION REQUIREMENTS

65. FEDERAL AVIATION ADMINISTRATION REQUIREMENTS

A. Airport Improvement Program (AIP) Project: The Work in this Contract is included in AIP Project No.[22] which is being undertaken and accomplished by the Port Authority of New York and New Jersey (Authority) in accordance with the terms and conditions of a grant agreement between the Authority and the United States, under the Airport and Airway Improvement Act of 1982 (AAIA) (P.L. 97-248, 49 U.S.C. 2201 et seq.) and Part 152 of the Federal Aviation Regulations (FAR) (14 CFR Part 152), pursuant to which the United States has agreed to pay a certain percentage of the costs of the project that are determined to be allowable project costs under that Act. The United States is not a party to this Contract and no reference in this Contract to the FAA or any representative thereof, or to any rights granted to the FAA or any representative thereof, or the United States, by the Contract, makes the United States a party to this Contract.

B. Consent to Assignment: The Contractor shall obtain the prior written consent of the Authority to any proposed assignment of any interest in or part of this Contract.

C. Veteran's Preference: In the employment of labor (except in executive, administrative, and supervisory positions), preference shall be given to Vietnam era veterans, Persian Gulf veterans, Afghanistan-Iraq War veterans, disabled veterans and small business concerns owned and controlled by disabled veterans as defined in Section 47112 of Title 49, United States Code. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

D. FAA Inspection and Review: The Contractor shall allow any authorized representative of the FAA to inspect and review any Work or materials used in the performance of this Contract.

E. Health and Safety Requirements: It is a condition of this Contract, and shall be made a condition of each subcontract entered into pursuant to this Contract, that the Contractor and any subcontractor shall not require any laborer or mechanic employed in the performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety, as determined under Construction Safety and Health Standards Title 29 CFR Part 1926 and other occupational and health standards (29 CFR Part 1910) promulgated by the United States Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (CWHSSA).

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22 This project number will be subsequently supplied.

F. Rights to Inventions - Materials: All rights to inventions and materials generated under this Contract are subject to regulations issued by the FAA and the recipient of the Federal grant under which this Contract is executed.

G. Disadvantaged Business Enterprises: It is the policy of the Department of Transportation (DOT) that disadvantaged business enterprises shall have the maximum opportunity to participate in the performance of this Contract.

1.) The Contractor agrees to ensure that disadvantaged business enterprises have the maximum opportunity to participate in the performance of subcontracts. In this regard the Contractor shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 to ensure that disadvantaged business enterprises have the maximum opportunity to compete for and perform subcontracts.

2.) The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted Contracts. Failure by the Contractor to carry out these requirements is a material breach of this Contract which may result in the termination of this Contract or such other remedy as the Authority deems appropriate.

3.) Subcontracts: The Contractor shall insert in all subcontracts the clause set forth in subparagraph 2 of this paragraph.

4.) The Contractor shall not terminate for convenience any DBE subcontractor listed on the Contractor's DBE Participation Plan (or an approved substitute DBE firm) and then perform the Work with its own forces or those of an affiliate without the prior written consent of the Engineer. When a DBE subcontractor is terminated or fails to complete the Work of the Contract, the Contractor shall make good faith efforts to find another DBE subcontractor to perform such subcontract Work.

5.) In the event that the Contractor does not comply with the requirements of 49 CFR 26.53, including, but not limited to, the requirement that the Contractor meet the DBE participation goal set forth in this Contract or, if the goal has not been met, demonstrate that good faith efforts were made to meet the goal, then the Authority may determine that the Contractor is not a responsible bidder and, as such, ineligible for award of future contracts.

H. Minimum Wages:

1.) All laborers and mechanics employed or working upon the site of the Work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents therefor) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1 (b) (2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to laborers and mechanics, subject to the provisions of subparagraph 4 below; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of Work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing Work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, that the employer's payroll records accurately set forth the time spent in each classification in which Work is performed. The wage determination (including any additional classification and wage rates conformed under (b)(i)3. of this Section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the Work in a prominent and accessible place where it can easily be seen by the workers.

2.)

a. The Engineer shall be the designated ("contracting officer") for this Contract, pursuant to 29 CFR 5.2 (e), and shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the Contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(i) Except with respect to helpers as defined in 29 CFR 5.2 (n) (4), the Work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(iv) With respect to helpers as defined in 29 CFR 5.2 (n) (4), such a classification prevails in the area in which the Work is performed.

b. If the Contractor and the laborers or mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

c. In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

d. The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs b.(ii) or (iii) of this paragraph, shall be paid to all workers performing Work in the classification under this Contract from the first day on which Work is performed in the classification.

3.) Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly wage rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

4.) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

I. Withholding: The Federal Aviation Administration shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of work, all or part of the wages required by the Contract, the Federal Aviation Administration may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

J. Payrolls and Basic Records:

1.) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the Work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found, under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the cost anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage ratios prescribed in the applicable programs.

2.)

a. The Contractor shall submit weekly for each week in which any Contract Work is performed a copy of all payrolls to the Authority. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under subparagraph 5.5(a)(3)(i) of Regulations, 29 CFR Part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

b. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be maintained under subparagraph 5.5(a)(3)(i) of Regulations, 29 CFR Part 5 and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations 29 CFR Part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of Work performed, as specified in the applicable wage determination.

c. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (b)(ii)of this section.

d. The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

3.) The Contractor or subcontractor shall make the records required under paragraph (a) of this section available for inspection, copying or transcription by authorized representatives of the Department of Transportation, Federal Aviation Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal Aviation Administration may, after written notice to the Contractor, the Authority, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

K. Apprentices, Trainees and Helpers:

1.) Apprentices: Apprentices will be permitted to Work at less than the predetermined rate for the Work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the United States Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of Work actually performed. In addition, any apprentice performing Work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the Work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeymans's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the Work performed until an acceptable program is approved.

2.) Trainees: Except as provided in 29 CFR 5.16, trainees will not be permitted to Work at less than the predetermined rate for the Work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification, by the United States Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of Work actually performed. In addition, any trainee performing Work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the Work performed until an acceptable program is approved.

3.) Equal Employment Opportunity: The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

4.) Helpers: Helpers will be permitted to work on a project if the helper classification is specified on an applicable wage determination or is approved pursuant to the conformance procedure set forth in 29 CFR 5.5(a) (1) (ii). The allowable ratio of helpers to journeymen employed by the Contractor or subcontractor on the job site shall not be greater than two helpers for every three journeymen (in other words, not more than 40 percent of the total number of journeymen and helpers in each contractor's or in each subcontractor's own work force employed on the job site). Any worker listed on a payroll at a helper wage rate, who is not a helper as defined in 29 CFR 2.5(n) (4), shall be paid not less than the applicable wage rate on the wage determination for classification of Work actually performed. In addition, any helper performing Work on the job site in excess of the ratio permitted shall be paid not less than the applicable journeyman's (or laborer's, where appropriate) wage rate on the wage determination for the Work actually performed.

L. Compliance With Copeland Act Requirements: The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.

M. Compliance With Davis-Bacon and Related Act Requirements: All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this Contract.

N. Disputes Concerning Labor Standards: Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts, 5, 6 and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

O. Certification of Eligibility:

1.) By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

2.) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

3.) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4.) The Contractor shall submit an executed copy of the form on the next page, entitled "Contractor's Certification Of Eligibility", with his Proposal.

CONTRACTOR'S CERTIFICATION OF ELIGIBILITY

The Bidder certifies, by submission of this Proposal or acceptance of this Contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this bid that it will include this Clause without modification in all lower tier transactions, solicitations, bids, proposals, contracts, and subcontracts. Where the Bidder/Offeror/Contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this Solicitation/Proposal.

That, the information above is true and complete to the best of my knowledge.

James M. Laing, Senior Vice President

_____

Name and Title (please print)

James M. Laing — Feb. 4, 2013

_____ _____

Signature — Date

NOTE: The penalty for making false statements in offers is prescribed in 19 U.S.C. 1001

CONTRACTOR'S CERTIFICATION OF ELIGIBILITY

The Bidder certifies, by submission of this Proposal or acceptance of this Contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this bid that it will include this Clause without modification in all lower tier transactions, solicitations, bids, proposals, contracts, and subcontracts. Where the Bidder/Offeror/Contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this Solicitation/Proposal.

That, the information above is true and complete to the best of my knowledge.

Frank C. Lizza, Jr. General Manager

Name and Title (please print)

Frank C. Lizza

Signature

Feb. 4, 2013

Date

NOTE: The penalty for making false statements in offers is prescribed in 19 U.S.C. 1001

CONTRACTOR'S CERTIFICATION OF ELIGIBILITY

The Bidder certifies, by submission of this Proposal or acceptance of this Contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this bid that it will include this Clause without modification in all lower tier transactions, solicitations, bids, proposals, contracts, and subcontracts. Where the Bidder/Offeror/Contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this Solicitation/Proposal.

That, the information above is true and complete to the best of my knowledge.

James M. Laing, Attorney-In-Fact

Name and Title (please print)

James M. Laing — Feb. 4, 2013

Signature — Date

NOTE: The penalty for making false statements in offers is prescribed in 19 U.S.C. 1001

P. Contract Work Hours and Safety Standards Act: Note: As used in the following, the terms "laborers" and "mechanics" include watchmen and guards.

1.) Overtime Requirements: No Contractor or subcontractor contracting for any part of the Contract Work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any Work week in which he or she is employed on such Work to Work in excess of eight hours in any calendar day or in excess of 40 hours in such Work week unless such laborer or mechanic receives compensation at a rate not less than 1 1/2 times his basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of 40 hours in such Work week, whichever is greater.

2.) Violation, Liability for Unpaid Wages, Liquidated Damages. In the event of any violation of the clause set forth in subparagraph 1 of the paragraph, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed, with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph 1 of this paragraph, in the sum of $10 for each calendar day on which such individual was required or permitted to Work in excess of eight hours or in excess of the standard work week of 40 hours without payment of the overtime wages required by the Clause set forth in subparagraph 1 of this paragraph.

3.) Withholding for Unpaid Wages and Liquidated Damages: The FAA shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of Work performed by the Contractor or subcontractor under any such Contract or any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph 2 of this paragraph.

4.) Subcontracts: The Contractor or subcontractor shall insert in any subcontracts the Clauses contained in 29 CFR 5.5(a) (1) through (10), the Clauses set forth in subparagraph 1 through 4 of this paragraph, a Clause requiring the subcontractors to include these Clauses in any lower tier subcontracts and also such other Clauses as the Federal Aviation Administration may by appropriate instructions require. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the Clauses set forth in subparagraphs 1 through 4 of this paragraph and the Clauses in 29 CFR 5.5.

Q. Contracts Subject only to Contract Work Hours and Safety Standards Act:

1.) The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the Contract for all laborers and mechanics, including guards and watchmen, working on the Contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid.

2.) The records to be maintained under paragraph 1 above shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Department of Transportation, Federal Aviation Administration and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

R. Subcontracts: The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR Part 5.5(a) (1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a Clause requiring the subcontractors to include these Clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by of any subcontractor or lower tier subcontractor with all the Contract Clauses in 29 CFR Part 5.5.

S. Contract Termination: Debarment: A Breach of Contract Clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for the debarment as a Contractor and a subcontractor as provided in 29 CFR 5.12.

T. During the performance of this Contract, the Contractor agrees as follows (This entire Clause shall be included in all federally funded construction contracts exceeding $10,000.):

1.) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, sex or national origin.

Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination, rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices (to be provided) setting forth the provisions of this Nondiscrimination Clause.

2.) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

3.) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice (to be provided) advising the said labor union or workers representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4.) The Contractor will comply with all provisions of Executive Order 11246 of 24 September 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

5.) The Contractor will furnish all information and reports required by Executive Order 11246 of 24 September 1965, as amended, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the Comptroller General of the United States, Department of Transportation, FAA and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

6.) In the event of the Contractor's noncompliance with the nondiscrimination Clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be cancelled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further government contracts or Federally-assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of 24 September 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of 24 September 1965, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

7.) The Contractor will include the portion of the sentence immediately preceding paragraph 1. and the provisions of Paragraphs 1 through 7 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of 24 September 1965, as amended, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontractor or purchase order as the Federal Aviation Administration may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Federal Aviation Administration, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

U. Contractors and subcontractors may satisfy the requirements of Paragraph B of Section 204 of Executive Order 11246 of September 24, 1965, as amended by complying with any of the following:

1.) Stating in the Invitations for Bids that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin, or

2.) Including appropriate insignia in display or other advertising as prescribed by the Department of Labor, or

3.) Using a single advertisement grouped with other advertisements under a caption which clearly states that all employers in the group assure all qualified applicants will have equal consideration for employment without regard to race, color, religion, sex, or national origin, or

4.) Using the phrase "an equal opportunity employer" in a single advertisement in clearly distinguishable type.

V. The following notices are to be posted per paragraphs A and C of Section 204 of Executive Order 11246 of September 24, 1965, as amended:

EQUAL EMPLOYMENT OPPORTUNITY IS THE LAW - DISCRIMINATION IS PROHIBITED BY THE CIVIL RIGHTS ACT OF 1964 AND BY EXECUTIVE ORDER NO. 11246

Title VI of the Civil Rights Act of 1964 - Administered by:

THE EQUAL EMPLOYMENT OPPORTUNITY COMMISSION

Prohibits discrimination because of Race, Color, Religion, Sex, or National Origin by Employers with 75 or more employees, by Labor Organizations with a hiring hall of 75 or more members, by Employment Agencies, and by Joint Labor-Management Committees for Apprenticeship or Training. After July 1, 1967, employees and labor organizations with 50 or more employees or members will be covered; after July 1, 1968, those with 25 or more will be covered.

ANY PERSON

Who believes he or she has been discriminated against

SHOULD CONTACT

THE EQUAL EMPLOYMENT OPPORTUNITY COMMISSION

1800 G Street N.W. Washington, D.C. 20506

Executive Order No. 11246 - Administered by:

THE OFFICE OF FEDERAL CONTRACT COMPLIANCE

Prohibits discrimination because of Race, Color, Religion, Sex or National Origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment.

By all Federal Government Contractors and Subcontractors, and by Contractors Performing Work Under a Federally Assisted Construction Contract, regardless of the number of employees in either case.

ANY PERSON

Who believes he or she has been discriminated against

SHOULD CONTACT

THE OFFICE OF FEDERAL CONTRACT COMPLIANCE

U.S. Department of Labor, Washington, D.C. 20210

W. This Contract (if the Contract price exceeds $100,000) and all Work performed thereunder is subject to the Clean Air Act and the Federal Water Pollution Control Act. Accordingly,

1.) The Contractor hereby represents that any facility to be used in the performance of this Contract or to benefit from this Contract is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities.

2.) The Contractor agrees to comply with all the requirements of Section 306 of the Clean Air Act and Section 508 of the Clean Water Act, Executive Order 11738, Environmental Protection Agency Regulation (40 CFR Part 15) and all regulations issued thereunder.

3.) The Contractor agrees that as a condition for award of this Contract he will notify the Authority of the receipt of any communication from the EPA indicating that a facility to be utilized for performance of or benefit from this Contract is under consideration to be listed on the EPA List of Violating Facilities.

4.) The Contractor agrees that he will include or cause to be included in any subcontract under this Contract which exceeds $100,000 the criteria and requirements in these subparagraphs 1 through 4.

X. For all projects involving airport location, a major runway extension, or runway location:

1.) The Contractor hereby represents that said projects will be located, designed, constructed, and operated so as to comply with applicable air and water quality standards.

2.) The Contractor agrees that he will include or cause to be included in any subcontract under this Contract the requirements of subparagraph 1.

Y.

1.) The Contractor hereby represents that in the performance of this Contract, he will adhere to all state and local regulations concerning air and water pollution controls (unless contrary to Federal requirements), secure necessary permits and inspections, and conduct his operations so as to minimize affects on the surrounding environment, all to the same extent as if the Authority were a private corporation.

2.) The Contractor agrees that he will include or cause to be included in any subcontract under this Contract the requirements of subparagraph 1.

Z. During the performance of this Contract, the Contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "Contractor") agrees as follows:

1.) Compliance with Regulations: The Contractor shall comply with the regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations) which are herein incorporated by reference and made a part of this Contract.

2.) Nondiscrimination: The Contractor, with regard to the work performed by it during the Contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the Contract covers a program set forth in Appendix B of the Regulations.

3.) Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Contractor for Work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this Contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

4.) Information and Reports: The Contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Authority or the Federal Aviation Administration to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish this information the Contractor shall so certify to the Authority or the Federal Aviation Administration as appropriate, and shall set forth what efforts it has made to obtain the information.

5.) Sanctions for Noncompliance: In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the Authority shall impose such Contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

a. withholding of payments to the Contractor under the Contract until the Contractor complies, and/or

b. cancellation, termination, or suspension of the Contract, in whole or in part.

6.) Incorporation of Provisions: The Contractor shall include the provisions paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as the Authority or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that, in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Contractor may request the Authority to enter into such litigation to protect the interests of the Authority and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

7.) Breach of Contract Terms - Sanctions: Any violation or breach of the terms of the Contract on the part of the Contractor/subcontractor may result in the suspension or termination of this Contract or such other action which may be necessary to enforce the rights of the parties of this agreement.

AA. Certification - Foreign Trade Restrictions: The Contractor or Subcontractor, by submission of a bid and/or execution of this Contract, certifies that it:

1.) is not owned or controlled by one or more citizens or nationals of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);

2.) has not knowingly entered into any contract or subcontract for this project with a contractor that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list; and,

3.) has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.

Unless the restrictions of this Clause are waived by the Secretary of Transportation in accordance with 49 CFR 30.17, no contract shall be awarded to a Contractor who is unable to certify to the above. Thereafter, if the Contractor knowingly procures or subcontracts for the supply of any product or service of a foreign country on the said list for use on the project, the Federal Aviation Administration may direct, through the Authority, cancellation of the Contract at no cost to the Government or the Authority.

Further, the Contractor agrees that, it will incorporate this provision for certification without modification in each contract and in all lower tier subcontracts. The Contractor may rely upon the certification of a prospective subcontractor unless it has knowledge that the certification is erroneous.

The Contractor shall provide immediate written notice to the Authority if the Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The subcontractor agrees to provide immediate written notice to the Contractor, if at any time it learns that its certification was erroneous by reason of changed circumstances.

This certification is a material representation of fact upon which reliance was placed when making the award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration may direct, through the Authority cancellation of the Contract or subcontract for default at no cost to the Government or the Authority.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a Contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

BB. Buy American - Steel And Manufactured Products Products For Construction Contracts

1.) The Aviation Safety and Capacity Extension Act of 1990 provides that preference be given to steel and manufactured products produced in the United States when funds are expended pursuant to a grant issued under the Airport Improvement Program. The following terms apply:

a. Steel and manufactured products. As used in this clause, steel and manufactured products include (1) steel produced in the United States or (2) a manufactured product produced in the United States, if the cost of its components mined, produced or manufactured in the United States exceeds 60 percent of the cost of all its components and final assembly has taken place in the United States. Components of foreign origin of the same class or kind as the products referred to in subparagraphs 2(a) or (b) shall be treated as domestic.

b. Components: As used in this clause, components means those articles, materials, and supplies incorporated directly into steel and manufactured products.

c. Cost of Components: This means the costs for production of the components, exclusive of final assembly labor costs.

2.) The Contractor agrees that more than 60% (by cost) of the steel and manufactured products to be used by the Contractor, subcontractors, materialmen, and suppliers in the performance of this Contract will be produced in the United States or will be otherwise exempt under one of the following:

a. that the U. S. Department of Transportation has determined, under the Aviation Safety and Capacity Expansion Act of 1990, that the products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality;

b. that the U. S. Department of Transportation has determined, under the Aviation Safety and Capacity Expansion Act of 1990, that domestic preference would be inconsistent with the public interest; or

c. that inclusion of domestic material will increase the cost of the Contract by more than 25 percent.

CC. List of Supplies/Materials that the U.S. Government Has Determined Are Not Produced In the United States In Sufficient and Reasonably Available Quantities And of Sufficient Quality (JAN 1991):

- Acetylene, black.
- Agar, bulk.
- Anise.
- Antimony, as metal or oxide
- Asbestos, amosite chrysolite, and crocidolite.
- Bananas.
- Bauxite.
- Kaurigum.
- Lac.
- Leather, sheepskin, hair type.
- Lavender oil.
- Manganese.
- Menthol, natural bulk.
- Mica.

- Beef, corned, canned.
- Beef Extract
- Bephenium Hydroxynapthoate.
- Bismuth.
- Books, trade, text technical, or scientific; newspapers; pamphlets; magazines; periodicals; printed briefs and films, not printed in the United States and for which domestics editions are not available.
- Brazil nuts, unroasted.
- Cadmium, ores and flue dust.
- Calcium cyanamide.
- Capers.
- Cashew nuts
- Castor beans and castor oil.
- Chalk, English
- Chestnuts.
- Chicle.
- Chrome ore or chromite.
- Cinchona bark.
- Cobalt, in cathodes, rondelles, or other primary ore and metal forms
- Cocoa beans.
- Coconut and coconut meat, unsweetened, in shredded, desiccated or similarly prepared form.
- Coffee, raw or green bean.
- Colchicine alkaloid, raw.
- Copra.
- Microprocessor chips (brought onto a construction site as separate units for incorporation into building systems during construction or repair and alteration of real property.)
- Nickel, primary, in ingots, pigs, shots, cathodes, or similar forms; nickel oxideand nickel salts.
- Nitroguanidine (also known as picrite).
- Nux vomica, crude.
- Oiticica oil.
- Olive oil.
- Pine needle oil.
- Platinum and related group metals, refined, as sponge, powder, ingots, or cast bars.
- Pyrethrum flowers.
- Quartz crystals.
- Quebracho.
- Quinidine.
- Quinine.
- Rabbit fur felt.
- Radium salts, source and special nuclear materials.
- Rosettes.
- Rubber, crude and latex.
- Rutile.
- Santonin, crude.
- Secretin.
- Shellac.
- Silk, raw and unmanufactured.

- Cork, wood or bark and waste.
- Cover glass, microscope slide.
- Cryolite, natural.
- Dammar gum
- Diamonds, industrial, stones and abrasives.
- Emetine, bulk
- Ergot, crude.
- Erthrityl tetranitrate.
- Fair linen, altar.
- Fibers of the following types: types: abaca, abace, agave, coir, flax, jute, jute, burlaps, palmyra and sisal.
- Goat and kidskins.
- Graphite, natural, crystal-line, crucible grade.
- Handsewing needles.
- Hemp yarn.
- Hog bristles for brushes.
- Hyoscine, bulk.
- Ipecac, root.
- Iodine, crude.
- Spare and replacement parts for equipment of foreign manufacture, and for which domestic parts are not available.
- Spices and herbs in bulk
- Sugars, raw.
- Swords and scabbards.
- Talc, block, steatite.
- Tantalum.
- Tapioca flour and cassava,
- Tartar, crude; tartaric acid and cream of tartar in bulk.
- Tea in bulk.
- Thread, metallic (gold).
- Thyme oil.
- Tin in bars, blocks, and pigs.
- Triprolidine hydrochloride.
- Tungsten.
- Vanilla beans.
- Venom, cobra.
- Wax, canauba.
- Woods; logs, veneer, and lumber of the following species: Alaskan yellow cedar, angelique, balsa, ekki, greenhart, lignum vitae, mahogany, and teak.
- Yarn, 50 Denier rayon.

Petroleum terms are used as follows:

"Crude oil" means crude petroleum, as it is produced at the wellhead, and liquids (under atmospheric conditions) that have been recovered from mixtures of hydrocarbons that existed in a vaporous phase in a reservoir and that are not natural gas products.

"Finished products" means any one or more of the following petroleum oils, or a mixture or combination of these oils, to be used without further processing except blending by mechanical means:

1.) "Asphalt" a solid or semi-solid cementitious material that (1) gradually liquefies when heated, (2) has bitumins as its predominating constituents, and (3) is obtained in refining crude oil.

2.) "Fuel Oil" a liquid or liquefiable petroleum product burned for lighting or for the generation of heat or power and derived directly or indirectly from crude oil, such as kerosene, range oil distillate fuel oils, gas oil, diesel fuel, topped crude oil, or residues.

3.) "Gasoline" - a refined petroleum distillate that, by its consumption, is suitable for use as a carburant in internal combustion engines.

4.) "Jet Fuel" - a refined petroleum distillate used to fuel jet propulsion engines.

5.) "Liquefied gases" - hydrocarbon gases recovered from natural gas or produced from petroleum refining and kept under pressure to maintain a liquid state at ambient temperatures.

6.) "Lubricating oil" - a refined petroleum distillate or specially treated petroleum residue used to lessen friction between surfaces.

7.) "Naptha" -a refined petroleum distillate falling with a distillation range overlapping the higher gasoline and the lower kerosenes.

8.) "Natural gas products" - liquids (under atmospheric conditions) including natural gasoline, that -

a. are recovered by a process of absorption, adsorption, compression, refrigeration, cycling, or a combination of these processes, from mixtures of hydrocarbons that existed in a vaporous phase in a reservoir, and

b. when recovered and without processing in a refinery: definitions of products contained in subdivision 2, 3, and 7 above.

9.) "Residual fuel oil" - a topped crude oil or viscous residuum that, as obtained in refining or after blending with other fuel oil, meets or is the equivalent of MILSPEC Mil F 859 for Navy Special Fuel Oil and any more viscous fuel oil, such as No. 5 or Bunker C.

"Unfinished oils" means one or more of the petroleum oils listed under "Finished products" above, or a mixture or combination of these oils, that are to be further processed other than by blending by mechanical means.

CHAPTER VIII

MISCELLANEOUS

66. SUBMISSION TO JURISDICTION

The Contractor hereby irrevocably submits himself to the jurisdiction of the Courts of the State of New York and to the jurisdiction of the Courts of the State of New Jersey in regard to any controversy arising out of, connected with, or in any way concerning the Proposal or this Contract. The Contractor agrees that service of process on the Contractor in relation to such jurisdiction may be made, at the option of the Authority, either by registered or certified mail addressed to the applicable office as provided for in the clause hereof entitled "Service of Notices on the Contractor", by registered or certified mail addressed to any office actually maintained by the Contractor or by actual personal delivery to the Contractor if the Contractor be an individual, to any partner if the Contractor be a partnership or to an officer, director or managing or general agent if the Contractor be a corporation.

Such service shall be deemed to be sufficient when jurisdiction would not lie because of the lack of basis to serve process in the manner otherwise provided by law. In any case, however, process may be served as stated above whether or not it might otherwise have been served in a different manner.

67. PROVISIONS OF LAW DEEMED INSERTED

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

68. INVALID CLAUSES

If any provision of this Contract shall be such as to destroy its mutuality or to render it invalid or illegal, then, if it shall not appear to have been so material that without it the Contract would not have been made by the parties, it shall not be deemed to form part thereof but the balance of the Contract shall remain in full force and effect.

69. NON-LIABILITY OF THE AUTHORITY REPRESENTATIVES

Neither the Commissioners of the Authority nor any officer, agent, or employee thereof shall be charged personally by the Contractor with any liability or held liable to him under any term or provision of this Contract, or because of its execution or attempted execution, or because of any breach hereof.

70. SERVICE OF NOTICES ON THE CONTRACTOR

Whenever provision is made in this Contract for the giving of any notice to the Contractor, its deposit in any post office or post office box, enclosed in a postpaid wrapper addressed to the Contractor at his office, or its delivery to his office, shall be sufficient service thereof as of the date of such deposit or delivery, except to the extent, if any, otherwise provided in the clause entitled "Submission to Jurisdiction". Until further notice to the Authority the Contractor's office will be that stated in his Proposal. Notices may also be served personally upon the Contractor; or if a corporation, upon any officer, director, or managing or general agent; or if a partnership upon any partner.

71. MODIFICATION OF CONTRACT

No change in or modification, termination or discharge of this Contract, in any form whatsoever, shall be valid or enforceable unless it is in writing and signed by the party to be charged therewith or his duly authorized representative, provided, however, that any change in or modification, termination or discharge of this Contract expressly provided for in this Contract shall be effective as so provided.

The authority of any person to order Extra Work or to alter the Contract Drawings and Specifications does not include the power to cancel, modify or waive any provision of the Form of Contract, and no officer or other representative of the Authority shall have the power so to do unless and until hereafter so authorized by or pursuant to a resolution of the Commissioners of the Authority or by or pursuant to a resolution of their appropriate Committee.

72. PUBLIC RELEASE OF INFORMATION

The Contractor and all his subcontractors shall not issue or permit to be issued any press release, advertisement, or literature of any kind, which refers to the Authority or the services performed in connection with this Contract, without first obtaining the written approval of the Chief Engineer. Such approval may be withheld if for any reason the Chief Engineer believes that the publication of such information would be harmful to the public interest or is in any way undesirable. This provision shall survive termination or expiration of this Contract.

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that we, the undersigned[23] Contractor and surety company (or companies), as principal and surety (or sureties), respectively,

Contractor	Surety

23 Insert names of the Contractor and surety company (or companies) in the appropriate columns. If space is insufficient add rider.

If the Contractor is a corporation, give the state of incorporation, using also the phrase "a corporation organized under the laws of _____".

If the Contractor is a partnership, give full names of partners, using the phrase "co-partners doing business under the firm name of _____".

If the Contractor is an individual using a trade name, give individual name, using also the phrase "an individual doing business under the trade name of _____.":

are hereby held and firmly bound unto The Port Authority of New York and New Jersey (herein called the "Authority") in the penal sum of _____ Dollars

and _____ Cents ($ _____.), for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, representatives, executors, administrators, successors and assigns. Each surety, however, if there is more than one, shall be jointly and severally liable for said penal sum.

Signed this _____ day of _____ 20

The condition of the above obligation is that

WHEREAS, the above named principal has entered into a Contract in writing with the Authority, a copy of which is hereby made a part of this bond as though herein set forth in full and which is designated Contract SWF-164.039 - "Stewart International Airport - Rehabilitate Runways 9-27 and 16-34", and

WHEREAS, the Authority has required this bond for the faithful performance of all obligations imposed by said Contract and also for the payment of all lawful claims of subcontractors, materialmen and workmen arising out of the performance of said Contract;

NOW, if the said principal shall well and faithfully do and perform the things agreed by him to be done and performed according to the terms and true intent and meaning of said Contract and if all lawful claims of subcontractors, materialmen and workmen arising out of the performance of said Contract are paid, then this obligation shall be void, otherwise the same shall remain in full force and effect; it being expressly understood and agreed that, provided the sureties shall comply with the provisions hereof, the aggregate liability of all sureties for any and all claims hereunder shall in no event exceed the penal amount of this obligation as hereinbefore stated.

This undertaking is for the benefit of the Authority and all subcontractors, materialmen and workmen having lawful claims arising out of the performance of said Contract, and all such subcontractors, materialmen and workmen (as well as the Authority itself) shall have a direct right of action upon this bond; but the rights and equities of such subcontractors, materialmen and workmen shall be subject and subordinate to those of the Authority.

The sureties, for value received, hereby stipulate and agree that the obligations of said sureties and their bond shall be in no way impaired or affected by any extensions of time, modification, omission, addition or change in or to the said Contract or the construction to be performed thereunder, or by any supervision or inspection or omission to supervise or inspect the construction, or by any payment thereunder before the time required therein, or by any waiver of any provision or condition thereof (whether precedent or subsequent), or by any assignment, subletting or other transfer thereof or of any part thereof or of any construction to be performed or any moneys due or to become due thereunder; and said sureties do hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulate and agree that any and all things done and omitted to be done by and in relation to assignees, subcontractors and other transferees shall have the same effect as to said sureties as though done by or in relation to said principal.

The sureties shall give the General Counsel of the Authority the following notices:

A. Written notice of an intent to pay any claim of a subcontractor, materialman or workman hereunder;

B. Written notice within five days of the institution of an action by a subcontractor, materialman or workman hereunder.

The sureties shall not pay the claim of any subcontractor, materialman or workman hereunder until the expiration of thirty days after receipt by said General Counsel of notice under either subparagraph A or B above, describing the claim to be paid.

IN WITNESS WHEREOF, the principal and the sureties have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____

Principal

(Seal) By [24] _____

_____

Surety

By[25] _____

APPROVED AS TO ACCEPTABILITY OF SURETIES:

_____

Credit Manager

_____ 20

---

24 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

25 Add signatures of additional sureties, if any.

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known, who being by me duly sworn, did depose and say that he resides at _____; that he is the _____. of _____ the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he signed his name thereto by like order.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me

personally came and appeared _____, to me known, and known to me to be one of the members of the firm of _____ _____ described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal) _____

(Notary Signature)

AFFIX ACKNOWLEDGMENT AND JUSTIFICATION OF SURETY

SPECIFICATIONS

DIVISION 1

GENERAL PROVISIONS

73. CONSTRUCTION REQUIRED BY THE SPECIFICATIONS

These Specifications relate generally to performing Rehabilitation of runways and assocuiated taxiways via mill and overlay, including electrical system rehabilitation and upgrades, installation of new duct bank crossings for future electrical/communication requirements, improving the existing fillets, installing 35-foot shoulders to both sides of runway 16-34 and constructing a new high-speed taxiway exit for Runway 9-27..

These Specifications require the doing of all things necessary or proper for or incidental to the matter referred to in the immediately preceding paragraph, as shown on the Contract Drawings in their present form. In addition, all things shown on the Contract Drawings even though not expressly mentioned in these Specifications, all things mentioned in these Specifications even though not shown on the Contract Drawings, and all things not specified either on the Contract Drawings, or in the Specifications but involved in carrying out their intent and in the complete and proper execution of the matter referred to in the immediately preceding paragraph are required by these Specifications; and the Contractor shall perform the same as though they were specifically delineated, described and mentioned.

In case of a conflict between a requirement of the Contract Drawings and a requirement in Division 1 of the Specifications, the requirement of Division 1 shall control. In case of a conflict between a requirement contained in other Divisions of the Specifications and a requirement of the Contract Drawings, the requirement of the Contract Drawings shall control.

Some Sections of the Specifications make cross references to construction specified in other Sections of the Specifications, including cross references intended to avoid duplication by the bidders in quoting prices and to point out some of the necessity for coordination. Such cross references are not intended to be complete or all inclusive, and the Contractor shall ascertain for himself both the nature and the extent of all construction which may be related to that under each Section of the Specifications whether or not expressly referred to.

Some Sections of the Specifications contain a general description of the construction under such Sections. Such description is merely a very general one and is not intended to outline the construction required by the Specifications and Contract Drawings. Accordingly, such description shall be construed as in aid of and supplemental to, but in no case limiting, impairing or decreasing, the requirements elsewhere set forth with respect to the construction to be performed.

The Contractor's compensation for all construction whatsoever referred to in the Specifications and Contract Drawings in their present form, even though the need for certain items of such construction may be contingent upon future occurrences or determinations or upon other circumstances, shall be deemed to be included in the price(s) quoted by the Contractor in the Form of Contract unless the Specifications or Contract Drawings expressly state that compensation in addition to such price shall be payable for such items of construction. The express statement in some cases to the effect that certain construction shall be without additional cost to the Authority shall not impair the application of this paragraph in other cases.

The distribution of various parts of the construction among the Divisions and Sections of the Specifications or among the Contract Drawings is not intended as a representation of the most effective or logical method of organizing, scheduling, or subcontracting the construction, and the Contractor shall ascertain for himself how to do so unless otherwise expressly prescribed in this Contract.

In all cases the provisions of the second paragraph of this numbered Section shall control.

74. AVAILABLE PROPERTY

Subject to the conditions elsewhere stated herein, those areas to be occupied by the permanent construction will be made available to the Contractor upon the commencement of his first operations at the construction site, together with an area shown on Contract Drawing No. CS001, CS002, CS003 and designated "Area Available For Contractor's Use".

Any additional property which the Contractor desires for his operations shall be obtained by him at his own expense.

The Contractor will be permitted to use only so much of the aforesaid areas as is necessary for the performance of the Contract, and he must at all times so conduct his operations as not to encroach upon or block the portions used by others. The Engineer may at any time make joint or exclusive assignments of particular portions thereof, either to the Contractor or to others, and may take over and use for other purposes any portions which, in the opinion of Engineer, are not required for the performance of the Contract.

The Contractor shall daily clean up the areas made available to him so that they are free at all times of refuse, rubbish, scrap material or debris.

75. CONSTRUCTION SITE SECURITY REQUIREMENTS

The Port Authority of New York and New Jersey operates facilities and systems at which terrorism or other criminal acts may have a significant impact on life safety and key infrastructures. The Authority reserves the right to impose multiple layers of security requirements on the performance of the Contract Work, including on the Contractor, its staff and subcontractors and their staffs depending upon the level of security required, as determined by the Authority. The Contractor shall, and shall instruct its subcontractors, to cooperate with Authority staff in adopting security requirements. These security requirements may include, but are not limited to, the following.

A. Identity Checks and Background Screening:

Contractor/subcontractor identity checks and background screening shall include but shall not be limited to: (1) inspection of not less than two forms of valid and current government issued identification (at least one having an official photograph) to verify staff's name and residence; (2) screening federal, state and local criminal justice agency information databases and files; (3) screening of any terrorist identification files; (4) multi-year check of personal, employment and/or credit history; (5) access identification to include some form of biometric security methodology such as fingerprint, facial or iris scanning.

The Contractor may be required to have its staff, and any subcontractor's staff, authorize the Authority or its designee to perform background checks. Such authorization shall be in a form acceptable to the Authority. If the Engineer directs the Contractor to have identity checks and background screening performed by a particular firm designated by the Engineer, the Authority will compensate the Contractor for the cost of such screening at the Net Cost of such screening. "Net Cost" shall be computed in the same manner as is compensation for extra work, including any percentage addition to cost, as set forth in the clause of the contract providing compensation for extra work. Performance of such Net Cost work shall be as directed by the Engineer and shall be subject to all provisions of the contract relating to performance of extra work. Compensation for said Net Cost work shall not be charged against the total amount of compensation authorized for extra work.

B. Issuance of Photo Identification Badges:

No person will be permitted on or about the construction site without a photo identification badge approved by the Engineer. The Contractor shall provide such badges for employees, subcontractors and materialmen. All employees of the Contractor, subcontractors and materialmen shall wear identification badges in a conspicuous and clearly visible position whenever they are working at the construction site.

If the Authority requires facility-specific identification badges for the Contractor's and subcontractors' staffs, the Authority will supply such identification badges at no cost to the Contractor.

C. Construction Site Access Control:

1.) Provide for construction site access control, inspection and monitoring by Contractor-retained security guards. This provision shall be in addition to the Contractor's responsibility to secure its equipment and work at the construction site.

2.) Prepare, maintain and update detailed security escort work plan schedules for the Engineer's review and approval. These shall be submitted in conjunction with the Progress schedules in accordance with the clause of the Contract entitled "Progress Schedules". The security escort work plan shall be sufficiently detailed to accurately depict all the Work area coverages and shall graphically represent the logical sequence and duration of activities, all in accordance with the requirements of the Contract.

3.) At the beginning of each work period furnish to the security guards, if any, and to the Engineer a memorandum showing for that work period:

a. The name and company affiliation of each employee of the Contractor and subcontractor who is expected to enter the site and,

b. The name of any firm anticipated to be delivering materials or servicing equipment that day and a description of such materials or services.

D. Construction Security Company:

1.) Enter into an agreement with a single New York State licensed security guard service company to provide required aeronautical escort and general security services as required by Transportation Security Administration (TSA) regulations (including TSR 1542), the Airport Security Program (ASP), the Air Terminal Rules and Regulations, Federal Aviation Administration Advisory Circulars (FAR 139), and local airport policy. Ensure that there are adequate staff in possession of SWF Airport ID cards, and properly trained and certified, at the time of Contract award to provide security services.

2.) Vehicles: The Contractor's security company shall provide the below required support vehicles for the entire work period:

a. Sufficient vehicles for securing guard posts.Each vehicle shall be fit to operate on the AOA and shall be licensed in the State of NY. The vehicles shall have amber rotating roof lights.

b. All vehicles shall have the name of the security guard company affixed prominently on the driver and passenger doors.

3.) Security Guard Requirements - Requirements for all persons performing security guard functions as defined in this clause:

a. Shall be a direct employee of the security company in contract with the Contractor.

b. Shall be able to work legally in the United States.

c. Shall possess a valid New York State security guard's license.

d. Shall submit to, and successfully pass, a fingerprint based criminal history records check and a TSA security threat assessment.

e. Shall be in possession of a valid SWF Airport ID card issued by the Airport authorizing unescorted access in the Security Identification Display Area (SIDA) and have commensurate escort endorsements/privileges.

f. All security company personnel performing operational functions shall be in possession of two-way radio communications at all times and shall be trained in the use of these radios. Radios will also be provided to the Authority supervisory staff as needed to monitor activities (approx 5 radios).

4.) Security Guard Supervisors - Requirements for all persons performing security guard supervision functions as defined in this clause:

a. Shall meet all requirements of a security guard.

b. Shall have demonstrated experience supervising security personal in secured areas/SIDA of an airport.

c. Shall be provided, and in possession of, working cell phones with the ability to immediately contact law enforcement and Airport Operations.

d. One supervisor shall be provided for no more than 20 security guard posts.

5.) Uniforms – Ensure that all security guards and supervisors on this Contract wear at all times a distinctive uniform, to include shirts, reflective vests, jackets, shoes, and hats.

a. A distinctive patch shall be affixed to each shirt, vest, jacket, blazer and/or outer garment, which identifies the Contractor's company or corporate name.

b. The basic uniform shall also include foul weather and winter gear rated to sub-zero temperatures (including jackets, hats, jumpsuits, earmuffs, and gloves).

c. Security guard and supervisor uniforms shall be unique from each other to allow for clear distinction of personnel on the worksite.

E. Escort Requirements:

1.) Provide qualified security guards (as defined in Security Guard Requirement section of this document) to serve as aeronautical escorts for work stages or portions thereof that are located within the Air Operations Area. These escorts may be provided in the following manners described below:

2.) Positive Person Escorts - A security guard, having escort privileges (E) and in possession of a valid SWF Airport ID Card authorizing unescorted access in the SIDA, shall provide positive escorts to individuals not in possession of a valid SWF Airport ID Card in a ratio of no less than 1:5. All persons under escort must be in continual line-of site of, and shall have the ability to communicate with the security guard providing the escort.

3.) **Positive Vehicle Escorts** - A security guard, having escort vehicle and person privileges (E) and in possession of a valid SWF Airport ID Card authorizing unescorted access and driving privileges (DR3) in the SIDA, shall provide positive escorts to individuals not in possession of a valid SWF Airport ID Card in a ratio of no less than 1:2. All persons under escort must be in continual line-of site of, and have the ability to communicate with, the security guard providing the escort.

4.) **Haul Route Escorts** - A haul route shall be generally defined as a pre-approved, clearly delineated, path on the AOA, where non-PONYA plated construction vehicles may traverse from an AOA access point to a defined construction site. Deploy authorized Haul Route Escorts to pre-determined locations along the haul route, unless otherwise specified by the Engineer. Haul Route Escorts shall ensure all vehicles are authorized and do not deviate from the designated route. Generally, one security guard shall be posted no more than every 500 feet, provided a clear line-of-site exists between each security guard. If the Authority and/or the TSA deem it necessary, in certain locations, reduce the 500' spacing to maintain a safe and secure operating environment.

F. Airfield Driver Endorsements – Ensure that all personnel operating vehicles on the AOA have completed airfield driver training as required by the Authority and have the appropriate driver endorsement (DR3) printed on their SWF Airport ID card.

G. Radios/Two-Way Communication:

1.) Furnish to each person assigned to a post, including all supervisors and relief personnel, and maintain in good repair and operating condition, portable two-way radio voice communication equipment capable of adequate communications throughout the airport including antennas, power supplies, batteries and other associated equipment, with no less than 2 distinct frequencies, unless otherwise directed by the Engineer.

2.) All of the radio equipment to be supplied by the Contractor shall be suitable and compatible for operation on the airport and shall include a "tone pack" identifier

3.) Train all personnel in the proper use of the devices.

4.) Maintain, repair, and replace radios so that all tours and posts have a full complement.

H. Security Guard Staffing: Ensure that required security guard staff is available and in place when required. Failure to provide such services shall be cause to invoke rights and remedies in accordance with the clause of the Contract entitled "Rights and Remedies of Authority".

a. Provide adequate relief personnel and vehicles at all posts to ensure no service disruption takes place.

Promptly comply with Authority requests to impose, increase, and/or upgrade security requirements as they may affect Contractor, subcontractors and their staffs during the term of this Contract to address changing security conditions and/or new governmental regulations.

76. OPERATIONS OF OTHERS

During the time that the Contractor is performing the Contract, other persons will be engaged in other operations on or about the construction site including routine facility maintenance and operations, tenant maintenance and operations and other Authority contracts all of which shall remain uninterrupted.
The Contractor shall so plan and conduct his operations as to work in harmony with others engaged at the construction site and not to delay, endanger or interfere with the operations of others (whether or not specifically mentioned above), all to the best interests of the Authority and the public and as may be directed by the Engineer.

77. LABOR ACTIONS

Whenever any labor strike, slowdown, work stoppage, picketing or other labor action which might interfere with the performance of the Contract, or of other Authority or PATH contracts or the operation of any Authority or PATH facility occurs at the construction site or at any other Authority or PATH facility as a result of the Contractor's (or its subcontractor's) utilization of particular means, methods or manpower to perform the Work required by the Contract, the Contractor shall pursue all remedies which are appropriate and available to him to avoid such interference.

78. CONTRACTOR'S MEETINGS

The Contractor shall conduct job progress and coordination meetings with subcontractors in his field office every two weeks, or as frequently as job conditions require or the Engineer may request. The Engineer shall be notified and, at his option, may attend these meetings. The Contractor shall prepare and distribute minutes to the Engineer and the subcontractors within forty-eight (48) hours of the day following the meetings.

The Contractor shall attend separate job progress and coordination meetings with the Engineer every two weeks, or at times otherwise requested by the Engineer.

79. CONTRACT DRAWINGS

The Contract Drawings which accompany and form a part of these Specifications bear the general title "The Port Authority of NY & NJ - Stewart International Airport – Rehabilitation of Runway 9-27 and Runway 16-34 - Contract SWF-164.039" and are separately numbered and entitled as follows:

G001	TITLE SHEET	General
G002	LOCATION PLAN	General
G003	INDEX OF DRAWINGS -1-	General
G004	INDEX OF DRAWINGS -2-	General
G005	GENERAL NOTES	General
CS001	CONSTRUCTION STAGING OVERALL PLAN	Construction Staging
CS002	CONSTRUCTION STAGE -1-	Construction Staging
CS003	CONSTRUCTION STAGE -2-	Construction Staging
CS004	CONSTRUCTION STAGE -3-	Construction Staging
CS005	CONSTRUCTION STAGE -4-	Construction Staging
CS006	TEMPORARY PAVEMENT MARKING DETAIL FOR CONSTRUCTION STAGE 1D	Civil
CS007	TEMPORARY PAVEMENT MARKING DETAIL FOR CONSTRUCTION STAGE 3	Civil
C001	LEGEND AND ABBREVIATIONS	Civil
C002	CIVIL NOTES	Civil
C003	REFERENCE PLAN	Civil
C004	REMOVAL PLAN -1-	Civil
C005	REMOVAL PLAN -2-	Civil
C006	REMOVAL PLAN -3-	Civil
C007	REMOVAL PLAN -4-	Civil
C008	REMOVAL PLAN -5-	Civil
C009	REMOVAL PLAN -6-	Civil
C010	REMOVAL PLAN -7-	Civil

C011	REMOVAL PLAN -8-	Civil
C012	REMOVAL PLAN -9-	Civil
C013	REMOVAL PLAN -10-	Civil
C014	REMOVAL PLAN -11-	Civil
C015	REMOVAL PLAN -12-	Civil
C016	REMOVAL PLAN -13-	Civil
C017	REMOVAL PLAN -14-	Civil
C018	REMOVAL PLAN -15-	Civil
C019	REMOVAL PLAN -16-	Civil
C020	REMOVAL PLAN -17-	Civil
C021	REMOVAL PLAN -18-	Civil
C022	REMOVAL PLAN -19-	Civil
C023	REMOVAL PLAN -20-	Civil
C024	REMOVAL PLAN -21-	Civil
C025	REMOVAL PLAN -22-	Civil
C026	REMOVAL PLAN -23-	Civil
C027	REMOVAL PLAN -24-	Civil
C028	REMOVAL PLAN -25-	Civil
C029	ALIGNMENT AND PAVING PLAN -1-	Civil
C030	ALIGNMENT AND PAVING PLAN -2-	Civil
C031	ALIGNMENT AND PAVING PLAN -3-	Civil
C032	ALIGNMENT AND PAVING PLAN -4-	Civil
C033	ALIGNMENT AND PAVING PLAN -5-	Civil
C034	ALIGNMENT AND PAVING PLAN -6-	Civil
C035	ALIGNMENT AND PAVING PLAN -7-	Civil
C036	ALIGNMENT AND PAVING PLAN -8-	Civil
C037	ALIGNMENT AND PAVING PLAN -9-	Civil
C038	ALIGNMENT AND PAVING PLAN -10-	Civil
C039	ALIGNMENT AND PAVING PLAN -11-	Civil
C040	ALIGNMENT AND PAVING PLAN -12-	Civil
C041	ALIGNMENT AND PAVING PLAN -13-	Civil
C042	ALIGNMENT AND PAVING PLAN -14-	Civil
C043	ALIGNMENT AND PAVING PLAN -15-	Civil
C044	ALIGNMENT AND PAVING PLAN -16-	Civil

C045	ALIGNMENT AND PAVING PLAN -17-	Civil
C046	ALIGNMENT AND PAVING PLAN -18-	Civil
C047	ALIGNMENT AND PAVING PLAN -19-	Civil
C048	ALIGNMENT AND PAVING PLAN -20-	Civil
C049	ALIGNMENT AND PAVING PLAN -21-	Civil
C050	ALIGNMENT AND PAVING PLAN -22-	Civil
C051	ALIGNMENT AND PAVING PLAN -23-	Civil
C052	ALIGNMENT AND PAVING PLAN -24-	Civil
C053	ALIGNMENT AND PAVING PLAN -25-	Civil
C054	(NOT USED)	Civil
C055	GRADING PLAN -1-	Civil
C056	GRADING PLAN -2-	Civil
C057	GRADING PLAN -3-	Civil
C058	GRADING PLAN -4-	Civil
C059	GRADING PLAN -5-	Civil
C060	GRADING PLAN -6-	Civil
C061	GRADING PLAN -7-	Civil
C062	GRADING PLAN -8-	Civil
C063	GRADING PLAN -9-	Civil
C064	GRADING PLAN -10-	Civil
C065	GRADING PLAN -11-	Civil
C066	GRADING PLAN -12-	Civil
C067	GRADING PLAN -13-	Civil
C068	GRADING PLAN -14-	Civil
C069	GRADING PLAN -15-	Civil
C070	GRADING PLAN -16-	Civil
C071	GRADING PLAN -17-	Civil
C072	GRADING PLAN -18-	Civil
C073	GRADING PLAN -19-	Civil
C074	GRADING PLAN -20-	Civil
C075	GRADING PLAN -21-	Civil
C076	GRADING PLAN -22-	Civil
C077	GRADING PLAN -23-	Civil
C078	GRADING PLAN -24-	Civil

C079	GRADING PLAN -25-	Civil
C080	UTILITIES PLAN -1-	Civil
C081	UTILITIES PLAN -2-	Civil
C082	UTILITIES PLAN -3-	Civil
C083	UTILITIES PLAN -4-	Civil
C084	UTILITIES PLAN -5-	Civil
C085	UTILITIES PLAN -6-	Civil
C086	UTILITIES PLAN -7-	Civil
C087	UTILITIES PLAN -8-	Civil
C088	UTILITIES PLAN -9-	Civil
C089	UTILITIES PLAN -10-	Civil
C090	UTILITIES PLAN -11-	Civil
C091	UTILITIES PLAN -12-	Civil
C092	UTILITIES PLAN -13-	Civil
C093	UTILITIES PLAN -14-	Civil
C094	UTILITIES PLAN -15-	Civil
C095	UTILITIES PLAN -16-	Civil
C096	UTILITIES PLAN -17-	Civil
C098	UTILITIES PLAN -19-	Civil
C099	UTILITIES PLAN -20-	Civil
C100	UTILITIES PLAN -21-	Civil
C101	UTILITIES PLAN -22-	Civil
C102	UTILITIES PLAN -23-	Civil
C103	UTILITIES PLAN -24-	Civil
C104	UTILITIES PLAN -25-	Civil
C105	RUNWAY 16-34 PROFILE -1-	Civil
C106	RUNWAY 16-34 PROFILE -2-	Civil
C107	RUNWAY 16-34 PROFILE -3-	Civil
C108	RUNWAY 9-27 PROFILE -1-	Civil
C109	RUNWAY 9-27 PROFILE -2-	Civil
C110	RUNWAY 9-27 PROFILE -3-	Civil
C111	RUNWAY 9-27 PROFILE -4-	Civil
C112	RUNWAY 9-27 PROFILE -5-	Civil
C113	RUNWAY 9-27 PROFILE -6-	Civil

C114	TYPICAL SECTIONS -1-	Civil
C115	TYPICAL SECTIONS -2-	Civil
C116	(NOT USED)	Civil
C117	DETAILS -1-	Civil
C118	DETAILS -2-	Civil
C119	DETAILS -3-	Civil
C120	DETAILS -4-	Civil
C121	DETAILS -5-	Civil
ML001	MARKING, LIGHTING AND SIGNAGE PLAN LEGEND, ABBREVIATIONS AND NOTES	Civil
ML002	MARKING, LIGHTING AND SIGNAGE PLAN – 1	Civil
ML003	MARKING, LIGHTING AND SIGNAGE PLAN – 2	Civil
ML004	MARKING, LIGHTING AND SIGNAGE PLAN – 3	Civil
ML005	MARKING, LIGHTING AND SIGNAGE PLAN – 4	Civil
ML006	MARKING, LIGHTING AND SIGNAGE PLAN – 5	Civil
ML007	MARKING, LIGHTING AND SIGNAGE PLAN – 6	Civil
ML008	MARKING, LIGHTING AND SIGNAGE PLAN – 7	Civil
ML009	MARKING, LIGHTING AND SIGNAGE PLAN – 8	Civil
ML010	MARKING, LIGHTING AND SIGNAGE PLAN – 9	Civil
ML011	MARKING, LIGHTING AND SIGNAGE PLAN – 10	Civil
ML012	MARKING, LIGHTING AND SIGNAGE PLAN – 11	Civil
ML013	MARKING, LIGHTING AND SIGNAGE PLAN – 12	Civil
ML014	MARKING, LIGHTING AND SIGNAGE PLAN – 13	Civil
ML015	MARKING, LIGHTING AND SIGNAGE PLAN – 14	Civil
ML016	MARKING, LIGHTING AND SIGNAGE PLAN – 15	Civil
ML017	MARKING, LIGHTING AND SIGNAGE PLAN – 16	Civil
ML018	MARKING, LIGHTING AND SIGNAGE PLAN – 17	Civil
ML019	MARKING, LIGHTING AND SIGNAGE PLAN – 18	Civil
ML020	MARKING, LIGHTING AND SIGNAGE PLAN – 19	Civil
ML021	MARKING, LIGHTING AND SIGNAGE PLAN – 20	Civil
ML022	MARKING, LIGHTING AND SIGNAGE PLAN – 21	Civil
ML023	MARKING, LIGHTING AND SIGNAGE PLAN – 22	Civil
ML024	MARKING, LIGHTING AND SIGNAGE PLAN – 23	Civil
ML025	MARKING, LIGHTING AND SIGNAGE PLAN – 24	Civil
ML026	MARKING, LIGHTING AND SIGNAGE PLAN – 25	Civil

ML027	PAVEMENT MARKING CURVE DATA TABLE	Civil
ML028	LIGHTING COORDINATE DATA TABLE -1-	Civil
ML029	LIGHTING COORDINATE DATA TABLE -2-	Civil
ML030	LIGHTING COORDINATE DATA TABLE -3-	Civil
ML031	LIGHTING COORDINATE DATA TABLE -4-	Civil
ML032	GUIDANCE SIGN COORDINATE DATA TABLE	Civil
ML033	PAVEMENT MARKING DETAILS -1-	Civil
ML034	PAVEMENT MARKING DETAILS -2-	Civil
ML035	PAVEMENT MARKING DETAILS -3-	Civil
ML036	PAVEMENT MARKING DETAILS -4-	Civil
ML037	PAVEMENT MARKING DETAILS -5-	Civil
E001	LEGEND	Electrical
E002	ELECTRICAL GENERAL NOTES AND ABBREVIATIONS	Electrical
E003	ELECTRICAL STAGING PLAN 1	Electrical
E004	ELECTRICAL STAGING PLAN 2	Electrical
E005	ELECTRICAL STAGING PLAN 3	Electrical
E006	ELECTRICAL STAGING PLAN 4	Electrical
E101	LIGHTING AND EQUIPMENT SCHEDULE 1	Electrical
E102	LIGHTING AND EQUIPMENT SCHEDULE 2	Electrical
E103	CCR TAGGING SCHEDULE	Electrical
E104	CONDUIT AND CABLE TAGGING SCHEDULE	Electrical
E105	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM EXISTING	Electrical
E106	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM - ELECTRICAL PHASE 1	Electrical
E107	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM - ELECTRICAL PHASE 2	Electrical
E108	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM DP- 1C DISTRIBUTION PANEL PHASE 2 AND 3	Electrical
E109	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM - ELECTRICAL PHASE 3	Electrical
E110	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM - ELECTRICAL PHASE 4	Electrical
E111	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM DP- 1C DISTRIBUTION PANEL PHASE 4 AND 5	Electrical

E112	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM – ELECTRICAL PHASE 5	Electrical
E113	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM – ELECTRICAL PHASE 6	Electrical
E114	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM DP- 1C DISTRIBUTION PANEL PHASE 6 AND 7	Electrical
E115	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM – PHASE 7	Electrical
E116	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM - ELECTRICAL FINAL PHASE 8	Electrical
E117	FIELD LIGHTING VAULT SINGLE LINE DIAGRAM DP- 1C DISTRIBUTION PANEL FINAL PHASE 8	Electrical
E118	FIELD LIGHTING VAULT PLAN - CCR ROOM - EXISTING	Electrical
E119	FIELD LIGHTING VAULT ELEVATIONS - CCR ROOM - EXISTING	Electrical
E120	FIELD LIGHTING VAULT PLAN - CCR ROOM - ELECTRICAL PHASE 1	Electrical
E121	FIELD LIGHTING VAULT PLAN - CCR ROOM - ELECTRICAL PHASE 2	Electrical
E122	FIELD LIGHTING VAULT PLAN - CCR ROOM - ELECTRICAL PHASE 3	Electrical
E123	FIELD LIGHTING VAULT ELEVATIONS - CCR ROOM – END OF CONSTRUCTION STAGE 1	Electrical
E124	FIELD LIGHTING VAULT PLAN - CCR ROOM - ELECTRICAL PHASE 4	Electrical
E125	FIELD LIGHTING VAULT PLAN- CCR ROOM - ELECTRICAL PHASE 5	Electrical
E126	FIELD LIGHTING VAULT PLAN - CCR ROOM – ELECTRICAL PHASE 6	Electrical
E127	FIELD LIGHTING VAULT ELEVATIONS – CCR ROOM – END OF CONSTRUCTION STAGE 3	Electrical
E128	FIELD LIGHTING VAULT PLAN - CCR ROOM – ELECTRICAL PHASE 7	Electrical
E129	FIELD LIGHTING VAULT PLAN – CCR ROOM – ELECTRICAL PHASE 8 – FINAL	Electrical
E130	FIELD LIGHTING VAULT ELEVATIONS – CCR ROOM - END OF CONSTRUCTION STAGE 4	Electrical
E131	FIELD LIGHTING VAULT – CCR INSTALLATION ELEVATION – TYPICAL	Electrical

E132	FIELD LIGHTING VAULT PLAN – DISTRIBUTION ROOM	Electrical
E133	FIELD LIGHTING VAULT PLAN – DISTRIBUTION BOARDS FINAL LAYOUT	Electrical
E134	DISTRIBUTION BOARD ELEVATION	Electrical
E201	REMOVAL PLAN 1	Electrical
E202	REMOVAL PLAN 2	Electrical
E203	REMOVAL PLAN 3	Electrical
E204	REMOVAL PLAN 4	Electrical
E205	REMOVAL PLAN 5	Electrical
E206	REMOVAL PLAN 6	Electrical
E207	REMOVAL PLAN 7	Electrical
E208	REMOVAL PLAN 8	Electrical
E209	REMOVAL PLAN 9	Electrical
E210	REMOVAL PLAN 10	Electrical
E211	REMOVAL PLAN 11	Electrical
E212	REMOVAL PLAN 12	Electrical
E213	REMOVAL PLAN 13	Electrical
E214	REMOVAL PLAN 14	Electrical
E215	REMOVAL PLAN 15	Electrical
E216	REMOVAL PLAN 16	Electrical
E217	REMOVAL PLAN 17	Electrical
E218	REMOVAL PLAN 18	Electrical
E219	REMOVAL PLAN 19	Electrical
E220	REMOVAL PLAN 20	Electrical
E221	REMOVAL PLAN 21	Electrical
E222	REMOVAL PLAN 22	Electrical
E223	REMOVAL PLAN 23	Electrical
E224	REMOVAL PLAN 24	Electrical
E225	REMOVAL PLAN 25	Electrical
E226	REMOVAL PLAN 26	Electrical
E227	REMOVAL PLAN 27	Electrical
E228	REMOVAL PLAN 28	Electrical
E229	REMOVAL PLAN 29	Electrical
E230	REMOVAL PLAN 30	Electrical

E301	AREA PLAN 1	Electrical
E302	AREA PLAN 2	Electrical
E303	AREA PLAN 3	Electrical
E304	AREA PLAN 4	Electrical
E305	AREA PLAN 5	Electrical
E306	AREA PLAN 6	Electrical
E307	AREA PLAN 7	Electrical
E308	AREA PLAN 8	Electrical
E309	AREA PLAN 9	Electrical
E310	AREA PLAN 10	Electrical
E311	AREA PLAN 11	Electrical
E312	AREA PLAN 12	Electrical
E313	AREA PLAN 13	Electrical
E314	AREA PLAN 14	Electrical
E315	AREA PLAN 15	Electrical
E316	AREA PLAN 16	Electrical
E317	AREA PLAN 17	Electrical
E318	AREA PLAN 18	Electrical
E319	AREA PLAN 19	Electrical
E320	AREA PLAN 20	Electrical
E321	AREA PLAN 21	Electrical
E322	AREA PLAN 22	Electrical
E323	AREA PLAN 23	Electrical
E324	AREA PLAN 24	Electrical
E325	AREA PLAN 25	Electrical
E326	AREA PLAN 26	Electrical
E327	AREA PLAN 27	Electrical
E328	AREA PLAN 28	Electrical
E329	AREA PLAN 29	Electrical
E330	AREA PLAN 30	Electrical
E401	TAXI GUIDANCE SIGN SHCEDULES 1	Electrical
E402	TAXI GUIDANCE SIGN SHCEDULES 2	Electrical
E403	TAXI GUIDANCE SIGN SHCEDULES 3	Electrical
E501	EXISTING ALCMS DIAGRAM	Electrical

E502	FINAL ALCMS SCHEMATICS 1	Electrical
E503	FINAL ALCMS SCHEMATICS 2	Electrical
E504	FINAL ALCMS SCHEMATICS 3	Electrical
E505	FINAL ALCMS SCHEMATICS 4	Electrical
E506	FINAL ALCMS SCHEMATICS 5	Electrical
E507	FINAL ALCMS SCHEMATICS 6	Electrical
E508	FINAL ALCMS DIAGRAM	Electrical
E601	TEMPORARY RUNWAY EDGE LIGHTING AND RDM SIGN – CONSTRUCTION STAGE 1	Electrical
E602	TEMPORARY RUNWAY EDGE LIGHTING AND RDM SIGN – CONSTRUCTION STAGE 3	Electrical
E603	TEMPORARY RUNWAY EDGE LIGHTING AND RDM SIGN – CONSTRUCTION STAGE 4	Electrical
E701	DUCTBANK SYSTEM PLAN	Electrical
E702	DUCTBANK SYSTEM ENLARGEMENT PLAN - EXISTING ELECTRICAL VAULT	Electrical
E801	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TAW	Electrical
E802	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TAA1	Electrical
E803	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TAA3	Electrical
E804	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TAA5	Electrical
E805	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TCI	Electrical
E806	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TAC	Electrical
E807	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TAE	Electrical
E808	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TML	Electrical
E809	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TF	Electrical
E810	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TH	Electrical
E811	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TB2	Electrical

E812	TAXIWAY EDGE LIGHTING CIRCUIT SCHEMATIC - TWG	Electrical
E813	TAXIWAY CENTERLINE LIGHTING CIRCUIT SCHEMATIC TCL1	Electrical
E814	TAXIWAY CENTERLINE LIGHTING CIRCUIT SCHEMATIC TCL2	Electrical
E815	RUNWAY GUARD LIGHTING CIRCUIT SCHEMATIC 927IG AND 927EG	Electrical
E816	RUNWAY GUARD LIGHTING CIRCUIT SCHEMATIC 1634IG AND 1634EG	Electrical
E817	RUNWAY 9-27 EDGE LIGHTING CIRCUIT SCHEMATIC - RE1 AND RE2	Electrical
E818	RUNWAY 16-34 EDGE LIGHTING CIRCUIT SCHEMATIC - 1634E	Electrical
E819	RUNWAY 9-27 CENTERLINE LIGHTING CIRCUIT SCHEMATIC - RC1, RC2, RC3, RC4	Electrical
E820	RUNWAY 9-27 TOUCHDOWN ZONE LIGHTING CIRCUIT SCHEMATIC – TDI	Electrical
E821	SIGNAGE CIRCUIT SCHEMATIC – MS1	Electrical
E822	SIGNAGE CIRCUIT SCHEMATIC – MS2	Electrical
E823	SIGNAGE CIRCUIT SCHEMATIC – GS	Electrical
E824	LANDING ZONE CIRCUIT SCHEMATIC - AMP3	Electrical
E901	FIXTURE INSTALLATION DETAILS 1	Electrical
E902	FIXTURE INSTALLATION DETAILS 2	Electrical
E903	FIXTURE INSTALLATION DETAILS 3	Electrical
E904	FIXTURE INSTALLATION DETAILS 4	Electrical
E905	FIXTURE INSTALLATION DETAILS 5	Electrical
E906	FIXTURE INSTALLATION DETAILS 6	Electrical
E907	FIXTURE INSTALLATION DETAILS 7	Electrical
E908	FIXTURE INSTALLATION DETAILS 8	Electrical
E909	FIXTURE INSTALLATION DETAILS 9	Electrical
E910	FIXTURE INSTALLATION DETAILS 10	Electrical
E911	FIXTURE INSTALLATION DETAILS 11	Electrical
E912	FIXTURE INSTALLATION DETAILS 12	Electrical
E913	FIXTURE INSTALLATION DETAILS 13	Electrical
E914	FIXTURE INSTALLATION DETAILS 14	Electrical
E915	SURFACE SENSOR DETAILS 1 AND BLOCK DIAGRAMS	Electrical

E916	SURFACE SENSOR DETAILS 2	Electrical
E917	REIL INSTALLATION DETAILS 1	Electrical
E918	REIL INSTALLATION DETAILS 2	Electrical
E919	REIL INSTALLATION WIRING DIAGRAM	Electrical
E920	ASLF-2 SEMIFLUSH APPROACH LIGHT INSTALLATION DETAIL	Electrical
E921	ASLF-2 SEMIFLUSH FLASHER INSTALLATION DETAIL	Electrical
E922	ASLF-2 SEQUENCED FLASHER MASTER CONTROL CABINET AND ICC DETAILS	Electrical
E923	ASLF-2 LOOPING WIRING DIAGRAM	Electrical
E924	ASLF-2 LIGHTING WIRING DIAGRAM	Electrical
E925	TYPICAL LIGHTING LAYOUT PLANS 1	Electrical
E926	TYPICAL LIGHTING LAYOUT PLANS 2	Electrical
E927	TYPICAL LIGHTING LAYOUT PLANS 3	Electrical
E928	TYPICAL LIGHTING WIRING DIAGRAMS 1	Electrical
E929	TYPICAL LIGHTING WIRING DIAGRAMS 2	Electrical
E930	TYPICAL TAXI GUIDANCE SIGN INSTALLATION DETAILS	Electrical
E931	TYPICAL HANDHOLE DETAILS	Electrical
E932	TYPICAL DUCTBANK AND CONDUIT DETAILS	Electrical
E933	THREE-PIECE BASE INSTALLATION DETAILS 1	Electrical
E934	THREE-PIECE BASE INSTALLATION DETAILS 2	Electrical
E935	COUNTERPOISE DETAILS	Electrical
S001	STRUCTURAL NOTES, LEGEND AND ABBREVIATIONS	Structural
S002	GUIDANCE SIGN FOUNDATION DETAILS	Structural
S003	REINFORCED CONCRETE PIPE FLARE END DETAIL	Structural
S004	REIL FOUNDATION DETAILS	Structural
N001	SOIL EROSION AND SEDIMENTATION CONTROL PLAN DETAILS AND NOTES	Environmental

The Contract Drawings do not show all of the details of the Work and are intended only to illustrate the character and extent of the Work to be performed. Accordingly, they may be supplemented during the performance of the Work by the Engineer or by the Contractor subject to the approval of the Engineer, to the extent necessary to further illustrate the Work.

An indication on the Contract Drawings of the existence, nature or location of any utilities, structures, obstructions, conditions or materials does not constitute a representation as to the conclusions to be drawn therefrom nor a representation that no others exist in addition to those shown, even in the same location; nor does the absence of any indication on said drawings of the existence, nature or location of any utilities, structures, obstructions, conditions or materials constitute a representation that none exist.

After the Contract has been executed, the Contractor will be furnished six (6) copies of the Specifications and Contract Drawings without charge.

80. SHOP DRAWINGS, CATALOG CUTS AND SAMPLES

The Contractor shall specifically prepare for this Contract all Shop Drawings which may be required in addition to the Contract Drawings or in addition to any other drawings which the Engineer may issue in supplementing the Contract Drawings.

The specific requirements elsewhere set forth in the Specifications for furnishing Shop Drawings, Catalog Cuts and samples for any particular portion of the Contract shall not limit the obligation of the Contractor to furnish Shop Drawings, Catalog Cuts and samples for any other portion when so required by the Engineer.

The Contractor shall submit a general "Submittal Schedule" for the Engineer's review and approval listing the planned transmittal date and estimated number in each specification section category of Shop Drawings, Catalog Cuts, pages of calculations and samples within 30 days after receipt by the Contractor of the acceptance of the Proposal. A more detailed schedule shall be submitted no less than 30 calendar days prior to the actual date of any submittal.

After checking and verifying all field measurements and after complying with applicable procedures specified hereunder, the Contractor shall submit to the Engineer for review and approval, in accordance with the approved schedule of Shop Drawing submissions, or for other action if so indicated by the Engineer, six copies, unless otherwise requested, of all Shop Drawings which will bear a specific written indication that the Contractor has reviewed the submission for conformance to the requirements of the Contract Drawings and Specifications.

The Port Authority uses Oracle Primavera Contract Management (formerly known as Expedition) software to track the status of Submittals provided by the Contractor. In order to facilitate this electronic tracking, the Contractor shall use the transmittal form that is provided at the pre-construction meeting, and shall forward it to the Engineer via a MAPI compliant e-mail system (e.g. Microsoft Outlook, CC mail, Lotus notes, etc.).

The Contractor's transmittals of Submittal data shall fully comply with the numbering and naming conventions and other procedures that will be provided by the Engineer to the Contractor at the pre-construction meeting.

All submissions shall contain specific reference to the contract drawing and technical specification section to which they apply, as indicated below or as otherwise identified, as the Engineer may require. In general, submissions shall specifically reference Contract Drawing numbers or Specification section numbers for which the item pertains. The data shown on the Shop Drawings shall be complete with respect to quantities, dimensions, conformance to the specified performance and design criteria, materials, test results and similar information to enable the Engineer to review the submittal as required.

The Contractor shall also submit six copies to the Engineer for review and approval pursuant to the approved submittal schedule, of all Catalog Cuts and samples for conformance to the requirements of the Contract Drawings and Specifications. All Catalog Cuts and samples shall have been reviewed by the Contractor and shall be accompanied by a specific written indication that the Contractor has reviewed the submittal for conformance with the Contract Drawings and Specifications and shall be identified clearly as to material, supplier, manufacturer's procedures and pertinent data such as catalog numbers and the use for which intended.

Before submission of each Shop Drawing, Catalog Cut and sample, the Contractor shall have determined and verified all quantities, dimensions, conformance to the specified performance and design criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed and coordinated each Shop Drawing or Catalog Cut with other Shop Drawings and Catalog Cuts and with other requirements of the Work.

At the time of each submission, the Contractor shall give the Engineer specific written notice of each variation in any Shop Drawing, Catalog Cut and sample from the requirements of the Contract Drawings or Specifications and, in addition, shall cause a specific notation of each such variation to be made on each submittal to the Engineer, for review and approval of each such variation.

The Engineer's review and approval of Shop Drawings, Catalog Cuts or samples shall not relieve the Contractor from responsibility for any variation from the requirements of the Contract Drawings or Specifications unless the Contractor has in writing called the Engineer's attention to each such variation at the time of submission as required hereunder and the Chief Engineer has given written approval of each by an express specific written notation thereof incorporated in or accompanying the Shop Drawing, Catalog Cut or sample approval. Approval of Shop Drawings, Catalog Cuts and samples which are inconsistent with the requirements of the Contract Drawings and Specifications shall not be deemed to waive or change such requirements or to relieve the Contractor of his obligations to perform such requirements unless the Chief Engineer shall expressly and specifically state that he is waiving or changing such requirements, as stated above.

Where a Shop Drawing, Catalog Cut or sample is required no related Work shall be performed prior to the Engineer's review and approval of the submission.

The format for Shop Drawings prepared by the Contractor shall be as follows: Standard "D" size drawings with outside cut line dimensions of 22 inches by 34 inches and showing in detail all dimensions and description of materials. Two borders shall be drawn. The first shall be drawn one-half inch from the outside edges (top, bottom, left and right). The second shall be drawn inward to the drawing, one-half inch from the top, bottom and right border lines and one and one-half inch from the left border line. The inside borders on these drawings shall be 20 inches by 31 inches. A title block shall be shown on the right side of the drawing adjacent to the inside border identifying the Contractor's Name, Contract Title, Contract Number, cross-referenced Contract drawing number, Specification reference number and related paragraph and applicable signatures. These drawings shall be arranged in systematic order and numbered consecutively.

Upon receipt of the submittal, the Engineer will review the Shop Drawing, Catalog Cut or sample for conformance to the design information and materials shown on the Contract Drawings and contained in the Specifications. Approval by the Engineer shall not constitute a complete review or approval of the means, methods, techniques, sequences or procedures of construction, except where a specific means, method, technique, sequence or procedure of construction is specifically delineated in or required by the Contract Drawings or Specifications, and the approval shall not constitute a review and approval in regard to safety precautions or programs incident thereto. The review and approval of a separate item will not in itself indicate approval of the assembly in which the item functions. Any design shown on the Shop Drawings and prepared by the Contractor, his subcontractors, their detailers, or their professional engineers is the complete responsibility of the Contractor.

Within the number of working days hereinafter specified after receipt of the Shop Drawing prints, the Engineer shall approve or not approve the same or require corrections or additions to be made thereon. When a shop drawing is not approved or if additions or corrections are required, the Engineer shall return within this period one of the six copies submitted and the Contractor shall make the revisions, corrections or additions shown thereon to be made. The Contractor shall resubmit six prints showing the drawing corrected as required. The Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Engineer on the previous submittal. Each drawing shall be corrected as required until the approval of the Engineer is obtained. After each resubmission, the Engineer shall have the number of working days hereinafter specified in which to approve revisions or corrections.

The number of working days within which the Engineer will advise the Contractor as to whether the Shop Drawings are approved, not approved, or require corrections or additions to be made thereto shall be as follows, except that 20 working days shall be required for the Engineer to review shop drawings submitted with design calculations.

No. of Dwgs. Submitted Within 5 Consecutive Working Days for Each Discipline(*)	No. of Working Days for Engineer To Review Shop Drawings
Up to 50	10
51 to 75	15
More than 75	20
* Disciplines shall be defined as follows: Structural, Architectural, Civil, Geotechnical, Mechanical, Electrical, Traffic and Environmental.	

Failure of the Contractor to provide 30 calendar days advance notice to the Engineer of any submittal shall result in a five (5) working day extension of the number of working days stated in the chart above. In no event shall an extension of the Engineer's review time provided for in this section relieve the Contractor from its duty to meet all contractual Milestone dates.

After approval has been given to any Shop Drawing or Catalog Cut no change will be permitted thereon unless approved in writing by the Engineer.

Before final payment for the Work is made, the Contractor shall submit to the Engineer only those previously approved or approved as noted Shop Drawings, which have been revised by field changes.

The Contractor shall mark-up the approved and approved as noted Shop Drawings directing specific attention to revisions reflecting the permanent construction as actually made. In accordance with the requirements specified in this numbered Section, the Contractor shall submit one original print of these drawings, marked "FINAL SHOP DRAWING – NOT FOR REVIEW", dated, and signed by the Contractor to the Engineer for verification. By signature, the Contractor is verifying that the drawing reflects the as-constructed condition.

All drawings, data, calculations and other papers of any type whatsoever, whether in the form of writing, figures or delineations, which are prepared in connection with this Contract and submitted to the Authority shall become the property of the Authority. The Authority shall have the non-exclusive right to use or permit the use of all such drawings, data and other papers and any ideas or methods represented thereby for any purpose and at any time without additional compensation. No such papers shall be deemed to have been given in confidence. Any statement or legend to the contrary in connection with such drawings, data or other papers and in conflict with the provisions of this paragraph shall be void and of no effect.

81. SUBSTITUTION

Where a proprietary item or make is specified or mentioned herein or called for or mentioned on the Contract Drawings and the phrases "similar and equal to" or "approved equal" are used in connection therewith, the utilization of any other item or make will be deemed a substitution. Substitution for the proprietary item or make specifically named may be made only in accordance with the Section hereof entitled "Workmanship and Materials" and in accordance with the following.

Whenever materials or equipment are specified or described in the Contract Drawings or Specifications by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of another supplier or manufacturer may be accepted by the Engineer if sufficient information and proof is submitted by the Contractor to permit the Engineer to determine that the material or equipment proposed is equivalent or equal to that named and the Engineer approves the substitution. The procedure for review by the Engineer will include the following. Requests for review of substitute items of material and equipment will not be accepted by the Engineer from anyone other than the Contractor. If the Contractor wishes to furnish or use a substitute item of material or equipment, the Contractor shall make a timely written application to the Engineer for approval thereof, certifying that the proposed substitution will perform at least the identical functions and achieve at least the identical results called for by the specified product and otherwise be equal to the specified product with regard to, but not limited to, durability, maintenance, strength, energy costs and record of proven performance. The application shall state that the evaluation and approval of the proposed substitution shall not delay the Contractor's completion of the Work as required by the Contract, whether or not approval of the substitution will require a change in the construction and, in no event will the Contractor be granted an extension of time for completion of any portion of the Work for reasons related directly or indirectly to the evaluation of the proposed substitution or to the proposed substitution itself. Any variations of the proposed substitution from that specified shall be identified in the application, and maintenance, repair and replacement services for the substitution shall be indicated. The Engineer may require the Contractor to furnish at the Contractor's expense additional laboratory test data concerning the proposed substitution.

Such submission to the Engineer shall be made only by including the requested substitution in the list of materials required to be submitted to the Engineer in accordance with the Section hereof entitled "Inspections and Rejections" within forty-five calendar days after the receipt of the acceptance of the Contractor's Proposal. After the approval of said list, no substitutions will be permitted, except that a brand or make named in the Specifications may be submitted for approval in lieu of a brand or make on said list. Any such submission shall not imply, or impose on the Engineer, any obligation whatsoever to discuss, disclose or justify the reasons for his opinion, approval, acceptance or rejection.

The Engineer shall be the sole judge of as to whether a proposed substitution will be approved, and no substitution shall be ordered or utilized without the Engineer's prior written approval. The Engineer may require Contractor to furnish at Contractor's expense a special performance guarantee or other assurance with respect to any approved substitution. Furthermore, the approval of any substitute proprietary item or make shall not in any way entitle the Contractor to additional compensation therefor.

Notwithstanding such approval, however, the Contractor assumes the risk that such approved substitute item or make is not equal to that shown or specified and if at any time the substitution shall appear not to be so equal he shall replace the substitution with that originally shown on the Contract Drawings or called for in the Specifications at his own cost and reimburse the Authority for any loss occurring on account of the substitution failing to be equal, notwithstanding that it had been previously approved for use by the Engineer.

The construction called for by the Contract Drawings and Specifications may be adapted for a particular proprietary item or make of material or equipment. Therefore, if any construction not required by the Contract Drawings or Specifications in their present form is necessary or desirable because of the use of substitute item or make of material or equipment (even though such other item or make is approved by the Engineer), such construction shall be furnished or performed by the Contractor at his expense and subject to the approval of the Engineer.

82. WORKMANSHIP AND MATERIALS

Workmanship and materials shall in every respect be free from defects of any kind and shall be in accordance with the best modern practice and whenever the Contract Drawings, Specifications or directions of the Engineer admit of a doubt as to what is permissible or fail to note the quality of any construction the interpretation which calls for the best quality is to be followed. Workmanship shall conform to applicable Specifications, manufacturer's instructions and recommendations for installation of products for the applications shown on the Contract Drawings, all of which shall be subject to the provisions of the Section of Division 1 GENERAL PROVISIONS entitled "Inspections and Rejections".

Materials and Equipment incorporated into the Work shall be new except as may be otherwise herein specifically required, and shall comply with make, size, type and quality specified, or as specifically approved in writing by the Chief Engineer in accordance with the Section of Division 1 GENERAL PROVISIONS entitled "Substitution".

Reference to standards of any society, institution, association, or governmental authority in the Specifications or on the Contract Drawings, whether specific or by implication, shall mean for such standards which are part of the building code in effect for Work of this Contract, the edition date published in such code; and such references which are not part of the building code, shall mean the latest edition date in effect at the time of opening of Proposals upon the present Contract unless specifically stated otherwise.

In addition, various paragraphs of these Specifications may contain references to certain standard or tentative specifications or requirements of various organizations. Unless otherwise stated, these references are to be construed as referring to the specifications and requirements in effect on the date set for opening Proposals upon the present Contract.

If required by the Engineer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment to be employed by the Contractor in performing the Work. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the approved instructions of the applicable supplier except as otherwise provided in the Contract Drawings or Specifications.

In case of a discrepancy between a description or requirement in the Contract Drawings and Specifications for any material or equipment and a catalog number or other designation for the same material or equipment (even though stated to be acceptable), the description or requirements shall control.

All inventions, ideas, designs and methods contained in the Specifications and Contract Drawings in which the Authority has or may acquire patent, copyright or other property rights are hereby expressly reserved for the exclusive use of the Authority. The Specifications and Contract Drawings contain confidential information which is disclosed only to enable this Contract to be performed. Said Specifications and Drawings must not be used for any purpose detrimental to the interest of the Authority and must not be produced or copied in whole or in part or used for furnishing information to others without the written consent of the Authority, provided, however, that the Contractor may, when the performance of the Contract so requires, furnish said information to others for the purpose of engaging or informing subcontractors and materialmen.

If, in accordance with this Contract, the Contractor furnishes research, development or consultative services in connection with the performance of the Contract and if in the course of such research, development or consultation patentable subject matter is produced by the Contractor, its officers, agents, employees, subcontractors or materialmen, the Authority shall have, without cost or expense to it, an irrevocable, non-exclusive, royalty-free license to make, have made, and use, either itself or by anyone on its behalf, such subject matter in connection with any activity now or hereafter engaged in or permitted by the Authority. Promptly upon request by the Authority, the Contractor shall furnish or obtain from the appropriate person a form of license satisfactory to the Authority, but as between the Contractor and the Authority the license herein provided for shall nevertheless arise for the benefit of the Authority immediately upon the production of said subject matter and shall not await formal exemplification in a written license agreement as provided for above. Such license may be transferred by the Authority to its successors, immediate or otherwise, in the operation or ownership of any real or personal property now or hereafter owned or operated by the Authority, but such license shall not be otherwise transferable. The FAA shall have the same rights as the Authority under this paragraph.

The right to use all material, software, firmware, compositions of matter, manufactures, apparatus, appliances, processes of manufacture or types of construction required in connection with this Contract and to which a patent, copyright or other intellectual property right applies or may apply shall be obtained by the Contractor without separate or additional compensation whether the same is patented, copyrighted or otherwise protected as an intellectual property right before, during or after the performance of the Contract.

The Contractor shall indemnify the Authority against and save it harmless from all loss and expense incurred in the defense, settlement or satisfaction of any claims in the nature of patent, copyright or other intellectual property right infringement arising out of or in connection with the Authority use, in accordance with the preceding two paragraphs of this numbered Section, of such subject matter or material, software, firmware, compositions of matter, manufactures, apparatus, appliances, processes of manufacture or types of construction to which a patent, copyright or other intellectual property right applies or may apply. If requested by the Authority and if notified promptly in writing of any such claim, the Contractor shall conduct all negotiations with respect to and defend such claim without expense to the Authority. If the Authority be enjoined from using any of the facilities which form the subject matter of this Contract and as to which the Contractor is to indemnify the Authority against patent, copyright or other intellectual property right claims, the Authority may, at its option and without thereby limiting any other right it may have hereunder or at law or in equity, require the Contractor to supply, temporarily or permanently, facilities not subject to such injunction and not infringing any patent, copyright or other intellectual property right or to remove all such facilities and refund the cost thereof to the Authority or to take such steps as may be necessary to ensure compliance by the Authority with such injunction, all to the satisfaction of the Authority and all without cost or expense to the Authority.

83. INSPECTIONS AND REJECTIONS

All Work and all construction, processes of manufacture and methods of construction involved in or related to the performance of the Work shall be at all times and places subject to the inspection of the Engineer, acting personally or through his Inspectors, and the enumeration in these Specifications of particular portions of such Work, construction, processes of manufacture or methods of construction which will or may be inspected by the Engineer or such Inspectors shall not be deemed to imply that only such Work, construction, processes of manufacture and methods of construction will or may be so inspected. The Engineer shall be the judge of the quality and suitability of the Work, construction, processes of manufacture and methods of construction for the purposes for which they are used or to be used. Should they fail to meet his approval they shall be forthwith reconstructed, made good, replaced or corrected, as the case may be, by the Contractor at his own expense. Rejected material shall be removed immediately from the site. The fact that the Inspectors have approved the materials and workmanship shall not relieve the Contractor from his obligation to supply other material and workmanship when so ordered by the Engineer.

The Contractor, at his own expense, shall furnish such facilities and give such assistance for inspection as the Engineer may direct. In the case of materials required by the Specifications to be inspected in the factory or plant, and in the case of any other items which the Engineer may designate, the Contractor shall secure for the Engineer and his Inspectors free access to all parts of such factories or plants and shall furnish to the Engineer three copies of purchase orders, two copies of mill shipping statements and four copies of shipping statements. Moreover, in the case of such materials to be factory or plant inspected, the Contractor shall give at least ten days' notice to the Engineer of his intention to commence the manufacture or preparation of such materials.

Other than the materials and equipment specifically required to be inspected at the manufacturer's factory or plant, all materials will be inspected at the construction site and any portions thereof which are rejected by the Engineer shall be immediately removed from the construction site by the Contractor and shall be replaced with new materials by the Contractor at his own expense.

In the case of materials to be inspected at the construction site, the Contractor shall submit a list of all such materials in triplicate to the Engineer for his approval prior to ordering same. The list shall be submitted within forty-five calendar days after receipt of the notice of acceptance and shall contain the following information:

A. Classification of submittal in accordance with the following:

Class I - A submittal for record of an expressly specified item.

Class II - A submittal of an item which conforms to an express generic specification or a submittal which is deemed by the Contractor to be identical to an expressly specified item.

Class III - A submittal which is deemed by the Contractor to be functionally equivalent but not identical to a specified item.

B. In the case of Class II and Class III, the Contractor shall supply adequate information to the Engineer to enable the Engineer to compare the specified item and the proposed substitution. Information shall include, but need not be limited to, technical specifications, Catalog Cuts, drawings, references to existing installations and test data, or any other data required by the Engineer.

C. In the case of fabricated materials for which Shop Drawings are to be prepared, a brief description of the material and the statement "see Shop Drawings".

D. In the case of materials or equipment listed in manufacturer's catalogs, the list shall contain the vendor's name, the manufacturer's name, brand name, style designation, catalog number and, where the Specifications require catalog cuts, the statement "see catalog cut".

E. In the case of materials or equipment for which Shop Drawings are not to be prepared, and which are not listed in any catalog, the list shall contain a complete description of the material or equipment, which shall be in sufficient detail to describe completely the materials or equipment and quality therefor.

The Engineer shall advise the Contractor whether said list is approved or requires corrections or additions within the number of working days indicated in the chart below:

Type of Submittal	No. of Working Days for Engineer to Approve/Disapprove Items
Class I Material submittals	10
Portland Cement mix designs that require confirmation of the 28-day properties	35
Changes in asphalt mix designs that need to be confirmed with a batch mix at the plant	35
Class II Material submittals	20
Class III Material submittals	30

Failure of the Contractor to provide 30 calendar days advance notice to the Engineer of any submittal shall result in a five (5) working day extension of the number of days stated in the chart above. In no event shall an extension of the Engineer's review time provided for in this section relieve the Contractor from its duty to meet all contractual Milestone dates.

Within ten working days after receipt of said list, the Engineer shall notify the Contractor of which items are approved and which disapproved. Within two working days thereafter, the Contractor shall resubmit a new list covering those items which were disapproved. After each such re-submission the Engineer shall have a similar period of ten days in which to approve or disapprove.

Should materials or equipment be delivered to the construction site without having been placed on the aforementioned list and approved, it shall be immediately removed from the construction site by the Contractor at his own expense.

84. MANUFACTURERS' CERTIFICATION

Where materials and equipment are required by these Specifications to conform to certain standard or tentative specifications or requirements of any organizations, including American Society for Testing and Materials, American National Standards Institute, Association Rules for Grading Lumber, Federal Specifications, National Electrical Manufacturers Association, American Association of State Highway and Transportation Officials, American Water Works Association and the International Municipal Signal Association, the Contractor shall furnish to the Engineer the manufacturer's written certification that each of the materials or equipment conforms to the foregoing standard or tentative specifications. The certification shall be delivered to the Engineer prior to installation of the materials to which it refers. Such certifications shall not be binding or conclusive on the Authority and may be rejected at any time by the Engineer if incorrect, improper or otherwise unsatisfactory in his opinion.

85. NO RELEASE OF CONTRACTOR

Any provision of this Contract for testing, inspection or approval, and any actual testing, inspection or approval, of any materials, workmanship, plant, equipment, drawings, program, methods of procedure, or of any other thing done or furnished or proposed by the Contractor to be done or furnished in connection with the Contract is for the benefit of the Authority not the Contractor. Any approval of such things shall be construed merely to mean that at that time the Engineer knows of no good reason for objecting thereto. No such provision for testing or inspection, no omission of testing or inspection, and no such approval shall release the Contractor from his full responsibility for the accurate and complete performance of the Contract in accordance with the Contract Drawings and Specifications or from any duty, obligation or liability imposed upon him by the Contract or from responsibility for injuries to persons or damage to property.

86. ERRORS AND DISCREPANCIES

If, in the performance of the Contract, the Contractor discovers any errors or omissions in the Contract Drawings or Specifications, or in the marks, lines and elevations furnished by the Authority in the construction undertaken and executed by him, he shall immediately notify the Engineer and the Engineer shall promptly verify the same.

If with the knowledge of such error or omission and prior to the correction thereof, the Contractor proceeds with any construction affected thereby, he shall do so at his own risk and the construction so done shall not be considered as construction done under and in performance of this Contract unless and until approved and accepted.

87. DIFFERING SUBSURFACE CONDITIONS

If during the performance of Work, the Contractor becomes aware of any unanticipated subsurface conditions or has cause to suspect the presence of such condition, then the Contractor shall immediately notify the Engineer, or designee thereof verbally, to be followed immediately by written notification. The Contractor shall specify the nature, location, and impact on the Work of such conditions. The Contractor shall immediately stop Work in and secure the area against injury to persons or damage to property pending further instructions from the Engineer.

The Contractor shall then conduct all necessary investigations and testing of the subsurface conditions as directed by the Engineer to identify the character and extent of the unanticipated subsurface conditions and/or to satisfy applicable Federal, State and local laws, codes and ordinances and regulations and shall notify the Engineer accordingly. The investigation program shall be submitted to the Engineer for review and approval.

In the event the Contractor discovers such subsurface conditions during the performance of the Work and (i) special handling of such condition is necessary and required for the performance of the Work as determined by the Engineer; (ii) such special handling cannot be avoided or mitigated by the exercise of reasonable measures by the Contractor; and (iii) the Contractor actually incurs increased costs caused by such condition that could not have been reasonably anticipated from the Contract Drawings, Reference Drawings and Specifications and inspection of the construction site; then in such event, as approved by the Engineer, the Contractor shall, notwithstanding any provision in this Contract to the contrary, be compensated for such costs for special handling, including the necessary investigations and testing of subsurface conditions, in accordance with the provisions of the Form of Contract clause entitled "Compensation For Extra Work".

88. ACCIDENTS AND FIRST AID PROVISIONS

The Contractor shall promptly report in writing to the Engineer and to the Authority Manager, Claims Administration all accidents whatsoever arising out of or in connection with the performance of the Contract, whether on or adjacent to the construction site, which result in death, injuries or property damage, giving full details and statements of witnesses. In addition, if death or serious injuries or serious damage is caused, the accident shall be reported immediately by telephone to both of the said representatives of the Authority.

The Contractor shall provide at the construction site such equipment and medical facilities as are necessary to supply first aid service, in case of accident, to any who may be injured in the progress of the Contract. He shall have standing arrangements for the removal and hospital treatment of any person who may be injured while engaged in the performance of the Contract.

If any claim is made by any third person against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the fact in writing to the aforementioned representatives of the Authority, giving full details of the claim.

89. SAFETY PROVISIONS

In the performance of the Contract, the Contractor shall exercise every precaution to prevent injury to workers and the public or damage to property.

He shall, at his own expense, provide temporary structures, place such watchmen, design and erect such barricades, fences and railings, give such warnings, display such lights, signals and signs, exercise such precaution against fire, adopt and enforce such rules and regulations, and take such other precautions as may be necessary, desirable or proper, or as may be directed.

The Contractor shall employ for Work of the Contract a competent person conforming to the requirements of the Code of Federal Regulations 29 CFR 1926.32(f) who shall be designated by the Contractor as authorized to perform the duties required by 29 CFR 1926 et seq. as applicable for Work of this Contract.

Obtain and submit to the Engineer one copy of material safety data sheet (MSDS) conforming to the requirements of 29 CFR 1910.1200(g) for each hazardous chemical utilized for permanent and consumable materials employed for Work of this Contract.

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss, including but not limited to:

A. All employees on the Work, the public, and other persons and entities who may be affected thereby;

B. All the Work, materials and equipment to be incorporated therein, whether in storage on or off the site; and

C. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

The Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and the Contractor has removed all workers, material and equipment from the construction site, or the issuance of the Certificate of Final Completion, whichever shall occur last.

Until fire protection needs are supplied by permanent facilities under this Contract, install and maintain temporary fire protection facilities. Comply with requirements of National Fire Protection Association NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alteration and Demolition Operations".

The Contractor shall employ only such men as are physically fit and are free from contagious or communicable diseases.

The Contractor shall use only machinery and equipment adapted to operate with the least possible noise, and shall so conduct his operations that annoyance to occupants of nearby property and the general public will be reduced to a minimum.

The bringing of intoxicating substances onto the construction site and the use or consumption of intoxicating substances at the construction site are prohibited. It shall be the responsibility of the Contractor to insure that all employees of the Contractor and of all subcontractors, materialmen and any other persons under contract to or under the control of the Contractor shall comply with the provisions of this paragraph.

The Contractor shall daily clean up all refuse, rubbish, scrap materials and debris caused by his operations, to the end that at all times the construction site shall present a neat, orderly and workmanlike appearance. Before the Certificate of Final Completion of Work will be issued, the Contractor shall remove all surplus materials, falsework, temporary fences and other temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations and shall put the construction site in a neat, orderly condition.

In the event the Contractor encounters at the construction site, material reasonably believed to be asbestos, polychlorinated biphenyl (PCB) or any other hazardous material not shown on the Contract Drawings or mentioned in the Specifications, the Contractor shall immediately stop Work in the area affected and report the condition in writing to the Engineer. Work in the affected area shall not thereafter be resumed by the Contractor except upon the issuance of a written order to that effect from the Engineer.

Within 15 days of the acceptance of his Proposal, the Contractor shall submit to the Engineer for review, the Contractor's Site Safety Program, which shall be specific for the construction site and include a description of the Work to be performed, a hazard assessment of the Work to be performed and the means by which such hazards shall be mitigated. The Contractor's Site Safety Program shall comply with all applicable federal, state, municipal and local and departmental laws and shall include, among other things, the designation by the Contractor of a qualified individual to administer such Site Safety Program.

90. RECYCLING OF CONSTRUCTION DEBRIS MATERIAL

The Contractor shall remove from Authority property all construction debris, demolition debris and other debris material generated from the performance of the Work of this Contract unless the material is deemed acceptable by the Engineer for on-site re-use or recycling in accordance with the technical requirements of this Contract and remains at the Work site. The Contractor shall transport to recycling facilities or re-use and recycle on-site for this Contract, as applicable, no less than 75% by weight of the following types of designated debris material, to the extent arising from the Work of this Contract:

Asphalt Concrete

Portland Cement Concrete

Steel

Excess Unrestricted Soil

During the process of removal of all such designated debris material from Authority property, the Contractor shall submit to the Engineer on a monthly basis a Designated Debris Material Assessment Summary indicating the actual types and quantities by weight of the designated debris material removed for this Contract up to that point in time. In addition, the Designated Debris Material Assessment Summary shall also include types and quantities by weight of designated debris material actually re-used or recycled on-site in this Contract or, if shown on the Contract Drawings, are stockpiled for future use by the Authority. The Designated Debris Material Assessment Summary shall be accompanied by written verification from recycling and landfill destinations identifying the originating Work site, quantity of material delivered and type of debris material for all designated debris material removed from the Work site.

Within 15 days of the acceptance of his Proposal, the Contractor shall submit to the Engineer for review the Contractor's Designated Debris Material Assessment Plan indicating the anticipated types and anticipated quantities by weight and the intended destinations for all such designated debris material to be removed from the Work site. The Designated Debris Material Assessment Plan shall also indicate anticipated types and anticipated quantities by weight of all such designated debris material to remain at the Work site for re-use or recycling in this Contract as applicable.

All removals shall be completed promptly upon the completion of construction under this Contract.

91. DIESEL-POWERED EQUIPMENT

A. The Contractor and its subcontractors shall minimize all air-borne pollutants generated by diesel-powered equipment and vehicles at all times during the performance of this Contract in accordance with this numbered Section. The requirements herein apply to all land-based and barge-mounted diesel-powered construction equipment. Marine propulsion engines, marine auxiliary engines, and dredges used in construction activity are exempt from these requirements.

B. No diesel-powered equipment shall be brought on the construction site without meeting the following requirements unless a waiver has been granted as specified in D. below. In addition, all such equipment and engines shall comply with all Federal, state and local regulations applicable to exhaust emission controls and safety.

1.) Ultra Low Sulfur Diesel (ULSD) Fuel

All diesel-powered equipment to be used in the performance of the Work of this Contract shall use ULSD fuel with an average sulfur content of no more than 15 parts per million (ppm). This requirement applies to on-road and non-road diesel engines. The Engineer may collect samples of the ULSD fuel directly from the fuel tanks of the diesel-powered equipment used on the construction site in order to verify that sulfur concentrations do not exceed 15 ppm. Diesel-powered equipment not using ULSD shall be removed from the construction site or shall immediately comply with the ULSD fuel requirements in this Section as directed by the Engineer and at no additional cost to the Authority.

2.) Emissions Control Devices – Best Available Technology (BAT)

All non-road diesel-powered equipment with a rated horsepower of 50 horse power (hp) or greater and active on the construction site for any portion of a 24-hour workday for more than 20 total consecutive and non-consecutive days shall be retrofitted with Emissions Control Devices (Devices) utilizing the best available technology (BAT). The Devices shall consist of Diesel Particulate Filters (DPFs) or other measures with equivalent particulate matter (PM) removal efficiency, wherever the implementation of such a Device is feasible in the opinion of the Engineer. For non-road diesel-powered equipment rated between 50 hp and 75 hp, Diesel Oxidation Catalysts (DOCs) may be used in place of DPFs.

Both active and passive filter regeneration mechanisms shall be considered for DPFs. In cases where DPFs are not feasible for safety considerations, mechanical reasons, or where the technology would not function properly, the Contractor shall submit a request for a waiver to the Engineer for review and approval prior to the use of such diesel-powered equipment. If the Engineer grants a waiver under these circumstances, then the Contractor shall retrofit the diesel-powered equipment with Flow Through Filters (FTF) if feasible in the opinion of the Engineer. DOCs shall be used in place of DPFs or FTFs unless it is proven to the Engineer by the Contractor that the application of this type of technology is also technically infeasible.

The use of diesel-powered engines greater than 50 hp without tailpipe reduction measures will be permitted pursuant to the Engineer's approval of a written request for a waiver submitted by the Contractor in accordance with D. below.

The use of Devices shall be targeted primarily toward the reduction of PM and secondarily to the reduction of nitrogen oxides (NOX), and shall in no event result in an increase in the emissions of either pollutant. The Devices of best available technology shall be defined as those that are contained in the U.S. Environmental Protection Agency (EPA) Verified Retrofit Technology List, the list of California Air Resources Board (CARB), Verifications, Europe's Verified Technology List (VERT), or as otherwise approved by the Engineer to provide the maximal level of pollutant reductions intended by this Section. For more information, refer to the following websites:

U.S. Environmental Protection Agency Verified Technology List:
http://www.epa.gov/otaq/retrofit/nonroad-list.htm

California Air Resources Board Verified Technology List:
http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm

Europe's Verified Technology List:
http://www.akpf.org/pub/vert_filterliste.pdf

3.) Diesel Construction Equipment Age Requirements

To facilitate the application of verified Emission Control Devices, as well as provide lower baseline emissions, Tier 0 engines shall not be used in the performance of this Contract unless they have been upgraded to Tier 1 and then retrofitted with best available technology devices. As determined by the Engineer, exceptions will be made only for specific engines that are not readily upgraded to Tier 1, and where the Work of this Contract cannot reasonably be performed using alternative engines that comply with this Section. In such cases, the Contractor shall submit a written request for a waiver to the Engineer for review and approval prior to bringing such equipment onto the construction site.

4.) Diesel Engine Idling Policy

The idling time of non-road and on-road vehicles shall be limited to three (3) consecutive minutes as determined by the Engineer with the following exceptions:

a. An on-road or non-road vehicle is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control, or is in queue when engaged in an active operation with other equipment.

b. It is necessary to operate defrosting, heating, or cooling equipment to ensure the safety or health of the driver or passengers.

c. To ensure the safe and proper operation of auxiliary equipment that is located in or on the vehicle, to accomplish the intended use of the vehicle or equipment, but only to the extent so necessary (for example - cranes and concrete mixers).

d. To bring the vehicle to the manufacturer's recommended operating temperature, but only to the extent so necessary.

e. The outdoor ambient temperature is below twenty (20) degrees Fahrenheit.

f. A vehicle is being actively worked on for repairs or maintenance and engine idling is necessary to effectuate such repairs or maintenance.

5.) Electrification

Where electric power is distributed to and available throughout a construction site, electrically powered equipment shall be preferred over diesel-powered versions of that equipment.

C. Submittals:

The Contractor shall submit to the Engineer for review and approval an inventory list for all non-road diesel equipment and engines, and verified Emissions Control Devices. No Work shall commence utilizing diesel-powered non-road equipment rated at 50 hp or greater until the Contractor submits a comprehensive and complete inventory list inclusive of all such equipment, including the specifics of each as detailed below, and same is approved by the Engineer.

1.) The inventory list shall be provided in an electronic format (e.g., Microsoft Word, Access or Excel), and shall include the following:

a. Contract number and title.

b. Owner of equipment's name, address, telephone number and contact person familiar with the operation and maintenance of the equipment and the emission control technologies; whether owner is the Contractor, subcontractor or rental firm.

c. Dates that equipment is anticipated to arrive at and depart from the site.

d. Number, type, make, year of manufacture, manufacturer and serial number.

e. Engine type, tier level, make, horsepower rating, year of manufacture, and serial number.

f. Approximate fuel consumption rate per shift.

g. Anticipated function, duration of use, and days and hours of operation.

h. Retrofit type, make, model, manufacturer, installation date, EPA, VERT or CARB verification number or supporting documentation related to emission control devices.

i. Previous acceptance or waivers granted by the Authority, or the City of New York, or the Metropolitan Transportation Authority, or another public agency that issued a waiver under the same or substantially the same standards.

2.) On-Going Equipment Updates:

Whenever a new or additional piece of diesel-powered non-road equipment is required to complete the Work of this Contract, the Contractor shall submit to the Engineer an update of the equipment inventory list. These updates shall include the actual dates the equipment arrives and departs from the site.

D. Waivers:

The Contractor shall submit a written request for a waiver to the Engineer for review and approval prior to bringing equipment that does not conform to the above requirements onto the construction site. The Contractor shall demonstrate due diligence by providing written documentation of efforts to comply with this Section. For waivers based upon the unavailability of retrofit devices for certain equipment, the Contractor will generally be required to provide written documentation from more than one vendor or supplier of retrofit devices to satisfy this requirement. Waiver requests related to the use of DPFs shall take into consideration actively regenerating filters for equipment with low temperature profiles that typically preclude the application of passively regenerating filtration systems.

Equipment retrofitted with an approved device in connection with another construction contract of the Authority, or the City of New York, or the Metropolitan Transportation Authority is exempt from further retrofitting for three (3) years from the date the retrofit was approved, even if new BAT retrofit devices are available. The Contractor shall submit to the Engineer documentation of approval of a retrofit device by the Authority, or the City of New York, or the Metropolitan Transportation Authority, or another public agency that issued a waiver under the same or substantially the same standards for the equipment in question. In addition, if the Authority, or the City of New York, or the Metropolitan Transportation Authority, another public agency that issued a waiver under the same or substantially the same standards previously waived a requirement contained in this Section for a particular piece of equipment, that equipment shall be exempt from the requirement for three (3) years from the date the initial waiver was granted.

1.) In responding to waiver requests, the following conditions will be taken into consideration with applicable documentation:

a. A BAT retrofit device would pose a safety hazard or impair operator visibility; or

b. A BAT retrofit device would void the engine warranty; or

c. A BAT retrofit device cannot be used for mechanical reasons; or

d. A BAT retrofit device or the engine would not function properly if the BAT retrofit device were installed; or

e. A Tier 0 engine is not readily upgraded to Tier 1, and where the task cannot be reasonably accomplished using alternative engines that do comply with this Section; or

f. The furnishing and installation of a BAT retrofit is more than 30 percent of the fair market value of the construction equipment; or

g. The Authority, or the City of New York, or the Metropolitan Transportation Authority, or another public agency that issued a waiver under the same or substantially the same standards previously approved a BAT retrofit device for the equipment in question. Such approval is valid for three years from the date it was issued; or

h. The Authority, or the City of New York, or the Metropolitan Transportation Authority, or another public agency that issued a waiver under the same or substantially the same standards previously granted a waiver for the equipment in question. Such waiver is valid for three years from the date it was issued.

In addition, the Engineer may, in his or her discretion, grant a waiver based upon excessive costs to satisfy the requirements of this Section, undue burden on the Contractor, marginal benefits, or other relevant factors, provided adequate supporting documentation is submitted by the Contractor.

2.) Waiver requests shall include the following:

a. Name of contractor applying for the waiver.

b. Contract number and title.

c. Owner of equipment's name, address, telephone number and contact person familiar with the operation and maintenance of the equipment and the emission control technologies, whether owner is the Contractor, subcontractor or rental firm.

d. Number, type, make, year of manufacture, manufacturer and serial number.

e. Engine type, make, horsepower rating, year of manufacture, and serial number.

f. Approximate fuel consumption rate per shift.

g. Anticipated function, duration of use, and days and hours of operation.

h. Technical explanation of safety hazard, mechanical constraint, warranty, limited availability, or functionality issues cited as basis for waiver.

i. Written documentation from retrofit device manufacturers, engine manufacturers, or rental companies, as appropriate, supporting the stated reasons for the waiver; for waivers based upon the unavailability of a retrofit device for specified equipment, the Contractor shall provide documents from more than one supplier.

j. If applicable, documentation of previous BAT retrofit approvals granted by the Authority, or the City of New York, or the Metropolitan Transportation Authority, or another public agency that issued a waiver under the same or substantially the same standards for the equipment in question.

k. If applicable, documentation of previous waivers granted by the Authority, or the City of New York, or the Metropolitan Transportation Authority, or another public agency that issued a waiver under the same or substantially the same standards for the equipment in question.

3.) Review of Waiver Application

The Engineer will make a determination whether to approve the Waiver Request no later than 10 days after its receipt.

92. DAILY PROGRESS, EQUIPMENT AND LABOR REPORTS

The Contractor shall furnish to the Engineer at the end of each day Work is performed at the construction site, a memorandum showing for that day (a) the construction performed, (b) the type of equipment used identifying each piece of equipment as owned by the Contractor or rented from others; (c) a statement of any unusual happening that occurred, and (d) the names and number of workers in each trade classification that were employed. Such memorandum shall not be deemed to be a substitute for the notices, time slips, memoranda or other data required under the clauses of the Form of Contract relating to compensation for Extra Work.

93. LAWS AND ORDINANCES

In order to effectuate the policy of the Authority, the Contractor shall comply with all provisions of federal, state, municipal, local and departmental laws, ordinances, rules, regulations and orders which would affect the Contract and the performance thereof and those engaged therein if said Contract were being performed for a private corporation, except where stricter requirements are contained in the Specifications or Contract Drawings, in which event the latter requirements shall apply. However, the Contractor shall not apply for any permits, licenses or variances in the name of or on behalf of the Authority, but shall do so in his own name where required by law, regulation or order or by the immediately preceding sentence. Nor shall the Contractor apply for any variance in his own name without first obtaining the approval of the Authority.

The Contractor shall verify that employees performing Work under this Contract in the United States are legally present in the United States and authorized to work by means of the federally required I-9 program.

94. SIGNS

No advertisement or sign, other than the name and address of the Contractor, will be permitted on any fences, temporary structures or elsewhere on the construction site and such advertisement will be permitted only upon the condition that it is first approved by the Engineer. In any event, the advertisement shall not exceed six feet by eight feet in overall dimensions.

95. CONTRACTOR'S FIELD OFFICE AND REPRESENTATIVE

At a readily accessible point on or near the construction site, the Contractor shall maintain a field office provided with a telephone.

During the performance of any Work at the construction site, the Contractor shall have a representative thereat who shall be authorized by the Contractor to receive and put into effect promptly all orders, directions and instructions from the Engineer. The Contractor's representative shall be provided, at all times, with a conformed copy of this Contract and a set of the Contract Drawings.

Orders and directions may be given orally by the Engineer and shall be received and promptly obeyed by the Contractor or his representative or any superintendent, foreman or other employee of the Contractor who may have charge of the particular part of the Work in relation to which the orders or directions are given. A confirmation in writing of such orders or directions will be given by the Engineer when so requested by the Contractor.

96. SURVEYS

The Engineer will establish a bench mark and a base line at or adjacent to the location of the Contractor's operations. The Contractor shall perform all surveys which may be required for the performance of the Contract. He shall carefully preserve any base line and bench mark which may be established by the Engineer.

The Contractor shall, in addition, furnish to the Engineer, without additional compensation therefor, any or all information and data regarding points, lines, grades, elevations and other survey information established by the Contractor during the performance of the Contract.

Surveys and measurements of quantities for purposes of computing Contractor's compensation shall be made by the Contractor as directed by and in the presence of, or jointly with, the Engineer, at the Engineer's option. Computations of quantities for payment shall be made by the Contractor and shall be subject to the approval of the Engineer.

97. TEMPORARY STRUCTURES

Unless otherwise provided in this Contract, the Contractor shall determine the need for and shall design, furnish and construct all barricades, fences, staging, falsework, formwork, shoring, scaffolding and other temporary structures required in the performance of the Contract, whether or not of the type enumerated in the Specifications or on the Contract Drawings, including those which would be required by law or regulation if this Contract were being performed for a private corporation. All such temporary structures shall be of adequate strength for the purposes for which they are constructed and shall be provided with graphics, warning signs and warning lights as required to inform personnel and the public of the hazards being protected against, and the Contractor shall maintain them in satisfactory condition. The design and drawings for such structures shall be prepared by the Contractor utilizing a professional engineer licensed in the state where the structure will be constructed, and when requested by the Engineer they shall be submitted for his review before being used.

The Contractor shall ensure that each temporary structure is inspected by the professional engineer who designed the temporary structure prior to initial use and submit a schedule of periodic inspections to be performed by such professional engineer to the Engineer for review. The number of periodic inspections of temporary structures to be performed by the professional engineer shall be the minimum required by law or regulation if this Contract were being performed for a private corporation. The Contractor shall also submit a signed and sealed statement of inspection from the professional engineer performing the inspection of the temporary structure, including a statement of fitness for use for the intended purpose of the temporary structure, to the Engineer for review.

Neither such approval, however, nor any requirements of the Engineer, the Specifications or the Contract Drawings shall relieve the Contractor of his responsibility for the design, construction and use of the temporary structures or from any obligations and risks imposed on him under this Contract, and any such approval or requirements shall be deemed merely to relate to minimum standards and not to indicate that the temporary structures are adequate or that they meet the Contractor's obligations under this Contract.

Temporary structures shall be painted with an approved dark color paint and shall be repainted whenever necessary during the period that the Contract is being performed. Upon completion of all Work under this Contract, the temporary structures shall be removed from the construction site.

98. PERMIT AND REQUIREMENTS FOR WELDING

Prior to the commencement of any cutting or welding operations at the construction site, the Contractor shall notify the Engineer and obtain an Authority cutting and welding permit. The Authority will issue this permit without payment of a fee, and application forms may be obtained from any Resident Engineer of the Authority, at his office at the facility. Unless otherwise approved by the Engineer, all cutting and welding operations shall be performed in accordance with the conditions which form a part of said permit. The permit application must be filled out and submitted in duplicate to the Engineer at least forty-eight hours prior to commencing welding or cutting operations at the construction site.

99. FINAL INSPECTION

When, in the opinion of the Contractor, the construction is completed and ready for final inspection, he shall so notify the Engineer in writing and the Engineer will give said construction (including any portions with respect to which Certificates of Partial Completion have been issued) a minute and thorough inspection. Before any Certificate of Final Completion will be issued, any defects or omissions noted on this inspection must be corrected by the Contractor.

100. WARRANTIES

The Specifications may provide for certain warranties of portions of the permanent construction. These warranties are intended for the greater assurance of the Authority and not as a substitute for rights which the Authority might otherwise have. Although such warranties shall be enforceable as provided, neither any requirement of this Contract with respect to warranties by the Contractor nor any guarantee or warranty given to the Contractor or the Authority by any manufacturer shall be deemed to be a limitation upon any rights which the Authority would have, either expressed or implied, in the absence of such guarantees or warranties.

101. UTILITY DATA COLLECTION

In order to assist the Authority with the collection of as-built utility data, notify the Engineer within 48 hours prior to the covering of all underground structures, piping, conduit, cable or duct banks.

Do not build-in, backfill, fill over, around, or in any way cover underground structures, piping, conduit, cable or duct banks until given notice to proceed by the Engineer.

Nothing contained herein shall relieve the Contractor from performing the Work in accordance with the Contract Drawings and Specifications nor release the Contractor from any obligations under or upon this Contract.

102. REQUIREMENTS FOR CRANES AND DERRICKS

During the performance of Work at the construction site, the use by the Contractor or his subcontractors of power-operated equipment that can hoist, lower and horizontally move a suspended load as specified in Federal Register Part II, Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926 Cranes and Derricks in Construction; Final Rule (OSHA), shall be subject to the approval of the Engineer in accordance with this Section.

A. General requirements

1.) Cranes shall be operated by certified crane operators. Certified crane operator shall mean an individual who holds a valid certificate of competence to operate a crane issued by the Commissioner in accordance with the NY State Department of Labor Regulations – Division of Safety and Health Code Rules Part 23 and National Commission for the Certification of Crane Operators (NCCCO).

2.) Determinations will be made in writing by the Engineer on whether cranes and other such equipment meeting OSHA 1926.1400 Scope section (c) entitled "*Exclusions*" shall be exempt from the requirements herein. Such determinations shall in no way relieve the Contractor from conformance with all applicable requirements of this Section and governing codes, including the NY State Department of Labor Regulations – Division of Safety and Health Code Rules Part 23.

B. For each crane, submit the following to the Engineer prior to delivery of the crane to the construction site:

1.) Equipment Owner Identification and Equipment User Identification.

2.) Drawings clearly indicating location of each crane or derrick, all pertinent features of the site, and supporting platforms and structures.

3.) Name of competent person as defined in Federal Register Part II, Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926 Cranes and Derricks in Construction; Final Rule (OSHA).

4.) Monthly and annual crane inspection reports. Attached to such records of inspection shall be a written designation naming the competent person identified in B. 3.) above, signed by the owner or lessee of the crane.

5.) For tower cranes - certification from a Professional Engineer licensed to practice in the State of New York that the supporting system, including slabs, foundations and the underlying soil will support the loads intended to be imposed thereon.

6.) High wind (50 MPH and over) emergency plan.

7.) Name of qualified person as defined in Federal Register Part II, Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926 Cranes and Derricks in Construction; Final Rule (OSHA). OSHA requirements requesting certification by a Professional Engineer shall be fulfilled by a Professional Engineer licensed to practice in the State of New York.

Upon the review and acceptance in writing by the Engineer of all of the above submissions, the Contractor will be permitted to deliver, place and/or assemble the crane at the construction site. Coordinate all such deliveries, placements and/or assemblies with the Engineer.

C. Requirements for cranes upon delivery to the construction site:

1.) Submit a valid certificate of competence to operate a crane and classifications for the operator to the Engineer.

2.) Submit rigger's qualifications to the Engineer.

3.) Cranes shall be equipped with hoisting mechanism brakes capable of sustaining at rest one and one-half times the maximum rated load on a single part line.

4.) Tower cranes shall be equipped with a device for measuring wind velocity. The sensing portion of every such device shall be mounted on the highest point of the crane while the readout of every such device shall be located in the cab or remote control station of the tower crane.

5.) Tower cranes shall be erected in accordance with the manufacturer's recommendations and NY State Labor Regulations Division of Safety and Health, Code Rule Part 23 and under the supervision of a competent, designated person experienced in tower crane erection.

6.) Tower cranes shall be erected so that the jibs and counterweights can swing 360 degrees without striking any building, structure or any other object.

7.) A preventive maintenance program shall be established for each mobile crane, tower crane and derrick based on each manufacturer's recommendations. Dated and detailed records of such programs shall be stored in the crane cab.

8.) No load-bearing component or part of any mobile crane, tower crane or power-driven derrick shall be replaced by another component or part nor shall any mobile crane, tower crane or derrick be modified by the addition thereto or the removal therefrom of any load-bearing component or part unless such replacement or modification shall be as certified by either the manufacturer or builder of such crane or derrick or by a Professional Engineer licensed to practice in the State of New York.

D. Requirements for testing and inspection of cranes at the construction site:

1.) Crane ropes shall be inspected on a daily and monthly basis and copies of the monthly inspection reports shall be stored in the crane cab.

2.) Prior to initial use, newly erected tower cranes shall undergo a static overload test in the direction of least stability. Such test shall consist of suspending a load at the rated load and at the maximum radius for a period of at least one hour. Subsequent to such test, settlement of the equipment and load-bearing foundation shall be within the limits specified by the tower crane manufacturer. A written report of such test shall be stored in the crane cab and a copy submitted to the Engineer.

3.) Should the monthly or yearly inspection expire while the crane or derrick is located at the construction site, the Contractor shall ensure that the owner of the crane or derrick performs the monthly and /or annual inspection. Submit proof of the inspection to the Engineer.

4.) Where the mast of any tower crane runs through floor openings in the building or other structure in which the crane is mounted and the mast is secured by wedges or braces, such wedges or braces shall be inspected for tightness and dislocation at least twice each Work period.

E. Requirements for operation of cranes at the construction site:

1.) The operator of any crane or derrick shall not leave his position at the controls while any load is suspended nor shall any person be permitted to work or pass under a stationary suspended load.

2.) Pre-lift meetings shall be held in accordance with Federal Register Part II, Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926 Cranes and Derricks in Construction; Final Rule (OSHA). Submit pre-lift meeting minutes to the Engineer.

3.) In the performance of construction where concrete is raised by mobile cranes, such loads raised to elevations more than 150 feet shall be deposited or discharged only in hoppers or other appropriate facilities which are so located as to permit operation of the boom of any such crane at a minimum load radius.

4.) Tower cranes shall not be operated when the wind speed is at any time greater than 30 miles per hour. Tower cranes shall not be raised to new operating levels when the wind speed exceeds 20 miles per hour.

5.) Stability, repairs, adjustments, hoisting, rigging, locking devices, and operating procedures shall comply with the Federal Register Part II, Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926 Cranes and Derricks in Construction Final Rule (OSHA) except when NY State Department of Labor Regulations - Division of Safety and Health Code Rules Part 23 does not allow alternatives.

F. The estimated review time for all crane and derrick submissions to the Engineer is five (5) business days. If the Contractor has not received any reply by the fourth day of the review, contact the Engineer.

G. If any governing agency issues a letter of deficiency to the Authority or stop work order to the Contractor while the crane or derrick is located at the construction site, the Contractor shall cooperate fully with the governing agency to ensure that all acceptable corrective actions will be taken immediately. Keep the Engineer advised during the performance of all remedial Work.

H. Cranes or derricks performing an emergency use pursuant to an order or direction issued by the Engineer shall be exempt from the submission requirements herein except for the requirements specified in B. 4.) and C. 1.) above.

103. TEMPORARY UTILITY SERVICES

Operate and maintain temporary services and facilities in a safe and efficient manner. Modify as required throughout progress of the Contract, and remove from Authority property when no longer required, or replaced by the use of completed permanent facilities as approved by the Engineer.

Make arrangements for securing, and pay all costs for heat, light, power, water, and other services which may be required for the performance of the Contract.

104. TEMPORARY SANITARY FACILITIES

Make arrangements for securing and pay all costs for temporary toilets, wash facilities and drinking water including toilet tissue, paper towels, paper cups and similar disposable materials for use by the Contractor, subcontractors, materialmen or other persons over whom the Contractor has control. Comply with regulations and health codes, which would be applicable if the Authority were a private corporation, for the type, number, location, operation and maintenance of fixtures and facilities. Install facilities where directed by the Engineer, and remove from Authority property when no longer required.

105. PROGRESS SCHEDULE

A. Schedule Requirements

1.) The Contractor shall, at his own expense, prepare, maintain and update detailed electronic progress schedules for the Engineer's review and approval. All submittals required herein shall be in the form and content stipulated in this Section. Each progress schedule shall bear the signature of the Contractor's authorized representative. The progress schedules/graphics required by this Contract shall be produced using the latest version of Oracle – Primavera P6 scheduling software.

2.) The schedule shall be prepared by a scheduler who is an employee of the Contractor with 3 (three) years minimum experience in the development and updating of Critical Path Method schedule networks for projects of a complexity comparable to this Contract, or by an outside entity with similar experience specializing in project controls. The Contractor's senior management personnel shall actively participate in the development and updating of the schedule.

3.) Progress schedules shall be sufficiently detailed to accurately depict all the Work and milestones (including acquisition of any required permits, design progress, procurement of subcontractors, key submittals and approvals, materials procurement and construction activities performed by the Contractor and his subcontractors) and shall graphically represent the logical sequence and duration of activities, all in accordance with the requirements of the Contract. The information provided in progress schedules shall also include, but not be limited to, the interdependencies between the Contractor's Activities and all other Activities required for the successful completion of the Contract, e.g., those to be performed by utility companies or by other entities. All Milestone dates specified in the Contract shall be represented in the schedule by Milestone activities that are logically interrelated to the Work that must be accomplished in order to achieve the Milestone.

4.) All activities, except the Contract Start Milestone and Contract Completion Milestone shall be linked to predecessor(s) and successor(s).

5.) The Contractor's schedule shall incorporate the Activity Code Structure shown in Attachment A, and such other coding as may be required by the Engineer.

6.) The Contractor shall load construction activities with budget information and shall identify the cost to perform Work for each construction and management activity. The sum of the costs assigned to all activities shall be equal to the Contract value. No activity costs shall be assigned to the preparation and review of submittals and materials fabrication or procurement.

7.) To assist the Contractor in preparing its progress schedule, a sample Network Diagram is shown in Figure 1. The sample is intended merely as an example of a format for the Contractor's guidance. The types of data shown are the types of data expected to be shown on the Contractor's Network Diagram. However, the information presented in the sample Network Diagram shall not be misinterpreted as either representing a plan for the Contractor's Network Diagram or a depiction of the level of detail which will be required in such diagram.

8.) The submittal of Progress Schedules under this Section shall not be deemed to be a substitute for the reporting requirements of the Section of Division 1 entitled "Daily Progress, Equipment and Labor Reports".

B. Schedule Terminology

Schedule terminology used in this Contract shall have the meaning described below:

1.) Activity: A discrete item of Work with a Duration that can be clearly defined; a synonym for task. Unless otherwise permitted in writing by the Engineer, an activity's duration shall be not more than 14 calendar days or 10 working days except for non-construction activities, such as procurement cycles, material delivery, soil consolidation, etc. Each activity (task) description shall clearly identify the Work to be performed. No two or more activities in the schedule shall have exactly the same description.

2.) Activity Codes: Activity Codes allow each activity to be grouped into specific classifications such as area, responsibility, phase, system, or location. The codes consist of specific values and descriptive titles that are entered into the data dictionary of the scheduling software. Activities shall be assigned specific Activity Codes as appropriate.

3.) Alternative Solutions: Analyses of various options for dealing with encountered or anticipated Contract problems. Alternative solutions shall be developed to assist in determining the best method(s) of preventing or correcting any impediments to the progress of the Work. Alternative Solutions analysis shall indicate impacts on scheduling and resources.

4.) Analysis Report: A report that displays the impacts of all variances reported in the Current Progress Schedule. The Analysis Report focuses attention on the impacts of variances between planned and actual performance, so as to support an assessment of such impacts. The Analysis Report shall include Alternative Solutions.

5.) Bar Chart: A schedule display designed to complement the Network Diagram. The Bar Chart is a traditional Gantt chart to which the Early Start Dates, Early Finish Dates, Late Start Dates, Late Finish Dates and Critical Path have been added.

6.) Calendar: A calendar defines when Work on an activity can occur (i.e. Mon – Fri for a standard Work week). Activities shall be assigned to a calendar that represents the planned Work days. The calendar shall incorporate the Authority holidays listed below. The use of multiple calendars will be permitted.

New Year's Day
Martin Luther King, Jr. Day
Presidents' Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veterans Day
Thanksgiving Day
Day After Thanksgiving
Christmas Day

7.) Constraint: A constraint is a restriction imposed on the start or finish of an activity or the Contract. An example of the use of constraints is the imposition of a "finish no later than" constraint[26] on the Contract Completion Milestone that is equal to the Contract completion date. This constraint facilitates the identification of activities that control or do not support the completion date. Constraints shall be limited to start and finish constraints on milestone activities that represent critical Contract dates, unless otherwise approved by the Engineer in writing.

8.) Critical Path: The longest path through the network in estimated total elapsed time from the start of the first Activity through the completion of the last Activity. The Critical Path consists of a series of Activities which must be completed on their scheduled completion dates in order for the Contract to be completed on schedule.

9.) Current Progress Schedule: The most recent progress schedule which has been approved by the Engineer. The Original Baseline Schedule shall be referred to as "Revision 0". Each time a different Current Progress Schedule is accepted by the Engineer, the revision number shall be increased by 1 and the old schedule shall be electronically archived so as to permit an audit trail.

10.) Duration: The estimated and/or actual length of time required to fully perform a specific Activity. The Duration for construction activities shall be expressed in Work days.

11.) Early Finish Date: The date upon which an Activity can be completed if it is begun on the Early Start Date.

12.) Early Start Date: The earliest date upon which an Activity can begin.

13.) Hammock: A hammock activity summarizing the early and late dates of a set of activities is used for reporting durations of groups of important activities. An activity shall be designated as a hammock by selecting Hammock as the activity type in the Primavera activity form.

14.) Lag: The interval between the completion of a Predecessor Activity and the start of a Successor Activity. For example, ten days of positive Lag will cause the Successor Activity to begin ten days after the Predecessor Activity has been completed. Negative Lag will cause the Activities to overlap. The amount of Lag between each Activity shall be clearly represented on the Network Diagram.

15.) Late Finish Date: The latest date by which an Activity shall be completed if the succeeding Activity is to be started on schedule.

16.) Late Start Date: The latest date by which an Activity shall be started to allow completion by the Late Finish Date.

17.) Milestone: A significant point in the performance of the Work. A milestone has no Duration, and represents the start of a portion of the Work or the completion of a portion of the Work. A milestone may also represent either the beginning or the completion of a task or action being performed by entities other than the Contractor (e.g., obtaining a permit, notification to proceed with certain Work, etc.).

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26 A late finish or "finish no later than" constraint limits the latest time an activity can complete

18.) Negative Float: The amount of time that the planned completion date of an Activity is later than its required (Late Finish) date. An Activity with Negative Float must be completed ahead of schedule if the Work is to be completed on time. Negative Float usually indicates the need for corrective and/or preventive action to complete the Work on schedule.

19.) Network Diagram: A logic diagram prepared according to the Precedence Diagram Method, which displays each Activity required for the performance of the Contract in the sequence in which it is to be performed with appropriate logic ties between activities displayed.

20.) Original Baseline Schedule: The detailed progress schedule first approved by the Engineer as specified herein. All performance of Work will be measured against the Original Baseline Schedule.

21.) Precedence Diagram Method (PDM): A particular type of graphic representation of all Activities and Constraints. The Activities are represented by nodes; the Constraints are represented by lines between nodes. A sample PDM Network Diagram is shown in Figure 1 of this Section.

22.) Predecessor Activity: The partial or full completion of an Activity which is a prerequisite to commencement of another Activity.

23.) Relationship: A logic tie between two activities representing restrictions on the start or completion of the subsequent activity. Relationships may cause either positive or negative lag. The four basic types of relationships are finish to start, start to start, finish to finish and start to finish.

24.) Successor Activity: An Activity which cannot be started or completed without the prior partial or full completion of a Predecessor Activity.

25.) Total Float: The amount of time by which an Activity or series of Activities may be delayed without affecting the date of completion of the Work. Total Float is not for exclusive use or benefit of either the Contractor or the Authority but shall be used for the benefit of the Work in such manner as the Engineer may in his discretion decide. Use of float suppression and manipulation techniques, such as preferential sequencing, lag logic restraints, inflated activity duration and/or constrained dates, other than as may be required by the Contract, shall be cause for rejection of the Original Baseline Schedule and any subsequent schedule revisions and updates.

C. Schedule Submittal, Review & Approval Process

1.) Baseline Schedule

a. Within forty five (45) calendar days of the acceptance of the Contractor's Proposal, the Contractor shall submit a proposed Baseline Schedule containing the Contractor's projected plan and schedule to complete all Work required by the Contract within the time(s) for completion required by the Contract. A schedule showing time(s) for completion later than those required by the Contract will not be accepted.

b. The Engineer will review the Baseline Schedule and return it to the Contractor with comments, or accept it as the Original Baseline Schedule, within fifteen (15) calendar days. The Contractor shall participate in any meetings called to resolve issues with the schedule.

c. If it is not accepted, the Contractor shall revise the Baseline Schedule in accordance with the Engineer's comments and resubmit it for the Engineer's approval within fifteen (15) calendar days of the receipt by the Contractor of the Engineer's comments. Until such time as acceptance of the Baseline Schedule by the Engineer, the Contractor shall continue to resubmit the Baseline Schedule as directed by the Engineer within the same time frame and in the same format as the initial resubmission.

d. After the approval of the Original Baseline Schedule, no changes shall be made therein without the written approval of the Engineer. No other act or omission on the part of the Engineer shall be deemed to constitute such approval. The Contractor shall not be entitled to any damages by reason of the failure of the Engineer to give timely approval or comments on any progress schedule submitted hereunder.

2.) Progress Schedule Updates

a. The Contractor shall submit to the Engineer not less frequently than once a month, on a date specified by the Engineer, an updated Current Progress Schedule. The Engineer may require that the Contractor also include scheduling updates with his monthly payment request. Schedule updates shall status the actual performance and progress of the Work and depict any changes. Schedule updates where early start or early finish of any activity is positioned on the data line but not actualized will not be approved.

b. If directed by the Engineer, within seven (7) calendar days after receipt by the Engineer of a updated progress schedule, the Contractor shall meet with the Engineer for the purpose of reviewing and obtaining the Engineer's approval of it.

c. The Engineer may require the Contractor to furnish a revised update which shall include any other information he may request to assist him in evaluating the Contractor's progress, including but not limited to manpower loading charts and equipment schedules; "what-if" analysis performed in a copy of the current progress schedule, etc.

d. In the event that the Engineer requests the Contractor to revise the updated schedule submitted, and/or to submit such additional information, the Contractor shall make the requested revisions and/or submit the updated schedule to the Engineer for approval along with the additional information requested within seven (7) calendar days of the Engineer's request.

D. Schedule Reporting Requirements

1.) The Original Baseline Schedule submittal shall include the following:

a. One PDF printout file and one Primavera file submitted electronically.

b. Six copies of the following output reports:

(i) A Schedule narrative in writing that provides a general description of the Contractor's approach to meeting the Contract goals and the Critical Path.

(ii) Explanation for any constrained dates.

(iii) A time-scale logic diagram in PDM format containing all activities displaying Activity ID, Activity Description, Calendar, original and remaining durations, percent complete, Early Dates and Total Float, and sorted by:

(a.) Early Start, Total Float

(b.) Total Float, Early Start (Critical Path report)

c. Supporting data showing all activities with their associated cost, budgets or estimates.

d. The Contractor shall electronically archive all accepted schedules.

2.) In addition to the reports required for the Baseline Schedule submittal, all Progress Schedule Update Reports shall include the following:

a. A narrative comparing the current Dates to the respective Milestone Dates, describing the physical progress during the current report period, explaining plans for continuing the Work during the next report period and describing and explaining changes in crewing and construction equipment. The narrative shall also explain changes in Activity durations, logic ties and Activity Values and the reason why the changes were made.

b. Whenever there is any delay or negative float prediction in the schedule, the Contractor shall submit an alternative solutions report that describes the delay, explains when it started and finished or is expected to finish and the basis for those dates and lists the affected schedule activities by activity ID, and he shall present reasons for the delay. Any revisions to durations or the logical sequence of Activities made to reflect these delays shall be explained. The report shall include proposed schedule recovery efforts such as multiple shifts or overtime to mitigate any potential delay to the overall Contract completion date, or request an extension of time, as appropriate.

c. Critical Path Analysis.

d. An Analysis Report indicating Activities and/or Milestones which are behind schedule by at least 30 calendar days (commonly evidenced by Negative Float).

e. A report that compares the Current Progress Schedule update with the Original Baseline Schedule and prior month's accepted schedule update and lists all changes made to the schedule.

E. General Schedule Provisions

1.) Should the Contractor fail to comply with any provision of this Section, The Engineer shall have the right in his discretion to withhold out of any payment (final or otherwise and even though such payment has already been certified as due) such sums as he deems necessary or desirable, all as more fully provided in the clause of the Form of Contract entitled "Withholding of Payments".

2.) Neither the acceptance, review or approval of any progress schedule or other data submitted by the Contractor pursuant to this Section, nor any other action on the part of the Engineer under this Section shall in any way be deemed to be a representation by the Engineer that the Contractor may or will be permitted to follow a particular schedule or sequence of operations or that by following any such schedule or sequence he may or will complete the Work by the time(s) required by the Contract or by any other time(s). Nor shall the approval of any progress schedule or other such data relieve the Contractor of his obligation to complete the Contract by the time(s) required in the Contract, even though the schedule may be inconsistent with such completion.

3.) Any approval under this Section shall be construed merely to mean that the Engineer knew of no good reason at that time to object thereto. No acceptance, review or approval or any other action under this Section shall limit, affect or impair the Contractor's obligation to perform all Work by time(s) required by the Contract and in accordance with all other provisions of the Contract.

4.) The performance of the Work by the time(s) required in the Contract, after taking into account extensions to which the Contractor may be entitled under the clause of the Form of Contract entitled "Extensions of Time", may require the Contractor to perform the Work using overtime labor, additional shifts or additional plant and equipment and/or other measures at no additional cost to the Authority. The Contractor shall anticipate, avoid and mitigate the effects of all delays.

5.) The Engineer shall have the right at any time when in his judgment the Work is not proceeding in accordance with the approved progress schedule or at any time when it is likely that the Work might not be completed by the time(s) required in the Form of Contract even though the Contractor is proceeding in accordance with the approved progress schedule, to order the Contractor without additional compensation to employ additional shifts to increase the number of men employed, to use additional plant or equipment, or to take such other steps as may be necessary or required to assure the completion within the time(s) shown in the accepted schedule.

6.) No action on the part of the Contractor pursuant to this Section shall be construed as a request by him for an extension of the time(s) for completion required by the Contract. A request for an extension of time shall be deemed made only if it complies with the requirements of the clause of the Form of Contract entitled "Extensions of Time". No extension of the time(s) for completion shall be inferred because of any action, omission to act, or statement on behalf of the Engineer pursuant to this Section. Extension of time, if any, shall be granted only pursuant to the clause of the Form of Contract entitled "Extensions of Time".

7.) The Contractor acknowledges and agrees that he is not entitled to an extension of time for impacts that do not extend the contractual end date of the Contract.

ATTACHMENT A

MANDATORY ACTIVITY CODE STRUCTURE

1.) Responsibility (Authority, Contractor)

2.) Area (building, floor or area)

3.) Trade/CSI code (concrete, steel, etc as required)

4.) Location (3rd Fl, etc)

5.) Phase of Work, if applicable

6.) Change Order work, if applicable

7.) Other, as required by the Engineer

PRIMAVERA PROJECT PLANNER

Date 01/02/0 -----ACTIVITY CODES DICTIONARY----- Page 1

NAME - Project Title

CODE	VALUE	TITLE	SEQUENCE
Activity Codes:			
RESP	Responsibility		
	AE	Architect/Engineer	
	C	Contractor	
	O	Port Authority	
AREA	Area		
	G	General Area	1
	CTL	Air Traffic Control Tower	2
MILE	Milestone		
CSI	Trade/CSI Code		
	03000	Concrete	
	04000	Masonry	
	07000	Thermal & Moisture Protection	
	15000	Mechanical	
	16000	Electrical	
LOCN	Location		
PHAS	Phase		
	D	Design	1
	P	Procurement	2
	C	Construction	3
CO	Change Order Wor		
OTH	As Req'd by Engr		

106. ANALYSIS OF BID

Within fifteen calendar days after acceptance of the Proposal, the Contractor shall prepare a detailed analysis of bid on forms furnished by the Authority with all of the spaces filled in without exception, and containing such information as the Engineer may require for each of the items enumerated in such form.

107. AIRPORT OPERATIONS AND CONDITIONS

A. General:

1.) Place "Water" identification signs on all water vehicles or water tanks, which are to be used for the transportation or storage of water during the course of the Work at the airport.

2.) At least 7 days but not more than 10 days prior to performing excavation, call 1-800-272-4480 and provide the information required for excavation(s) in New York and call 1-800-272-1000 and provide the information required for excavation(s) in New Jersey.

3.) Do not place temporary structures or store materials or equipment required in the performance of the Work within any of the buildings on the airport without specific prior approval of the Engineer.

4.) Do not store petroleum or combustible products, or any other flammable materials, within any buildings or in any part of the airport except as designated by the Engineer.

5.) Do not burn or bury debris of any type on Authority property, or wash waste materials down sewers or into waterways.

6.) Maintain haul routes in a satisfactory condition, and repair damage to such routes, resulting from the Contractor's operations. Unless otherwise approved by the Engineer, clean haul routes each work period and remove earth or other materials, which fall or are otherwise placed on such routes during the performance of Work.

7.) Do not park vehicles on any grass or unauthorized area. Free parking of vehicles in any of the airport parking lots will not be permitted.

8.) Protect against damaging existing lights, pavement, curbs and other fixed items that are to remain. Such items, which are damaged, either directly or indirectly, by the Contractor during the performance of the Contract, whether negligently or not, shall be restored to the condition that existed prior to such damage.

9.) Take all precautions necessary for protection of persons, traffic and property during dust or fragment generating operations, concrete mixing or placing, or other operations which may stain, soil or damage property or injure persons.

10.) Provide sound suppression devices on gasoline and diesel powered construction equipment and pneumatic tools as required to maintain noise exposures below the limits specified in the Code of Federal Regulations (CFR) 29 CFR 1926 U.S. Occupational Health and Safety Administration (OSHA). Maintain such sound suppression devices in proper operating condition throughout the time of their use, and adjust and repair as required to maintain noise within exposure levels stipulated in 29 CFR 1926.52, Table D-2.

11.) Remove on an on-going basis, and before the end of each work period, all paving materials left in the grass shoulder areas, in manholes, catch basins or handholes as a result of the cleaning of the Contractor's equipment.

12.) Food or food related debris shall not to be left on or disposed of on the construction site.

13.) Equipment, vehicles and materials, not being utilized in the current work period shall be removed and stored in the area designated by the Engineer for such purpose, or if there is no such area designated then such items shall be removed from the airport.

B. Construction Site Conditions at Air Operations Areas:

1.) "Air Operations Area" (AOA) means that portion of the airport designed and used for landing, takeoff, parking or surface maneuvering of aircraft, as well as the Restricted Service Roads (RSR).

2.) During the time that the Contractor is performing the Work, the Air Operations Areas will remain in use by aircraft. To the extent feasible and convenient in the opinion of the Engineer, and to the extent permitted by the Federal Aviation Administration (FAA), the use by aircraft of aprons, runways and taxiways adjacent to areas where the Contractor is working will be so scheduled as to reduce disturbance to the Contractor's operations. However, during these periods aircraft may be taxiing through and around the construction areas. In order to minimize conflicts between aircraft operations and construction operations, the Contractor shall proceed with performance of the Work in a safe manner and in accordance with the requirements hereinafter stipulated, at all times coordinating operations with the Engineer, however no representation or guarantee is made that the disturbance can or will be reduced. Also, it is anticipated but not guaranteed that certain aprons, runways, taxiways, and taxilanes will be shut down to aircraft operations for limited periods at the times required by the Contractor. In any event, however, aircraft operations shall always have priority over any and all of the Contractor's operations.

3.) Should the Contractor be specifically directed to suspend operations or be directed as hereinafter described, and if solely because of such direction the Contractor is necessarily kept idle at the construction site, the Contractor will be compensated as stipulated in the provisions of the Contract concerning compensation for emergency delays.

a. Should aprons, runways, taxiways or taxilanes be required for the use of aircraft and should the Engineer solely deem the Contractor to be too close to the portion used by aircraft, the Contractor may be directed to suspend operations, remove personnel, plant, equipment and materials to a safe distance and stand by until the aprons, runways, taxiways or taxilanes are no longer required for use by aircraft, at which time the Contractor shall immediately resume operations in the vacated areas when so directed by the Engineer.

4.) The Contractor, subcontractors, materialmen, deliveryman or other persons over whom the Contractor has control shall not enter upon or allow any plant or material to be located upon any part of the Air Operations Areas without specific prior approval of the Engineer.

5.) The Contractor, employees of the Contractor, subcontractors, materialmen and all other persons over whom the Contractor has control shall comply with the following:

a. Clearly display on their person an identification tag indicating their name and company before entry upon any Air Operations Area. The Contractor shall provide tags and holders for such identification. The Contractor is advised that security requirements are subject to change and will be addressed further in the pre-construction meeting.

b. Do not enter upon any Air Operations Area unless accompanied by a representative of the Authority designated by the Engineer to escort the Contractor and equipment to and from the point or points of operation within the limits of such areas, and do not traverse back and forth between points within such areas unless accompanied by said Authority representative.

c. Do not enter or remain upon or allow any plant or materials to be brought or to remain upon any part of the Air Operations Areas if in the opinion of the Engineer they would create a hazard to aircraft or airport operations.

d. Smoking is not permitted in the Air Operations Area.

6.) No two adjacent taxiways shall be closed at the same time unless otherwise directed by the Engineer.

7.) Materials tracked onto movement areas shall be removed continuously during each work period.

a. "Movement Areas" means areas within the AOA comprised of the runways, taxiways and other areas of the airport that are used for taxiing or hover taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking area. The Air Traffic Control Tower or Ground Control typically controls these areas.

8.) At the end of each work period, remove plant, materials, equipment and any other obstructions away from the work area to a non-AOA site as designated by the Engineer.

9.) Information on Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) weather conditions or Category II operations at the airport is available to the Contractor at the Operations Supervisor's Office of the airport. Category II operations only apply at EWR and JFK.

At the following Air Operations Area locations, conform to the following requirements:

a. Approach to Runways: When a runway is active, keep obstructions due to Work below or outside the VFR and IFR approach surfaces.

(i) "Obstruction" shall be defined as any obstacle exceeding the obstruction standards specified by 14 CFR Part 77, subpart C.

b. Adjacent to Runways:

(i) When a runway is active, no construction activities shall be permitted within 250-feet from the runway centerline. Place barricades in accordance with the Section herein entitled "Barricades."

(ii) During VFR weather conditions, obstruction mark all construction equipment, material, or debris penetrating a surface originating along a line 250-feet from the runway centerline at runway elevation, and extending upward and away from the runway at a slope of one foot vertically for every seven feet horizontally, in accordance with the paragraph herein entitled "Obstruction Marking and Lighting". In addition, all penetrations above runway elevation between 200-feet and 250-feet from the runway centerline shall be obstruction lighted with omni-directional lenses.

(iii) During IFR weather conditions; in addition to obstruction marking, provide obstruction lights on fixed obstructions, construction equipment, materials, or debris penetrating a surface originating along a line 500-feet from the runway centerline at runway elevations, and extending upward and away from the runway at a slope of one foot vertically for every seven feet horizontally. For such lighting, provide, locate and operate in accordance with the paragraph herein entitled "Obstruction Marking and Lighting". In addition, all penetrations above runway elevation between 250-feet and 500-feet from the runway centerline shall be obstruction lighted with omni-directional lenses.

(iv) When Category II landing operations are being conducted on runways during IFR weather conditions, as defined by Federal Aviation Administration United States Terminal Procedures, no construction operations, equipment, materials or debris shall be within the Category II Touchdown Area, the Missed Approach Area and Transitional Surfaces as hereinafter defined.

(a.) "Touchdown Area" means an area longitudinally centered on the runway centerline, extending from a point 200-feet in advance of the runway approach threshold (normal or displaced) for a distance of 3,200-feet in the direction of landing, and having a total width of 1,000-feet.

i. "Threshold" is defined as the beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced.

ii. "Displaced Threshold" is the portion of pavement behind a threshold that may be available for takeoffs in either direction or landing from the opposite direction.

(b.) "Missed Approach Area" means an area, which begins at the end of the touchdown area at the height of the runway and extends upward at a slope of one foot vertically for each 40-feet horizontally. In plan view, it has the same width as the touchdown area at the point of beginning with the width increasing uniformly to 3,100-feet at 6,000-feet from the point of beginning.

(c.) "Transitional Surfaces" means surfaces sloped at 7:1 extending outward and upward from the edges of the touchdown area or the missed approach area to a height of 150-feet above the elevation of the runway centerline or the end of the Touchdown Area.

(v) Perform Work so that when the runway is being made available for aircraft operations, the maximum grade difference in any paved surface within the Safety Area shall not exceed 1 inch on runway surface and 3 inches within any part of the Safety Area.

(a.) "Runway Safety Area" means surfaces within 250-feet measured from and parallel to the centerline of the runway, and extending 1,000-feet beyond and parallel to the end of the runway. It is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway, in accordance with AC 150/5300-13.

(vi) On active runways, open excavations, debris, construction equipment, personnel or materials are not permitted within the Safety Area.

(a.) "Open Excavation" means any trench in unpaved areas exceeding 6" in width or 3" in depth; and in paved areas, a drop of 3" or greater within a 6" horizontal measure.

(vii) Do not permit material capable of being dislodged by aircraft blast within 250-feet from the runway centerline. Remove or stabilize such loose materials in this area as approved by the Engineer.

c. Adjacent to Taxiways (T/W) or Taxilanes (T/L):

(i) Neither construction activity nor personnel are permitted within the Object Free Area (OFA),

(a.) "Object Free Area" means an area on the ground centered on the runway, taxiway, or taxilane centerline provided to enhance safety of aircraft operations by having the area free of objects except for those objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

(ii) Perform Work within the specified limits shown in Table I below only when the taxiway/taxilane is closed to air operations.

(iii) Open excavations as close as the edge of the taxiway are permitted provided they are delineated by placing obstruction marked and lighted collapsible barricades, in accordance with "Barricades" hereof, along the edge of the taxiway.

(iv) Do not permit loose material capable of being dislodged by aircraft blast and becoming a hazard within the Taxiway Safety Area (TSA), shown in Table 1 when the T/W or T/L is active. Remove or stabilize such loose materials in this area as approved by the Engineer.

(a.) "Taxiway Safety Area" means a surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

(v) Waste and loose material shall not be placed in active movement areas.

Table 1					
	TEB	LGA	EWR	SWF	JFK
T/W OFA	186 feet	259-feet	320-feet	386-feet	386-feet
(From centerline)	(93 feet)	(129.5-feet)	(160-feet)	(193-feet)	(193-feet)
T SA	118 feet	171-feet	214-feet	262-feet	262-feet
(From centerline)	(59 feet)	(85.5-feet)	(107-feet)	(131-feet)	(131-feet)
T/L OFA	162 feet	225-feet	276-feet	334-feet	334-feet
(From centerline)	(81 feet)	(112.5-feet)	(138-feet)	(167-feet)	(167-feet)

C. Construction Site Conditions Outside Airport Operations Areas:

1.) During the time the Contractor is performing the Work, it may at times be necessary because of emergency or abnormal traffic conditions to suspend the Contractor's operations, or to postpone the time at which traffic lanes, parking or other areas become available for performance of Work. Should the Contractor be specifically directed to suspend operations in traffic lanes, parking or other areas, and remove personnel, and obstructing plant, equipment and materials from such lanes or areas, or should such lanes or areas not be available by the times specified, and if solely because of such suspension of operations or late availability of traffic lanes, parking, or other areas the Contractor is necessarily kept idle at the construction site, the Contractor will be compensated as stipulated in the provisions of the Contract concerning compensation for emergency delays.

2.) Limit the maximum height of construction equipment to 25-feet unless otherwise shown on the Contract Drawings or expressly approved by the Engineer, obstruction light in accordance with the paragraph herein entitled "Obstruction Marking and Lighting" and obstruction mark and light that portion of equipment which exceeds 25-feet in height in accordance with FAA Advisory Circular 70/7460-1K Current Revision.

3.) Perform such duties as the Engineer may direct and as may be necessary in the opinion of the Engineer for the rerouting of traffic in the performance of the Work.

4.) Restrict smoking to areas designated by the Engineer for this purpose.

D. Obstruction Marking and Lighting:

1.) Material, temporary construction and facilities for obstruction marking and lighting constitute temporary facilities that are and shall remain the property of the Contractor unless otherwise shown on the Contract Drawings or specifically directed by the Engineer to be turned over to the Authority.

2.) Provide new materials, or undamaged previously used materials in serviceable condition conforming to the requirements specified herein.

3.) In Air Operations Areas or airport areas where obstructions occur within navigable airspace provide obstruction lights, Model UF-60-7-75A-PE-BI as manufactured by Julian A. McDermott Corp., Ridgewood, N.Y., or approved equal.

a. Unless otherwise shown on the Contract Drawings, mount an obstruction light on the highest point of construction equipment or obstruction.

b. Ensure that obstruction lights are maintained in proper operating condition throughout Work of this Contract, and operate at night seven (7) days a week and during IFR weather conditions.

(i) "Night" means the time between the end of evening civil twilight, and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time.

E. Paving and Surfacing in Air Operations Areas:

1.) Paving and Surfacing in Air Operations Areas are designed to meet stringent requirements for aircraft operations. Exercise extreme care in machine and hand placing material to achieve the finished elevations shown on the Contract Drawings within the tolerances specified elsewhere herein.

2.) When applying tack coat, sealcoat, or pavement marking paint near or around edge lights and any in-pavement lights, provide temporary covers to protect glass fixtures. Remove covers prior to resuming air operations.

3.) Deactivate and adjust elevation of all existing edge lights and all in-pavement lights prior to paving operations in any given area and reactivate them prior to resuming air operations.

4.) Prior to reactivating a runway or a taxiway, any portion of a raised manhole, catch basin hand hole, edge light, or subsurface structure, located within 250 feet of a runway centerline or within the Taxiway Safety Area (TSA) shown in Table 1, protruding by more than three inches shall be ramped in accordance with details shown on the Contract Drawings or, if not shown, as directed by the Engineer.

5.) In areas that are to be opened to aircraft prior to completion of paving top course, ramp all lifts which exceed a maximum of one inch in depth. Ramp in accordance with details shown on the Contract Drawings or, if not shown, as directed by the Engineer. When paving operations are resumed, cut and trim ramp to expose unsealed or granular surface for a depth of one inch, paint the edge of the lift with a thin coat of hot asphalt cement and place fresh asphalt against the edge of the lift and compact.

6.) Remove sand and other debris from the taxiway, runway, apron, taxilanes, and restricted service road surfaces crossing air traffic lanes. Completely sweep with a power driven sweeper and flush with water on an ongoing basis so that such surfaces are ready for use by aircraft as required.

F. Night Illumination of Paving and Surfacing Operations:

1.) Paving and surfacing operations conducted at Night shall, in addition to the requirements of the paragraph entitled "Obstruction Marking and Lighting" hereof, conform to the following requirements:

a. In Air Operations Areas, locate and shield night illumination to prevent interference with air traffic control or impairment of safe aeronautical operations.

b. Outside Air Operations Areas, locate and shield night illumination to prevent interference with motorists and pedestrians or impairment of traffic and pedestrian movement.

2.) Illumination of Area of Work: Provide and operate portable floodlight units similar and equal to "Maxi-Lite 695" as manufactured by Allmand Brothers Inc., Holdredge, NE.

3.) Equipment Illumination: Provide and operate electric beam lights with a capacity of not less than 3,000 watts affixed to paving machines, rollers, distribution trucks and other vehicles to provide not less than twenty foot candles of illumination on the following horizontal surfaces:

a. During operation of paving machines, an area 12-feet by 12-feet immediately behind the machine;

b. During operation of rolling equipment, an area 12-feet wide by 30-feet long immediately in front of and behind the machine; and

c. During application of tack coat, an area 12-feet by 12-feet on the area being coated.

G. Existing Airport Lights in Air Operations Areas:

1.) Various types of lights are installed in the areas in which the Work is to be performed. Prior to the commencement of operations, note the exact number and location of lights in such areas and provide adequate protection therefor. Any light fixture which is damaged by the Contractor, whether negligently or not, during the performance of the Work shall be repaired or replaced in an approved manner before the end of each work period. Should the Contractor not repair or replace any such damaged lights by the end of each work period, the Authority will undertake such restoration and the cost thereof, as determined by the Engineer, will be deducted from the Contractor's compensation hereunder. The number and locations of lights shown on the Contract Drawings are approximate only and the Authority does not guarantee their accuracy.

H. Subsurface Structures:

1.) Attention is called to the fact that some of the manholes, chambers or other subsurface structures, in which Work is to be performed under this Contract, contain energized high and low voltage cables, and that various insects, snakes, spiders and rodents may be present.

2.) Apply to the Engineer in writing at least 24-hours in advance of the time of: a. entry into existing manholes, handholes, or other subsurface structure or, b. interruption or disruption of utility services. Perform interruptions of electrical services, and entry into subsurface structures in accordance with the provisions of the Section hereof entitled "PERMIT AND REQUIREMENTS FOR ELECTRICAL DISTRIBUTION WORK". Service shall not be cut off on existing installations until all operations have been completed except for connections or reconnections to power source of wiring to be installed under this Contract. Notice to the Engineer shall specifically state which utilities will be affected and the time and the duration of such interruption. Keep all such interruptions to a minimum. No interruption of utility services shall be made without approval of the Engineer whose decision in all cases shall be final.

3.) Test each subsurface structure for combustible, toxic or otherwise harmful, gases or vapors in accordance with NFPA No. 328 "Recommended Practice for the Control of Flammable and Combustible Liquids and Gases in Manholes, Sewers and Similar Underground Structures" before permitting personnel to enter. If such gases or vapors are detected, ventilate the subsurface structure until the gases have dissipated to an acceptable level as determined by the OSHA Air Quality regulations prior to entry.

4.) Manholes and other subsurface structures in which Work is to be performed under this Contract may contain water. Remove water encountered in such locations and keep the floors of such locations free of standing water at all times workers are in such locations.

5.) Verify the exact locations of underground utilities and subsurface structures in the field, and assume all risks of whatever nature, if any, as to the locations of such utilities and structures.

I. No requirement of or omission to require any precautions under this Contract shall be deemed to limit or impair any responsibility or obligation assumed by the Contractor under or in connection with this Contract and the Contractor shall at all times maintain adequate protection to safeguard the public and all persons engaged in the Work and shall take such precautions as will accomplish such end, without undue interference with the public or the operations of the Authority.

108. PERMIT AND REQUIREMENTS FOR ELECTRICAL DISTRIBUTION WORK

A. Notify the Engineer at least 24 hours prior to the commencement of operations at the construction site which in any way may affect existing electrical circuits or require entry into any electrical manhole at the airport, and obtain from the Engineer, Authority Form PA 2497A entitled, "Electrical Work Permit". Execute such form in triplicate each morning prior to commencement of Work on existing electrical circuits or entry into manholes. The Authority will issue this form to the Contractor without payment of a fee.

B. Allow sufficient time for loads to be transferred to other circuits from the circuits upon which Work is to be performed and for lock out of circuits which are within existing load centers. Comply with other requirements contained on the back of the "Electrical Work Permit" insofar as they are applicable to the Work to be performed under this Contract. In any event, reconnect and place back in operation electrical circuits activating parking field, roadway, runway operations, apron and taxiway lights prior to the close of operations on each day, and in any event before sunset of each day. Overtime operations or premium time required to be paid by the Contractor for or in connection with this numbered Section shall be borne by the Contractor without separate or additional compensation therefor.

C. Lock-out tag-out procedures will be executed jointly between Contractor and airfield electrical maintenance.

109. AIRPORT CONSTRUCTION SAFETY REQUIREMENTS

A. General Safety Requirements:

1.) The Contractor shall adhere to all safety precautions described in the current edition of the U. S. Department, Federal Aviation Administration Advisory Circular AC 150/5370-2, current edition, Operational Safety on Airports During Construction. The Contractor is to strictly conduct all activities as not to violate safety standards contained in said Advisory Circular.

2.) Throughout the construction period, the following safety and operational practices shall be followed:

a. Operational safety shall be a standing agenda item during work progress meetings throughout the duration of the Contract.

b. The Contractor shall perform onsite inspections of the construction site throughout the duration of the Contract, with immediate remedy of any safety deficiencies.

c. The Contractor, employees of the Contractor, subcontractors, materialmen or any other support workers over whom the Contractor has control, who are required to enter the Aircraft Operations Area will be required to wear a reflective safety vest, day or night.

d. Construction that is within the safety area of an active runway, taxiway, or apron must be performed when the runway, taxiway, or apron is closed or use-restricted and initiated only with prior permission from the Engineer.

e. The Engineer may order the Contractor to suspend operations and move personnel, equipment, and materials to a safe location at any time he deems it necessary.

B. Maintenance of Construction Site:

1.) Inspect all construction and storage areas as often as necessary to be aware of conditions.

2.) Promptly take all actions necessary to prevent or remedy any unsafe or potentially unsafe conditions as soon as they are discovered.

3.) Provide continuous clean-up operations including a mechanical sweeper for all haul operations or other related traffic to and from the construction site.

4.) The Contractor, at the direction of the Engineer, may be required to provide and maintain an emergency response route through the work area, for Airport Emergency Vehicles. Construction vehicles accessing this road will give way to emergency vehicles at all times. Parking or staging of any construction equipment or stockpiling of materials blocking the road or access to the road will not be permitted.

C. Approach Clearance to Runways:

1.) Runway thresholds must provide an unobstructed approach surface over equipment and materials. (Refer to Contract Drawings for construction clearance surfaces.)

2.) Ensure all personnel, materials, and/or equipment are clear of the applicable runway end slope criteria (Refer to Contract Drawings for construction clearance surfaces.)

D. Runway and Taxiway Safety Area (RSA and TSA):

1.) Limit construction to outside of the approved RSA and TSA, as defined elsewhere in this section—unless the runway is closed or restricted to aircraft operations, requiring a lesser standard RSA that is equal to the RSA available during construction.

2.) Procedures for Protecting Runway Edges:

a. Limit construction to no closer than 250 feet from the runway centerline—unless the runway is closed to aircraft operations.

b. Personnel, material, and/or equipment shall not penetrate the Obstacle Free Zone (OFZ) as defined in the U. S. Department, Federal Aviation Administration Advisory Circular AC 150/5300-13, current edition, Airport Design, Paragraph 306, "Obstacle Free Zone"

(i) "Obstacle Free Zone" means the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual Navaids that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway and for missed approaches.

3.) Procedures for Protecting Runway Ends.

a. Maintain the RSA as it existed before construction activity—unless the runway is closed to aircraft operations.

b. Prevent personnel, material, and/or equipment, from penetrating the OFZ.

E. Closed Runways:

1.) For work that necessitates the closure of a runway or runways, the Contractor shall furnish and install and subsequently remove or relocate a lighted "X" as per FAA Advisory Circular 150/5345-55 "Lighted Visual Aid to Indicate Temporary Runway Closure", at each end of the closed runway on or near each of the runway designation numbers as directed by the Engineer. The Contractor shall be responsible for the storage, mobilization, and demobilization of the lighted "X's" for each runway closure period and they remain the property of the Contractor unless otherwise noted on the Contract Drawings.

2.) The lighted "X's" shall be the Sweepster Lighted Runway Closure Marker Model LXD06, or approved equal conforming to NTSB Safety Recommendation A-03-05 and 06.

F. Barricades

1.) Use barricades to indicate construction locations in non-movement areas, which no part of an aircraft may enter. Barricades may be of different shapes and made from various materials, including railroad ties, sawhorses, jersey barriers, or barrels and shall be marked with diagonal, alternating orange and white stripes. During reduced visibility or night hours, supplement the barricades with red lights, flashing or steady burning, meeting the luminance requirements of the State Highway Department.

a. "Non-movement areas" are areas within the AOA not controlled by the Air Traffic Control Tower or Ground Control. These areas are typically aircraft ramp and parking areas as well as vehicular service roads.

2.) Indicate construction locations in movement areas in which aircraft may enter with orange traffic cones, red lights (either flashing or steady burning), and collapsible barricades marked with diagonal, alternating orange and white stripes. All barricades, temporary markers, and other objects left in the safety area associated with the open runway, taxiway, and taxi lanes must be as low as possible to the ground, of low mass and easily collapsible upon contact with an aircraft or any of its components. The barricade shall be properly weighted or attached to the surface to prevent displacement by prop wash, jet blast, wing vortex or other surface wind currents. If affixed to the surface, they must be frangible at grade level or as low as possible, not to exceed 3-inches in height. Barricades shall be Neubert Aero Corp., Model NAC-PC2410 or Model NAC-PC9642, Multi-Barrier Safety Barricade Corp., Model AR-10X96, YODOCK APC or an approved equal.

3.) Barricades shall be spaced no greater than 10 feet apart.

G. Temporary Lighting and Markings

1.) The Contractor will be required to provide and maintain temporary pavement markings, remove existing markings and remove temporary markings, all in accordance with the Contract Drawings and Specifications.

H. Airport Air Operations Area Access and Control

1.) The Contractor, staff, employees, subcontractors, delivery and haul operators, or anyone required to enter the Air Operations Area related to the Contract Work, shall produce valid government issued photo identification.

2.) The Contractor shall supply daily lists of all workers as well as list of all planned or anticipated deliveries. All vehicle operators must have, in their possession and produce on request, a valid drivers license.

3.) Individual Contractor Identification is required for each worker. Identification badges are to be displayed on their outermost garment at all times. The Contractor Identification Badge shall be a minimum of 2" x 2" in size and include the following:

a. Minimum 1" x 1" current color photo of the individual

b. Laminated

c. Company name (and/or subcontractor where applicable)

d. Person's name

e. Unique badge number

f. Expiration date in accordance with the Contract

I. Vehicle Operation Marking and Control

1.) All Contractor vehicles (including equipment, subcontractors, delivery vehicles, etc.) that must enter the Air Operations Area for the required Work of the Contract, must be escorted and properly identified. To operate during daylight hours, construction equipment must have a 3' x 3' orange and white "Airfield Vehicle" identification flag (ANNIN & Co. NYL-GLO #319733 or approved equivalent) or flashing beacon. Any vehicle operating on the movement areas during hours of darkness or reduced visibility must be equipped with a flashing amber beacon light. In addition, vehicles must display permanently affixed company identification media acceptable to the Authority.

2.) Neither the Contractor nor any construction support personnel will be permitted access to the AOA or work site in a private or personal vehicle. There is no employee parking on the Air Operations Areas.

3.) At Air Operations Areas provide obstruction marking flags equipped with approved stiffeners as follows:

a. For Marking of Equipment, Material and Debris: 3-feet by 3-feet colored orange and white in a checkerboard pattern, mounted on a staff of not less than 8-feet in length. Maintain flag in a vertical position at all times and display on each fixed obstruction, truck or other piece of equipment, and at each separate group of workers and material or debris stack.

J. Navigational Aids

1.) The Contractor shall not conduct any construction activity within navigational aid critical areas or affect the visual signal, transmitted signal or power supply of any navigational aid. Navigational aid restricted areas affected by the area of work are depicted on Contract Drawings. Work in these restricted areas is subject to availability based on runway configuration and weather conditions at the time, and may be cancelled by the Engineer without advance warning based on the aforementioned conditions. If the Contractor is specifically directed by the Engineer to suspend his operations in these areas, the Contractor will be compensated as stipulated in the provisions of the Contract concerning compensation for emergency delays.

2.) Navigational aids include instrument landing system components and very high-frequency omni-directional range, airport surveillance radar.

3.) Do not operate ultrasonic, X-ray, radio-type transmitter, magnetic or similar electro-magnetic devices, which affect or may affect the operation of airport navigational aids, unless the Engineer has granted specific prior approval for their operation or use.

4.) The navigational aids will be rendered out of service by the airport.

K. Limitations on Construction

1.) The Contractor shall obtain Authority permits for open-flame welding or torch cutting operations and electrical power shut-downs prior to start of the Work.

2.) All site storage of supplies and equipment requires approval by the Engineer. All site storage must be in containers and must have company name and 24 hour contact telephone number clearly displayed.

L. Radio Communications

1.) The Contractor is not required to have two-way radio communications with the Engineer.

2.) The Contractor is prohibited from having any communications, including two-way radio, with the Airport Air Traffic Control Tower. All movements within the AOA shall be escorted by the Facility Staff.

110. ACCESS TO CUSTOMS SECURITY AREAS

A. The Contractor shall at his own cost provide to each of his employees and cause to be provided to each employee of his subcontractors, materialmen and others performing services for or on behalf of the Contractor hereunder and who are required to enter a Customs Security Area, a customs identification security card, strip or seal meeting the requirements of the U.S. Customs and Border Protection, Department of Homeland Security (U.S. Customs). See 19 Code of Federal Regulations Section 122.14.

B. The Contractor shall also at his own cost post a bond with U.S. Customs in an amount determined by the U.S. Customs Security Area Director assuring compliance with Customs Regulations applicable to Customs Security Areas. See 19 Code of Federal Regulations Part 113, Appendix A.

C. Under U.S. Customs Regulations, each violation of a Customs Security Area Regulation subjects the Contractor to liquidated damages of $1,000 per violation, which may be assessed by U.S. Customs against the bond posted by the Contractor with U.S. Customs.

D. The Contractor shall advise each of his employees, and cause to be advised each of the employees of subcontractors, materialmen, and others performing services for or on behalf of the Contractor hereunder, of the provisions of the U.S. Customs Regulations with regard to Security Areas and shall require them to comply therewith. Violations of U.S. Customs Regulations giving rise to the imposition of liquidated damages by U.S. Customs include, but are not limited to:

1.) Failure to advise employees of provisions of Customs Regulations relative to Security Areas or to require them to familiarize themselves with said provisions or to comply therewith;

2.) Failure to perform background checks;

3.) Failure to return Customs approved identification card, strip, or seal;

4.) Failure to notify Customs that employee(s) no longer require access to the Customs Security Area;

5.) Entry into Customs Security Area without Customs approved identification card, strip, or seal;

6.) Failure to openly display or produce, upon demand, Customs approved identification card, strip, or seal;

7.) Entry into a Customs security area for a purpose other than to perform duties authorized by Customs;

8.) All other violations that in the judgment of the Area Director endanger the revenue or the security of the area.

E. Further information concerning U.S. Customs Security Area Requirements shall be obtained from the U.S. Customs and Border Protection Hologram Office, at 718-553-1653 for New York facilities, and at 973-565-8000 x6581 for New Jersey facilities.

111. HOURS OF WORK AND CONSTRUCTION STAGING

A. Hours of Work

1.) Subject to all requirements stated elsewhere herein, the Work of this Contract shall be performed in accordance with Construction Staging in B. below and during the following hours of Work:

a. Work inside the Lighting Vault shall be performed only between the hours of 7:00 AM and 3:00 PM, each day, Monday through Friday.

b. Work requiring interruption or interfacing with active circuits or equipment shall be coordinated with the Engineer and shall be performed only between the hours of 7:00 AM and 3:00 PM, each day, Monday through Friday.

c. Electrical Work Phases 1, 2 and 3 shall be performed during Stage 1 only between the hours of 7:00 AM and 3:00 PM, each day, Monday through Friday.

d. Electrical Work Phases 4, 5 and 6 shall be performed during Stage 3 only between the hours of 7:00 AM and 3:00 PM, each day, Monday through Friday.

e. Electrical Work Phases 7 and 8 shall be performed during Stage 4 only between the hours of 7:00 AM and 3:00 PM, each day, Monday through Friday.

f. Stage 1A

(i) Perform the Work under B.1.)a. and B.1)c. below each night from 11:00 PM to 5:30 AM.

(ii) Perform the Work under B.1.)b. below during one two-week closure commencing at 11:00 PM Sunday and ending fourteen days later at 11:00 PM Sunday.

g. Stages 1B and 1C

(i) Perform the Work under B.2.)a. and B.3)a. below without restrictions as to Work hours.

h. Stage 1D

(i) Perform the Work under B.4.)a. below between the hours of 11:00 PM and 5:30 AM for a period of no more than four consecutive nights commencing immediately after the completion of Stages 1A, 1B and 1C.

(ii) Perform the Work under B.4.)b. and B.4.)c. below between the hours of 11:00 PM and 5:30 AM.

(iii) Perform the Work under B.4.)d. and B.4.)e. below during one two-week closure commencing at 11:00 PM Sunday and ending fourteen days later at 11:00 PM Sunday.

(iv) Perform the Work under B.4.)f. below between the hours of 11:00 PM and 5:30 AM for a period of no more than four consecutive nights commencing immediately after the completion of Stage 1D electrical and paving Work.

i. Stage 2

(i) Perform the Work under B.5.)a. below during two 48-hour weekend closures commencing at 11:00 PM Friday and ending two days later at 11:00 PM Sunday.

(ii) Perform all other Stage 2 Work between the hours of 11:00 PM and 5:30 AM.

j. Stage 3

(i) Perform the Work under B.6.)a. below between the hours of 11:00 PM and 5:30 AM for a period of no more than four consecutive nights commencing immediately after the completion of Stage 2.

(ii) Perform the Work under B.6.)b. below without restrictions as to Work hours.

(iii) Perform the Work under B.6.)c. below between the hours of 11:00 PM and 5:30 AM for a period of no more than four consecutive nights commencing immediately after the completion of Stage 3 electrical and paving Work.

k. Stage 4

(i) Perform the Work under B.7.)a. below during six 48-hour weekend closures commencing at 11:00 PM Friday and ending two days later at 11:00 PM Sunday.

(ii) Perform all other Stage 4 Work between the hours of 11:00 PM and 5:30 AM.

2.) Unless otherwise noted, do not perform Work outside of these hours of Work, on a legal holiday in the State of New York or during the following periods:

a. Commencing the weekend prior to Thanksgiving through the weekend after Thanksgiving.

b. Commencing the weekend prior to Christmas through the weekend after New Years.

3.) Because of arrivals and departures of aircraft, the Authority makes no representation as to the periods of time when conditions at or near the runways or elsewhere at the airport will be such as to permit the Work to be performed without interruption, or as to when any Work can be performed or completed. Arrivals and departures of aircraft are under the control of the FAA Control Tower operator and emergencies and operating conditions may necessitate sudden changes, both in airport operations and in the operations of the Contractor.

4.) The Contractor shall submit to the Engineer, at least one week in advance, his scheduled hours of Work for each week.

B. Construction Staging

See Contract Drawings CS001 through CS007 for Stages. Perform all Work in accordance with Hours of Work in A. above, the Contract Drawings and Specifications and as follows:

1.) Stage 1A

a. Install electrical base cans and conduit.

b. Perform all paving Work, except pavement grooving, for this area and install mid-section of electrical light cans for Runway centerline lights and Taxiway lead-in lights.

c. Core and install top section of electrical light cans and install mud plates on runway centerline lights and Taxiway lead-in lights.

d. Notify the Engineer sixty days prior to completion of Stage 1A Work in order to schedule a flight check for Runway 9 ILS.

e. Upon completion of pavement rehabilitation, install final pavement markings on taxiways only. Install temporary pavement markings on Runway 9-27 between runway stripes and where ramping is required.

f. If unable to perform the Work in B.1.) a. and B.1.)c. above due to operational or weather issues, perform such Work in Stage 1B.

g. Complete all Stage 1A Work prior to commencing Work on Stage 1B, except as noted in 1.)f. above.

2.) Stage 1B

a. Perform all Work, except pavement grooving, for this area.

b. Upon completion of pavement rehabilitation, install final pavement markings. Install temporary pavement markings where ramping is required.

3.) Stage 1C

a. Perform Work, except grooving, for this area.

b. Upon completion of pavement rehabilitation, install final pavement markings. Install temporary pavement markings where ramping is required.

4.) Stage 1D

a. Temporarily relocate the Runway 27 threshold to the west as follows:

(i) Remove existing and install temporary threshold bar and aiming point runway markings and activate temporary threshold lights during the first 6½-hour night of the four-night period in A.1.)h.(i) above.

(ii) Change lens/globes on existing Runway edge lights.

(iii) Render the existing Runway 27 glide slope out of service.

(iv) Render the existing Runway 27 PAPI unit out of service.

(v) Render the existing Runway 9 localizer out of service.

(vi) Change the distance remaining sign panel to reflect the temporary Runway lengths.

b. Install electrical base cans and conduit for this area. At the intersection of Taxiway A and Runway 16-34, one access lane for emergency vehicles shall be maintained at all times.

c. Perform all paving Work at the intersection of Taxiway A and Runway 16-34 except pavement grooving.

d. Perform all remaining paving Work, except pavement grooving, and install mid-section of light cans for Runway centerline lights and Taxiway lead-in lights.

e. Core and install top section of light cans and install mud plates on Runway centerline lights and Taxiway lead-in lights.

f. Remove the temporary Runway 27 threshold markings and restore threshold and all associated markings, lights and signage to its final location. Restore Runway 27 glide slope and PAPI. Remove temporary and install permanent threshold bar and aiming point runway markings during the first 6½-hour night of the four-night period in A.1.)h.(iv) above.

g. Notify the Engineer sixty days prior to completion of Stage 1D Work in order to schedule a flight check for the Runway 9 and Runway 27 ILS.

h. Upon completion of pavement rehabilitation in Stages 1A and 1D and during relocation of threshold at Runway 27 to its final location, remove temporary pavement markings and install final pavement markings for Stages 1A and 1D. Install temporary pavement markings where ramping is required.

i. Perform pavement grooving for Stage 1 during Stage 2.

j. Complete all Work in Stages 1A, 1B, 1C and 1D, except pavement grooving, prior to commencing Work on Stage 2.

5.) Stage 2

a. Perform all Work including the installation of airfield guidance signs for this area.

b. Upon completion of pavement rehabilitation, install final pavement markings. Install temporary pavement markings where ramping is required.

c. Complete all asphalt paving and electrical base can and conduit installation Work prior to commencing Work on Stage 3.

d. Perform pavement grooving for Stage 2 during Stage 4.

6.) Stage 3

a. Temporarily relocate the Runway 9 threshold to the east as follows:

(i) Remove existing and install temporary threshold bar and aiming point runway markings and activation of temporary elevated threshold lights during the first 6½-hour night of the four-night period in A.1.)j.(i) above.

(ii) Change lens/globes on existing Runway edge lights.

(iii) Render the existing Runway 9 glide slope out of service.

(iv) Render the existing Runway 9 PAPI unit out of service.

(v) Render the existing Runway 27 localizer out of service.

(vi) Change the distance remaining sign panel to reflect the temporary Runway lengths.

b. Perform all remaining Work, except pavement grooving, for this area.

c. Remove the temporary Runway 9 threshold markings and restore threshold and all associated markings, lights and signage, including the ALSF and FAA NAVAIDS to their final location. Remove temporary and install permanent threshold bar and aiming point runway markings during the first 6½-hour night of the four-night period in A.1.)j.(iii) above.

d. Notify the Engineer sixty days prior to completion of Stage 3 Work in order to schedule a flight check for Runway 27 ILS.

e. Upon completion of pavement rehabilitation and during relocation of threshold at Runway End 9 to its final location, remove temporary pavement markings and install final pavement markings. Install temporary pavement markings where ramping is required.

f. Perform pavement grooving for Stage 3 during Stage 4.

g. Complete all Stage 3 Work, except pavement grooving, prior to commencing Work on Stage 4.

7.) Stage 4

a. Perform full depth shoulder pavement and new duct bank crossings.

b. Perform all remaining Work for this area.

c. Remove all mud plates installed over light cans in previous Stages and install light fixtures.

d. Prior to end of each Work shift and opening area of Work to Air Operations, install temporary pavement markings. Install temporary pavement markings where ramping is required.

e. Upon completion of pavement rehabilitation, remove temporary pavement markings and install final pavement markings.

f. Complete pavement grooving for Stages 2, 3 and 4.

END OF SECTION

DIVISION 2

SECTION 02073

CUTTING, PATCHING AND REMOVAL

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for cutting, patching and removal of existing construction.

1.02 QUALITY ASSURANCE

A. Cutting, patching and removal shall be performed by workers skilled in the specific trades involved.

B. Site Conditions

1. Except for portions shown to be relocated or retained by the Authority, remove and transport off Authority property all portions of the existing construction shown on the Contract Drawings to be removed in accordance with Division 1 clause entitled "Recycling of Construction Debris Material".
2. All construction debris shall become the Contractor's property.
3. Prior to start of Work, make an inspection accompanied by the Engineer to determine physical condition of adjacent construction that is to remain.

1.03 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MATERIALS

All materials required for patching shall be new. Patching materials shall match in every respect adjacent portions of the existing construction unless otherwise shown on the Contract Drawings.

PART 3. EXECUTION

3.01 PROTECTION

A. Protect existing adjacent surfaces to remain and finished surfaces at all times and repair or replace, if damaged, at no cost to the Authority and to the satisfaction of the Engineer.

B. Protect all existing and new construction including utilities, finishes and equipment from water, damage, weakening or other disturbance.

3.02 CUTTING, PATCHING AND REMOVAL

A. Perform all cutting, patching and removal as shown on the Contract Drawings. Work shall be performed in accordance with the approved methods using approved materials.

B. Do not cut or remove more than is necessary to accommodate the new construction or alteration.

C. Maintain the integrity of all construction at all times.

D. Do not allow removed materials and debris to accumulate at the construction site; remove them at the end of each work period or daily. All areas adjacent to, and leading to and from the site shall be kept free of removed materials and debris.

E. Do not burn, bury, or dispose of in storm drains, wetlands or waterways on Authority property debris of any type.

F. Dispose of debris resulting from removal operations in accordance with all local laws and regulations that would apply if the Authority were a private corporation.

END OF SECTION

SECTION 02073

CUTTING, PATCHING AND REMOVAL

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

No submittals are required.

END OF APPENDIX "A"

DIVISION 2

SECTION 02221

EXCAVATION, BACKFILLING AND FILLING

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for excavation, backfilling and filling.

B. Definitions

1. As used herein, excavation shall mean the removal of existing pavement, concrete foundations and all materials other than bedrock (ledge rock) encountered within the limits of excavation that are not specified to be removed under the Section entitled "CUTTING, PATCHING AND REMOVAL".
2. As used herein, backfilling shall mean the filling of excavations made for construction purposes and shall extend only to existing grades or design grades, whichever are lower.
3. As used herein, filling shall mean the placement of fill material in conformance with requirements of this Section at or above existing grades.

1.02 REFERENCES

American Society for Testing and Materials (ASTM)

ASTM D 422	Standard Test Method for Particle - Size Analysis of Soils
ASTM D 1556	Standard Test Method for Density of Soil in Place by the Sand-Cone Method
ASTM D 1557	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)
ASTM D 2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2922	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

New Jersey Interagency Engineering Committee (NJIEC)

Standard Soil Aggregate Gradations

1.03 JOB CONDITIONS

A. Protect excavations as follows:

1. Prevent water from entering excavated areas and, if it does, remove it immediately to maintain a dry condition at all times.
2. Dispose of water in a manner not to cause injury to the public health or damage to public or private property.
3. If water enters excavated areas and weakens or disturbs underlying soil, remove the weakened or disturbed soil and replace it in conformance with 3.02 A.5.
4. Where shown on the Contract Drawings or where required for protection of adjacent utilities or structures or where required for performance of the Work, secure the sides of excavations against movement as follows:
   a. Install sheet piling or sheeting held in place by waling and bracing members. Top of sheeting shall extend at least six inches above ground.
   b. Do not excavate below the bottom of sheet piling or sheeting except as necessary to install sheeting.
   c. Fill voids behind sheeting immediately with material conforming to I-12 designation defined in 2.01 A.1 or otherwise approved by the Engineer.
   d. Comply with all other provisions of the Specifications that may impose additional or stricter requirements.
5. For excavations extending to a depth of 5 feet or more, and where sheeting is not required to conform with provisions of 1.03 A.4 above, excavate slopes to a safe angle of repose, or protect trench excavations by use of a portable trench shield.
6. Restore all areas impacted by excavation to their original condition, matching pavement types and sections to meet original pavement grades.

B. Do not traverse paved areas with tracked vehicles or equipment such as carry-all scrapers which may damage such pavement unless protected to the satisfaction of the Engineer.

C. Do not place fill or backfill on frozen subgrade.

D. Do not perform rolling or other compaction at any time when the ground water level is above a plane two feet below the surface to be compacted. When the ground water level is above such plane, lower it by approved methods and maintain it below such level prior to and during the compaction operations.

E. Protect from damage trees and other vegetation that are to remain in place.

1.04 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Fill

1. Unless otherwise shown on the Contract Drawings, fill shall consist of clean sand and gravel containing no organic matter, conforming to the following NJIEC Standard Soil Aggregate Gradations:

	Total Percent Passing by Weight NJIEC Designation		
	I-7	I-10	I-12
Sieve Sizes			
4 inch		100	100
2 inch		80-100	
1 inch	100		
3/4 inch		60-100	70-100
1/2 inch	80-100		
No. 4		40-100	
No. 8	35-100		
No. 16	25-90	20-70	
No. 50	5-50	5-40	0-75
No. 100	0-8	0-30	
No. 200	0-2	0-20	0-5

2. The Contract Drawings show the locations in which each designation of fill is required.

B. Backfill

1. Unless otherwise shown on the Contract Drawings, material shall conform to the requirements for I-12 designation, subject to 2.01 B.2 below.
2. Where the entire backfill is above the water table, material conforming to the requirements for I-10 designation may be used in lieu of I-12 designation, except under foundations, aircraft pavement and utilities.

C. Sources

1. When fill and backfill material are provided by the Authority, the location of the stockpile and NJIEC Designation (if applicable) are shown on the Contract Drawings. Samples of material will not be required for testing.
2. Material excavated at the construction site shall be used for fill or backfill to the extent that it conforms with the requirements specified in 2.01 A.1 and 2.01 B.1 as noted on contract drawings. Samples shall be submitted for testing by the Engineer for conformance with the requirements of this Section.
3. If sufficient quantities of material are unavailable from sources described in 2.01 C.1 and 2 above, furnish material from sources off site.

PART 3. EXECUTION

3.01 PREPARATION

A. Clearing and Grubbing

Remove trees, clear and grub areas to be excavated or in which construction is to be performed, as follows:

1. Remove trees, stumps, all roots larger than 2 inches in diameter, and all matted root systems.
2. Remove all topsoil, debris, organic matter and any other objectionable material not suitable for use as backfill or fill or for support of structures or pavements.
3. Backfill all holes and other low spots resulting from clearing and grubbing with material conforming with 2.01 B before proceeding with compaction of fill as specified in 3.03 or with other construction in the area.

3.02 EXCAVATION

A. General

1. Excavation shall consist of the removal of materials as defined in 1.01 B.1, and the removed materials shall be segregated as suitable and unsuitable and stockpiled as shown on the Contract Drawings.
2. When excavation of bedrock (ledge rock) is required as shown on the Contract Drawings, the provisions for removal are specified in the Section entitled "ROCK EXCAVATION".
3. Excavate to elevations required for installation of permanent construction in such manner as not to disturb the subgrade below such elevations.
4. Where existing foundations or other existing construction are encountered which may cause hard spots, remove them to a minimum of two feet below subgrade for pavement or structures.
5. Should bottom of excavation be weakened or disturbed or carried below required depth:
   a. Under footings - compact bottom, as specified in 3.03 below and replace over-excavation with concrete of the same Class and Type as that specified for the footing or foundation.
   b. Elsewhere - Compact bottom as approved by the Engineer and refill with material conforming to I-12 designation defined in 2.01 A.1.
6. Perform excavation around and adjacent to existing structures, pipes and conduits which are to remain in place, without damage to or movement of existing construction. Use hand excavation to locate and expose near-surface structures, pipes and conduits. When excavation is to be performed under such structures, pipes and conduits, support them in a manner as approved by the Engineer to ensure uninterrupted operation of the supported items.

B. Dewatering

1. Where excavations are to extend below the water table, prior to placement of any permanent construction or filling or backfilling any excavated area, lower the water table in such an area to two feet below the elevation of the required subgrade and maintain this condition until the construction or pavement is placed thereon.

2. Dewater in a manner to prevent the loss of ground due to the migration of soil fines into the dewatering system.

C. Trenching for Utilities

1. Shape bottom of trench to uniform invert section.
2. When excavating in soft soils which may be subject to lateral movement or bottom heave conform with requirements shown on the Contract Drawings.

D. Disposal of Excavated Material

All debris and all material either unsuitable for or in excess of that required for backfill or fill, shall be disposed of away from the construction site.

E. Restrictions

1. Do not place backfill until the Engineer has inspected and approved the Work and indicated where backfill may be placed.
2. Leave all pipe joints exposed until all tests on such pipe, required by other Sections of the Specifications, have been performed.
3. Remove all temporary structures, sheet piles, sheeting, bracing and forms and all organic materials and debris of every nature, taking care, upon the removal of sheet piling, sheeting and temporary supports, not to cause movement of adjacent ground or structures or create the danger of a slide.

3.03 PLACEMENT AND COMPACTION

A. Equipment

1. Steel vibratory rollers shall have provision for regulation of vibration frequency. The Engineer shall be informed of the type and size of equipment to be used before the start of any compaction efforts.
2. Placement and spreading equipment shall be reviewed and approved by the Engineer.
3. Unless otherwise shown on the Contract Drawings, pneumatic-tired rollers shall have minimum weight of 20 tons and a tire pressure of between 60 and 150 psi as directed by the Engineer. For aircraft pavements, the minimum roller weight shall be 50 tons.
4. When mechanical tampers are to be used, the Engineer shall be informed of the type and size for approval before compaction efforts with this equipment can begin.

B. Compaction Requirements

Backfill and fill shall be compacted to achieve a density of 95 percent of the maximum density as determined by Procedure C of ASTM D 1557, except where alternate density requirements are approved by the Engineer or shown on the Contract Drawings.

C. Subgrade, Excavated and Existing Surfaces

Compaction of subgrade, excavated and existing surfaces will consist of a proof-rolling operation performed as follows:

1. Compact surface with a minimum of six passes of an approved vibratory steel roller operated at a speed not to exceed three miles per hour and at the optimum operating frequency recommended by the manufacturer.
2. In areas where surface consists of a fine grained soil, compact with a minimum of six passes of an approved pneumatic-tired roller.
3. Overlap passes of roller a minimum of six inches.

4. In areas where use of a roller is impractical, compact surface while at or near optimum moisture content with mechanical tampers.

D. Backfill and Fill

1. Moisture content of backfill and fill material shall be within a range of plus or minus two percent of optimum, as determined by Procedure C of ASTM D 1557.
2. Backfill, conforming with I-12 gradation, and fill, conforming with I-7 and I-12 gradation, shall be placed in 14-inch, loose layers and compacted with a minimum of six passes of an approved vibratory roller operated at a speed not to exceed three miles per hour.
3. Passes shall be overlapped a minimum of six inches.
4. Backfill and fill, conforming with I-10 gradation, shall be placed in 12-inch, loose layers and compacted with a minimum of six passes of an approved pneumatic-tired roller.
5. In areas where a 14-inch layer over existing material is not adequate to support the construction equipment, increase thickness of first lift as approved by the Engineer.
6. In areas adjacent to structures and utilities as shown on Contract Drawings, compaction equipment shall be restricted and as directed by the Engineer.
7. In areas where use of a roller is impractical, place fill in maximum 8-inch, loose layers and compact with approved mechanical tampers to specified density.
8. Compact backfill as specified in 3.03 D.6 above for fill. In pipe trenches, each layer of backfill shall be not more than eight inches in thickness before compaction. Backfill shall be placed on both sides of the pipe, simultaneously.
9. The surface of filled or backfilled areas, which are to receive pavement or on which a structure is to be placed, shall be within plus or minus 1/2 inch of the elevations shown on the Contract Drawings and shall be free of depressions or projections greater than 1/2 inch when tested with a 16-foot straight edge.
10. The surface of filled areas at other locations shall be within plus or minus one inch of elevations shown on the Contract Drawings unless a closer tolerance is necessary to meet requirements of other Sections of the Specifications or the Contract Drawings.

3.04 FIELD TESTS

A. Inspection and Testing

1. The Engineer will perform Quality Assurance testing on delivered field samples of material submitted from each source, for conformance with 2.01. Gradation and maximum density will be determined in accordance with ASTM D 422 and Procedure C of ASTM D 1557, respectively. If deemed appropriate by the Engineer, Atterberg Limits will be determined on fine-grained soils in accordance with ASTM D 4318.
2. If the sample from a source is approved and if the Engineer requests, conduct the Engineer's representative to that source. Additional samples will be selected and tested.
3. The Engineer will notify the Contractor of approval of material source within seven days after receiving samples. Approval of a source of backfill or fill material shall be subject to material continuing to meet the requirements of 2.01.

4. When performing Quality Assurance testing, the Engineer will determine the density of compacted fill or backfill by in-place density tests or from undisturbed samples cut from the compacted fill or backfill as required. Notify the Engineer 24 hours prior to start of filling or backfilling to allow the Engineer time to make provisions for such testing.
5. To evaluate whether material has been compacted to specified density the Engineer will compare results of in-place density tests with results of control tests on material of the same designation using Procedure C of ASTM D 1557.
6. If fill or backfill have not been sufficiently compacted as determined by in-place density tests, the compaction effort shall be continued and moisture content shall be adjusted as necessary until the specified compaction is obtained.
7. The Engineer will check conformance to elevations shown on the Contract Drawings and required tolerance for surface straightness.
8. Provide labor and equipment to take samples as directed and to assist the Engineer in other tests.

B. Testing Requirements for Fill and Backfill

1. Control Tests

   Fill and backfill material field samples will be tested in the laboratory by the Engineer as part of the Quality Assurance program. These control tests consist of determining maximum density and optimum water content by Procedure C of ASTM D 1557, and gradation by ASTM D 422. When deemed appropriate by the Engineer, Atterberg Limits will be determined on fine-grained soils.

2. In-Place Density Tests

   Quality Control consisting of in-place density testing, as a minimum, shall be performed by the Contractor to determine densities achieved after compaction efforts. An in-place Quality Control plan shall be submitted to the Engineer for review and approval. This plan should address, as a minimum, items such as in-place test type and frequencies for different materials; equipment type, calibration and maintenance; operator identity and qualifications, etc.

   Quality Assurance testing will be performed by the Engineer after compaction operations, at the standard frequencies already established by Port Authority testing bulletins. Test methods may either sand-cone (ASTM D 1556), rubber balloon (ASTM D 2167), or nuclear device (ASTM D 2922), with moisture content for nuclear method determined by ASTM D 3017. Tests will measure the density of the layer immediately below each compacted layer and the density of the uppermost or final layer.

C. Proofrolling in Pavement areas or under footings

1. After excavation has been performed to the elevation of pavement subgrade, proofroll the area shown on the Contract Drawings with two passes of a pneumatic-tired roller in the presence of the Engineer.
2. If, in the sole determination of the Engineer, the proofrolling produces noticeable weaving of the surface, excavation of unsuitable material may be required below pavement subgrade, within the limits and to the depth ordered by the Engineer.
3. In no case will the depth of such removal of unsuitable material exceed three feet below the pavement subgrade.

4. Remove all such unsuitable material and replace it with suitable backfill material in accordance with the requirements of 2.01 B.

5. The Contractor will be reimbursed for any ordered excavation of unsuitable material below the elevation of pavement subgrade or under footings and subsequent backfilling (but not for the proofrolling specified in 3.04 C.1) at the "Net Cost" for such Work. "Net Cost" shall be computed in the same manner as is compensation for Extra Work, including any percentage addition to cost, as set forth in the clause of the Contract providing compensation for Extra Work. Performance of such Net Cost Work shall be subject to all provisions of the Contract relating to performance of Extra Work. Compensation for said Net Cost Work shall not be charged against the total amount of compensation authorized for Extra Work.

END OF SECTION

SECTION 02221

EXCAVATION, BACKFILLING AND FILLING

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

02221A01 Where sheet piling or sheeting is required as shown on the Contract Drawings, submit detailed Shop Drawings and design calculations of the sheeting and bracing system to the Engineer for review in accordance with the requirements of "Shop Drawings, Catalog Cuts, and Samples" of Division 1 - GENERAL PROVISIONS. Submit such drawings and calculations three weeks prior to commencement of such excavation. Shop Drawings and calculations shall be prepared by a Professional Engineer, licensed in the State in which the work will be performed, who has a minimum of five years experience in the design of soil retaining structures. The Shop Drawings shall be sealed and signed by the Professional Engineer.

Product Data

02221D01 Submit to the Chief of Materials Engineering, Materials Engineering Division, Engineering Materials Laboratory, Port Authority Technical Center, 241 Erie Street, Jersey City, N.J. 07310-1397, proposed material suppliers and sources for each designation of fill or backfill to be used under this contract. The submittal document must contain, as minimum information, the Contract location, title and number; designation of intended material use; source and supplier of material being submitted. Sample submittal paperwork must be received by the Chief of Materials Engineering at least three weeks prior to delivery of material to site. Do not delivery any material until the Engineer has checked an approved material supplier and source. Delivered material must receive on-site approval as per Section 3.04, Paragraph A, prior to use.

Calculations

02221H01 Where sheet piling or sheeting is required as shown on the Contract Drawings, submit detailed design calculations of the sheeting and bracing system to the Engineer for review and approval. Submit calculations three weeks prior to commencement of such excavation. Calculations shall be prepared by a Professional Engineer, licensed in the State in which the work will be performed, who has a minimum of five years experience in the design of soil retaining structures. The calculations shall be sealed and signed by the Professional Engineer.

Quality Assurance-Quality Control

02221L01 The Contractor shall be responsible for Quality Control procedures. Before the actual start of earth work, the Contractor must submit a Quality Control Plan for review and approval by the Engineer.

END OF APPENDIX "A"

DIVISION 2

SECTION 02231

AGGREGATE BASE COURSE

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for dense graded aggregate base course (DGABC) and open graded aggregate base course (OGABC) each where shown on the Contract Drawings including the use of recycled concrete aggregate (RCA) as an alternate for virgin aggregate.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Society for Testing and Materials (ASTM)

ASTM C 88	Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregate by Washing
ASTM C 131	Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1556	Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3(2,700 kN m/m^3))
ASTM D 1883	Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D 2167	Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2434	Test Method for Permeability of Granular Soils (Constant Head)
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 3665	Practice for Random Sampling of Construction Materials
ASTM D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Job Conditions

1. Aggregate Base Course shall not be placed or spread unless subgrade is free of frost and standing water.

2. Do not place aggregate base course, or perform any compaction operations when ground water level is above a plane two feet below the bottom of the base course. This condition would be indicated by existing water level readings, known site conditions or by the results of probes performed by the Contractor before material placement.

3. When necessary, lower and maintain ground water below the required plane by methods approved by the Engineer.

B. Design and Tolerance

1. The compacted base course, shall have a minimum California Bearing Ratio (CBR) of 80 as determined by ASTM D 1883. In the case of open graded aggregate base course the permeability, as tested in accordance with ASTM D 2434, shall be a minimum of 1.0×10^{-3} centimeters per second.

2. Surface of the base course shall be within plus or minus 1/2 inch of elevations shown on the Contract Drawings and free of depressions or projections greater than 3/8 inch when tested with a 16-foot straight edge applied parallel with or at right angles to the centerline.

3. Thickness of base course at any point shall not be deficient by more than 1/2 inch from the required thickness shown on the Contract Drawings.

4. The field density of the base course after compaction shall be at least 95 percent (100 percent for runways, taxiways and aprons) of the maximum density as determined by Procedure "C" of ASTM D 1557, with the exception that base course material passing the 1-1/2-inch sieve shall be used instead of the material passing the 3/4-inch sieve specified.

1.04 QUALITY CONTROL AND ASSURANCE

A. Provide and maintain quality control plans and procedures that shall ensure all base course materials and completed construction conform to this Section. The Engineer shall be afforded access to the Contractor's plant, equipment and field operations at all times for checking compliance with the approved quality control procedures. Provide labor and equipment to take samples as directed and assist the Engineer in other tests. Repair all areas from which samples are taken to meet all requirements of this Section.

B. The quality control plan shall include as a minimum:

1. Assignment of quality control responsibility to specifically-named individuals.

2. Outline of sampling location procedures and in-place density testing methodologies.

3. Performance of regularly scheduled inspections of the material source in the case of RCA.

4. Provisions for the prompt implementation of control and corrective measures.

5. Provisions for liaison with the Engineer at all times

6. Performance of necessary quality control tests, including use of a nuclear gauge.

C. For RCA, Quality Control procedures shall include performing the following tests on dedicated stockpiles being produced for use under this Contract:

1. Gradation tests (ASTM C 117 and C 136) shall be performed at least once per day.

2. Composition tests shall be a continuous visual inspection and shall include removal of any objectionable material to ensure compliance with 2.01B.

3. Soundness of Aggregates (ASTM C 88) and Resistance to Degradation (ASTM C 131) shall be performed a minimum of once every two weeks, unless otherwise directed by the Engineer.

D. For Contracts requiring over 500 cubic yards of aggregate base course, and where otherwise directed by the Engineer, select an area from the first day's production to be called a control strip. The control strip shall be a minimum of 2500 square feet and shall be constructed to meet the requirements of this section and in the same manner as the remainder of the course it represents. The purpose of the control strip is to have the contractor establish the compaction pattern, methods and effort required to achieve the quality requirements and to calibrate the Contractor's nuclear gage. Additional control strips shall be constructed whenever a significant change occurs in the type or source of the material and whenever a significant change occurs in the composition of the material from the same source.

E. Engineer's Sampling and Testing

1. The Engineer may elect to inspect, test, and approve aggregate base course at the source. At least five days prior to delivery of material to site, the Engineer shall be notified.

2. Base course material delivered to the construction site will be sampled and tested by the Engineer for conformance to the requirements specified in 2.01 A copy of the test analyses will be on file with the Engineer. The samples will be taken from stockpiles on site, prior to material placement operations. Minimum testing frequencies will be as follows:

<u>Aggregate Base Course Using Virgin Aggregate</u>

Gradation	1 test per Lot
Moisture-Density	
Proctor Test	1 test per Lot

A Lot shall be defined as one day's production but no more than 400 cubic yards.

<u>Aggregate Base Course Using Recycled Concrete Aggregate</u>

Gradation	4 tests per Lot (one test from each sublot)
Moisture-Density	
Proctor Test	4 tests per Lot
Composition	4 tests per Lot

3. The Engineer will check base course thickness at least once every 2500 sq. ft.

4. The Engineer will determine field density of compacted base course from in-place density tests. Frequency of testing will be at least one test every 2500 square feet per lift. Locations of random sampling shall be determined in accordance with ASTM D 3665. The in-place field density shall be determined in accordance with ASTM D 2922 and ASTM D 3017, or ASTM D 2167, or ASTM D 1556.

5. The Engineer will check conformance to elevations required by the Contract Drawings and required tolerance for surface straightness.

1.05 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Virgin aggregate for base course shall be quarry processed, crushed dolomite, limestone, gneiss, or trap rock free from coatings of clay, silt, vegetable matter, and other objectionable materials, and shall contain no clay balls.

B. Recycled concrete aggregate for base course shall be as follows:

1. The RCA shall consist of at least 90 percent, by weight, Portland cement concrete, with the following materials making up the remaining 10 percent:

   Wood-0.1%, maximum
   Brick, Mica schist, or other friable material-4%, maximum
   Asphalt Concrete-10%, maximum

2. Virgin aggregate may be added to meet the 90% minimum concrete requirement.

3. The percentage of asphalt concrete and other deleterious material shall be determined by weighing that material retained on the No. 4 sieve, and dividing by the total weight of RCA material retained on the No. 4 sieve.

C. Gradation for aggregate base course shall be as follows:

1.

	Percentage Passing By Weight	
Sieve Size	DGABC	OGABC
1 1/2"	100	100
3/4"	55-90	60-95
3/8"		40-80
No.4	25-60	15-35
No. 50	5-25	8-20
No. 200	3-12	0-7

2. The portion passing the No. 40 sieve shall be non-plastic when tested in accordance with ASTM D 4318.

3. The aggregate base course shall have not less than 90% by weight with at least two fractured faces and 100% with at least one fractured face, and with a maximum of 7% of flat or elongated pieces. A flat piece is one having a ratio of length to width greater than five.

D. Soundness of Aggregates:

Loss limitation shall not be more than 10% loss by weight, using sodium sulfate for 5-cycle test period, or not more than 15% loss by weight, using magnesium sulfate for a 5-cycle test period as determined by ASTM C 88.

E. Resistance to Degradation:

Percentage loss between the original weight and the final weight of the test sample, shall not exceed 45% as determined by ASTM C 131.

F. Recycled Concrete Aggregate Stockpile Approval:

RCA will be sampled from lots as specified in 1.04 E.2. Each sublot of each lot shall meet all applicable test requirements of this Section. If any one sublot does not meet these requirements, the entire lot will be disapproved and shall not be used for the purposes of this Contract.

The Engineer will approve or disapprove the RCA within 4 days after sampling, unless the Engineer determines that soundness of aggregate or resistance to degradation tests specified in this Section 2.01 are required, in which case 21 days will be required for approval or disapproval. Do not deliver RCA until it has been approved by the Engineer.

After a lot has been approved, no additional material shall be added to the lot stockpile until that stockpile is exhausted. Any new stockpile formed shall be subject to testing and acceptance as described above.

PART 3. EXECUTION

3.01 INSTALLATION

A. Equipment

1. Placing and spreading equipment shall be approved by the Engineer and be capable of spreading material without segregation of aggregate sizes.
2. Steel vibratory rollers to be used for compaction, shall have provision for regulation of vibration frequency. Pneumatic rubber-tired rollers shall have a minimum weight of 20 tons and tire pressure of between 60 and 150 psi, as directed by the Engineer. All compaction equipment, including mechanical tampers when proposed, is subject to review an approval by Engineer.

B. Preparation of Subgrade

1. Verify that job conditions specified in 1.03 A have been met and there are no high points in the subgrade which would interfere with meeting the tolerance requirements specified in 1.03 B.
2. For granular subgrades, compact subgrade with a minimum of 6 passes of an approved vibratory steel roller, operating at the optimum operating frequency as recommended by the manufacturer.
3. For fine-grained soil subgrades, compact subgrade with a minimum of 6 passes of an approved pneumatic rubber-tired roller.

4. Rollers shall be operated at a speed not to exceed 3 miles per hour. Roller passes shall be overlapped a minimum of 6 inches.

5. All subgrade compaction operations shall be performed at or near optimum moisture content. In areas where use of a roller is impractical, compact subgrade with approved mechanical tampers.

6. Provide grade control as follows:

   a. Set grade stakes on a rectangular grid not more than 25 feet on centers.

   b. After firmly driving stakes, offset mark each 6 inches above the top of base course.

   c. Maintain stakes during placement and compaction of base course.

C. Placement and Compaction

1. Place base course materials evenly over the prepared subgrade with approved spreading equipment. In multi-layer construction, the previously constructed layer should be cleaned of loose of foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered by the next layer.

2. When spread, base course materials shall be at or near optimum moisture content and of a thickness such that the maximum depth of a compacted layer shall be 6 inches. In multi-layer construction, the base course shall be placed in approximately equal-depth layers.

3. Compact immediately after spreading, while at or near optimum moisture content, by rolling. The number, type and weight of rollers shall be sufficient to compact the material to the required density.

4. In areas where use of rollers is impractical, compact with manually operated equipment while at or near optimum moisture content.

5. The base course shall be maintained in a condition that will meet all specification requirements until the Work is accepted. Equipment used in the construction of an adjoining section may be routed over completed portions of the base course, provided no damage results and provided that the equipment is routed over the full width of the base course to avoid rutting or uneven compaction.

6. If, in the opinion of the Engineer, the compacted base course softened due to exposure to the elements, drain off all freestanding water and recompact the base course until density requirements are met.

D. Adjustment of Deficiencies

1. Scrape, add or remove material or replace deficient material, and recompact to meet specified density, grade or smoothness criteria.

2. In no case will the addition of thin layers of material be added to the top layer of base course to meet grade. If the elevation of the top layer is 1/2 inch or more below grade, the top layer of base shall be scarified to a depth of at least 3 inches, new material added, and the layer shall be cut back to grade and rerolled.

END OF SECTION

SECTION 02231

AGGREGATE BASE COURSE

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Samples

02231C01 In the case of RCA, an actual material submittal from the proposed source may be required as the result of a new, unfamiliar or unsatisfactory supplier submittal. Two 75 pound representative samples from a dedicated stockpile proposed for use under this contract must then be supplied as follows:
a. Submit RCA samples in clean, sturdy containers or bags that shall not permit loss of any of the material.
b. Clearly label samples with the Contract location, title, and number; identification of the material supplied; and the location of the source.
The Engineer will approve or disapprove within 21 days after receipt of sample. When an actual sample is required, do not deliver material to the site until Engineer has approved of the sample.

Product Data

02231D01 Submit to the Engineer of Materials, Engineering Materials Laboratory, Port Authority Technical Center, 241 Erie Street, Jersey City, NJ 07310-1397, all of the following:
The proposed source of material. Material must come from a source approved by either NYDOT or NJDOT. The Engineer will approve or disapprove within 10 working days after receipt of submittal. Do not deliver material until the Engineer has approved of the source.

02231D02 If the source and/or the supplier of the aggregate base course material changes, resubmittals for approval must be made in accordance with 1.05, above.

Certificates

02231E01 In the case of RCA, the name of the intended supplier and certified test data demonstrating the supplier's compliance with the material requirements of 2.01, at least 21 days prior to delivery of any RCA to the construction site. The Engineer will approve or disapprove within 10 working days after receipt of submittal. Do not deliver material until the Engineer has approved of the source.

END OF APPENDIX "A"

DIVISION 2

SECTION 02274

GEOTEXTILES

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies the requirements for geotextiles (fabrics) made of polymers for the following applications:

1. Subsurface Drainage
2. Sediment Control
3. Erosion Control
4. Separation of Dissimilar Materials (including subgrade stabilization)

B. This Section does not specify requirements for geotextiles for the following application:

1. Reinforcement within pavement structures and paving membranes
2. Reinforcement for embankment structures
3. Polymeric liners (geomembranes)

1.02 REFERENCES

The following is a list of the publications referenced in this Section:

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M288 Standard Specification for Geotextiles

American Society of Testing and Materials (ASTM)

ASTM D 4354 Standard Practice of Sampling of Geosynthetics for Testing

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

Unless otherwise shown on the Contract Drawings or Specified herein, the geotextiles shall conform to the applicable requirements of AASHTO M288.

1.04 QUALITY ASSURANCE

A. Geotextile materials will be visually inspected by the Engineer when delivered to the construction site. Damaged materials or materials not meeting the requirements of this Section shall be removed from the construction site and replaced.

B. Engineer's Sampling and Testing

1. The Contractor shall furnish labor, equipment and materials to take samples, and to repair all areas where samples are taken.

2. Quality Assurance (QA) testing of the physical requirements of the geotextile fabric will be performed by the Engineer using random samples obtained from materials delivered to the job site.

3. The Engineer will perform field seam tests on random samples obtained in the field.

4. Unless otherwise shown on the Contract Drawings, the Engineer will determine the lot sizes for testing based on ASTM D 4354 and the type and number (minimum three) of tests per lot.

1.05 DELIVERY, HANDLING AND STORAGE

Comply with AASHTO M288 to protect materials against moisture and ultraviolet exposure prior to installation.

1.06 SPARE MATERIALS

During construction, the Contractor shall have on hand sufficient spare geotextile materials and appurtenances as necessary to repair damage to permanent and temporary geotextile installations.

1.07 SUBMITTALS

For Submittal Requirements, see Appendix "A".

PART 2. PRODUCTS

2.01 MATERIALS

A. General

Fibers used for the manufacture of geotextiles and the threads used in joining geotextiles by sewing shall comply with the physical and chemical requirements of AASHTO M288.

B. Geotextile

For the indicated application, comply with the physical requirements of AASHTO M288 Table 1 Physical Requirements and with Permeability and Apparent Opening Size as noted on the Contract Drawings.

1. Subsurface Drainage: "Class A"

2. Sediment Control: "Self Supported"

3. Erosion Control: "Class A"

4. Separation of Dissimilar Materials (including subgrade stabilization): "High Survivablility Level"

C. Temporary Silt Fences

1. Geotextiles for temporary silt fences shall meet the requirements for sediment control, self supported, of AASHTO M288 Table 1 unless otherwise shown on the Contract Drawings.

2. Posts and appurtenances shall be in accordance with the fabric manufacturer's written recommendations, except as otherwise shown on the Contract Drawings.

3. Prefabricated silt fences with the geotextiles affixed to the posts are permitted.

PART 3. EXECUTION

3.01 PREPARATION

A. Prepare surfaces against which the geotextile will be installed by clearing and grading as required to remove surface irregularities or projections which may interfere with the installation or which may damage the geotextile.

B. Plan the work such that the exposure of the geotextile between laydown and coverage shall be limited to a maximum of fourteen (14) days.

3.02 INSTALLATION

A. General

1. Install the geotextile as shown on the Contract Drawings and as specified herein.

2. Unroll and place the geotextile to maintain a smooth surface and in such a manner that placement of overlying materials will not excessively stretch or tear the geotextile.

3. Factory or field sewn or sealed seams shall meet the applicable requirements of AASHTO M288 Table 1.

4. Unless otherwise shown on the Contract Drawings or specified herein, overlapped seams shall have a minimum overlap of 12 inches except when placed underwater where the overlap shall be a minimum of three (3) feet.

5. Remove or repair damaged geotextile as directed by the Engineer. Repairs shall be made with a geotextile patch placed over the damaged area and extending three (3) feet beyond the perimeter of the damage, and shall be seamed to match the surrounding installation.

B. Subsurface Drainage Installations

1. At seams, overlap the fabric in the direction of flow with upstream over downstream.

2. Where seams are required in the longitudinal trench direction and within the trench, they shall be sewn or have a minimum overlap equal to the trench width.

C. Erosion Control Installations

1. Terminal ends of the geotextile shall be anchored at the crest and toe of slopes as shown on the Contract Drawings.

2. For slope protection installations, successive sheets shall be overlapped with upstream over downstream and/or upslope over downslope.

3. Placement of armor stone, rip-rap and aggregate bedding onto the geotextile shall begin at the toe and proceed upslope. For underwater applications, the first layer of such material shall be placed the same day as the geotextile is installed.

4. The height from which material shall be dropped onto the geotextile shall be limited to one (1) foot unless otherwise shown on the Contract Drawings.

D. Separation and Subgrade Stabilization Installations

1. Unroll the material in the direction of construction traffic unless otherwise directed by the Engineer. Adjacent rolls shall be overlapped in the direction of material placement and as shown on the Contract Drawings.

2. Anchor the geotextile as required using pins, staples or piles of the material to be placed on the fabric.

3. Form curves cut from pieces lapped in the direction of construction or by folding in the direction of construction.

4. Placement of material onto the geotextile shall be as specified on the Contract Drawings.

E. Sediment Control Installation

1. Install and maintain sediment controls, as shown on the Contract Drawings.

2. Removal and disposal of temporary sediment controls, and restoration of the site shall be as shown on the Contract Drawings.

PART 4. FIELD TESTS AND ADJUSTMENTS

A. Proofroll and correct deficiencies as required by the Contract Drawings or as specified in other Sections of the Specifications.

B. Unless otherwise shown on the Contract Drawings, correction of deficiencies and additional proof rolling shall be at no additional cost to the Authority.

C. Testing of field seams shall be by the Engineer as specified elsewhere herein.

END OF SECTION

SECTION 02274

GEOTEXTILES

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Certificates

02274E01 Submit manufacturer's certificates of compliance with all requirements for materials specified in this Section.

END OF APPENDIX "A"

DIVISION 2

SECTION 02545

AERONAUTICAL PAVEMENT GROOVING AND REGROOVING

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for aeronautical pavement grooving and regrooving.

1.02 ENVIRONMENTAL REQUIREMENTS

No grooving will be permitted when freezing or near freezing conditions exist or are forecasted to occur within the specified hours of work.

1.03 SPARE PARTS

Have spare equipment and/or replacement parts available at the construction site to minimize construction schedule interruptions.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

3.01 PREPARATION

A. In the case of grooving newly constructed asphalt pavement, grooving shall not commence until 45 days after placement of the asphalt concrete, unless otherwise shown on the Contract Drawings.

B. In the case of grooving newly constructed concrete pavement, grooving shall not commence until the concrete has attained a minimum compressive strength of 4,000 psi based on tests of samples of concrete taken during the placing of the concrete.

C. In the case of regrooving, the maximum width of cutters shall be 5 feet, unless otherwise approved by the Engineer.

3.02 EQUIPMENT

A. Provide a grooving machine of a type equipped with diamond-saw cutting blades, and capable of making at least 18 inches in width of multiple parallel grooves in one pass of the machine.

1. Thickness of the cutting blades shall be sufficient to cut grooves of the required width and depth in one pass of the machine.

2. The cutting head shall not contain a mixture of new and worn blades or blades of unequal wear or diameter.

3. The wheels on the grooving machine shall be of a design that will not scar or spall the pavement.

4. Equip the machine with devices to control depth of groove and alignment within the specified tolerances.

3.03 INSTALLATION

A. Unless otherwise shown on the Contract Drawings, the transverse groove configuration shall be 1/4 inch deep by 1/4 inch wide, spaced 1-1/2 inches on center. Grooves shall be cut perpendicular to the runway or taxiway centerline and shall be continuous from starting edge to ending edge. Allowable tolerance on groove:

1. Depths: ±1/16 inch, with at least 95% no less than 3/16 inch, 60% no less than 1/4 inch and no more than 5% exceeding 5/16 inch.

2. Width: +1/16 inch, -0 inch, with at least 95% no less than 3/16 inch, 60% no less than 1/4 inch, and no more than 5% exceeding 5/16 inch.

3. Spacing: Center to center, -1/8 inch.

4. Alignment: Shall vary not more than 1-1/2 inches in 75 feet.

B. Grooves shall be not closer than 3 inches or more than 9 inches from transverse joints in concrete pavements or from expansion joints in lime cement flyash (LCF) based pavement, unless otherwise shown on the Contract Drawings. Grooves may be continued through longitudinal construction joints.

C. Around flush runway and taxiway centerline lights, runway surface sensors and shallow cable slots of runway surface sensors, grooving shall be terminated as shown on the Contract Drawings.

D. Intersections of runways and/or taxiway(s), if any, shall be grooved as shown on the Contract Drawings. Where step patterns are shown, the cutting width shall be between 18 and 40 inches.

E. Groove in accordance with the configuration details and at locations shown on the Contract Drawings.

F. In the case of regrooving, new grooves must match exactly those in adjacent area in spacing, depth and configuration. If existing grooves cannot be matched, cease operations until adjustments to the equipment are made or other solutions are found, as approved by the Engineer.

G. Repair any damage resulting from pavement grooving or regrooving to the satisfaction of the Engineer at no additional cost to the Authority.

3.04 PROTECTION

A. During grooving, continually flush with water and sweep or vacuum pavement to prevent hardening and build-up of material and to prevent delay in reopening runways and taxiways.

B. Exercise care to prevent grooving residue from entering edge light boxes, catch basins and grass areas or from remaining on the runway or taxiway surfaces (including shoulders).

C. Broom-clean shoulders of grooved pavement and remove all accumulated grooving residue on a daily basis to the satisfaction of the Engineer. In addition, at the conclusion of the grooving or regrooving work, open all catch basins and clean them of any and all residue created as a result of grooving or regrooving to the satisfaction of and as required by the Engineer.

3.05 ACCEPTANCE TESTING

A. Grooves will be tested by the Engineer based on results of zone testing performed by the Engineer. Instruments for measuring groove width and depth must have a range of at least 0.5 inches and a resolution of at least 0.005 inches. Instruments for measuring center-to-center spacing must have a range of at least 3 inches and a resolution of at least 0.02 inches.

B. Each cutting head on each piece of grooving equipment used during the work period will be tested by the Engineer at least three times during work period at a random locations within each zone. At each location, five consecutive grooves sawed by each cutting head on each piece of grooving equipment will be measured for width, depth and spacing. Measurements will be taken along a line perpendicular to the grooves.

Zone	Location
1	Centerline to 5 feet left or right of the centerline
2	5 feet to 25 feet left of the centerline
3	5 feet to 25 feet right of the centerline
4	25 feet to edge of grooving left of the centerline
5	25 feet to edge of grooving right of the centerline

C. When more than one groove sawed by the same cutting head fails to meet the specified depth or width spacing in more than one zone, stop production and make adjustments before resuming grooving operations.

END OF SECTION

DIVISION 2

SECTION 02561

ASPHALT CONCRETE PAVING (FAA)

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for plant mix macadam base course, bottom course, top course, tack coat and overlay of existing pavement with asphalt concrete. This Section conforms to the requirements, with FAA approved modifications, of FAA Specification Item P-401, "Plant Mix Bituminous Pavements".

B. Except as provided in 1.01 C. below, recycled asphalt concrete pavement (consisting of reclaimed asphalt pavement blended with new materials) may be used to the maximum percentages specified in 1.04 C.2.b.

C. Recycled asphalt concrete pavement shall not be used in the top courses within the center 80 feet of runways and the center 50 feet of taxiways, nor in any mixes where modified asphalts are used.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M320	Performance Graded Asphalt Binder
AASHTO R28	Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)
AASHTO T313	Test Method for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)
AASHTO T315	Test Method for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)
AASHTO T48	Flash and Fire Points by Cleveland Open Cup
AASHTO T240	Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test)

American Society for Testing and Materials (ASTM)

ASTM C 88	Test Method For Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Test Method for Materials Finer than 75-micrometers (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C 127	Test Method for Specific Gravity and Absorption of Coarse Aggregate
ASTM C 128	Test Method for Specific Gravity and Absorption of Fine Aggregate
ASTM C 131	Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 566	Test Method for Total Moisture Content of Aggregate by Drying
ASTM C 1252	Test Methods for Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading)
ASTM D 75	Practice for Sampling Aggregates
ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
ASTM D 692	Coarse Aggregate for Bituminous Paving Mixtures
ASTM D 979	Practice for Sampling Bituminous Paving Mixtures
ASTM D 995	Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
ASTM D 1073	Fine Aggregate for Bituminous Paving Mixtures
ASTM D 2041	Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2726	Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D 3203	Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 3549	Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens
ASTM D 3666	Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials
ASTM D 4125	Test Method for Asphalt Content of Bituminous Mixtures by Nuclear Method
ASTM D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4402	Test Method for Viscosity Determinations of Unfilled Asphalt Using the Brookfield Thermosel Apparatus
ASTM D 4791	Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867	Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	Test Method for Mechanical Size Analysis of Extracted Aggregate

ASTM D 5821	Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D 5976	Type I Polymer Modified Asphalt Cement for Use in Pavement Construction
ASTM D 6084	Method for Elastic Recovery of Bituminous Materials by Ductilometer
ASTM D 6307	Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method
ASTM D 6926	Test Method for Preparation of Bituminous Specimens Using Marshall Appartus
ASTM D 6927	Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM E 178	Practice for Dealing with Outlying Observations
ASTM E 950	Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Internal Profile Reference
ASTM E 1274	Test Method for Measuring Pavement Roughness Using a Profilograph

Asphalt Institute - Manual Series

MS - 2	Mix Design Methods for Asphalt Concrete, and Other Hot-Mix Types
MS -20	Asphalt Hot-Mix Recycling

Dept. of Transportation - Federal Aviation Administration (FAA)

Eastern Region Laboratory Procedures Manual (ERLPM) March, 1994

Standards for Specifying Construction of Airports

P-401	Plant Mix Bituminous Pavements

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Job Conditions

1. Apply tack coat only when the base surface is dry and the ambient temperature in the shade has not been below 32 degrees F for 12 hours immediately prior to application, unless otherwise approved by the Engineer.

2. Do not place asphalt concrete upon a wet or frozen surface.

3. The minimum laydown temperature shall be not less than 310°F, when the base temperature is below 50°F and not less than 275°F when the base temperature is 50°F or greater. The Engineer will measure the temperature of the asphalt concrete in the truck at the paver.

4. The minimum allowable base temperature for a lift thickness is shown in the following table:

Nominal Lift thickness (inches)	Minimum Allowable Base Temperature (Degrees F)
2 or greater	32
1-1/2 or greater, but less than 2	40
Less than 1-1/2	50

5. If nominal lift thickness is two inches or greater and the base temperature is below 32°F, the Engineer may approve paving operations if the Contractor can demonstrate, prior to commencing with paving, that density and mat texture uniformity can be achieved. All other requirements apply.

6. In case of sudden rain, the Engineer may at his sole discretion permit placing of mixture already in transit from the plant, provided the surface to be paved is free from pools of water and laydown temperatures conform to the above tabulation. Such permission, however, shall not be interpreted as a waiver of any of the quality requirements.

B. Asphalt Concrete Mix Design

1. Design asphalt concrete job mix formula based on the "Mix Design Table" specified in 2.03 A and specimen compaction temperature specified in 1.04 E.3

2. Design top and bottom courses to the following target values:

	Bottom Course	Top Course	
Design Properties	Mix 1[1]	Mix 2	Mix 3
Marshall Stability, lbs. @ 75 Blows (ASTM D 6927)	2150 min.	2150 min.	2150 min.
Flow Value, 0.01 inch gradation (ASTM D 6927)	8 - 16	8 - 16	8 - 16
Air Voids, Percent [2] (ASTM D 3203)	3.8 - 5.2	2.8 - 4.2	2.8 - 4.2
Percent Voids Filled With Bitumen	65 - 75	67 - 77	67 - 77
Voids in the Mineral Aggregate (VMA) Minimum %	12	13	14

3. Plant mix macadam base course shall be a mixture designed within the gradation limits specified in 2.03 A.

4. The design job mix formula shall indicate definite percentages passing for each sieve fraction of aggregate and the asphalt content.

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1 For asphalt concrete mixes with five percent of the aggregate or greater retained on the 1" sieve, the Engineer may require the use of six inch molds to increase the repeatability of Marshall test results. For six-inch molds Marshall stability shall be 4800 lbs. minimum at 113 blows with 22.5 lb. hammer and 18 inch drop and the flow value shall be within the 12 to 24 range.

2 Determine by comparing bulk specific gravity (ASTM D 2726) to maximum specific gravity (ASTM D 2041).

5. Design new job mix formula for each asphalt plant used, whenever there is a change in material or when field conditions dictate a need for redesign.

6. When required by the Engineer, determine the tensile strength ratio of specimens of the composite paving mixture by procedures specified in ASTM D 4867. The value shall be not less than 80 percent.

C. Plant Production Requirements

1. The asphalt concrete mixture or its components shall not be heated to a temperature outside the limits specified in 3.02 A.

2. Plant production tolerance limits for Marshall Stability and flow value are as follows:

   Marshall Stability at 75 blows (ASTM D 6927) - 1800 lbs. min.[3]

   Flow Value, 0.01inch gradation (ASTM D 6927) - 8 to 16.[3]

   Acceptance shall be on a lot basis as set forth in 1.04 E.3. The acceptance of each lot shall be based on the Percent of Material Within Tolerance Limits (PWL), as set forth in 4.03 B.5. If the PWL of the lot for either parameter is less than 90 percent, the Contractor shall take corrective actions as set forth in 3.03 C.

3. Modified Asphalt Performance Grade

   Modified asphalt shall meet the performance grade requirements set forth in 2.02 B, when tested in accordance with 1.04 E.12. When material fails to meet the requirements, make corrections in accordance with 3.03 E.

4. Marshall Air Voids

   Targets for Marshall air voids are 4.5 percent for mix 1, and 3.5 percent for mixes 2 and 3. Acceptance shall be on a lot basis as specified in 1.04 E.3. The acceptance of each lot shall be based on the Percent of Material Within Tolerance Limits (PWL) as set forth in 4.03 B.5. Adjustment to contract compensation shall be made if the PWL of the lot is less than 90 percent as set forth in 4.03 C. If the PWL of the lot equals or exceeds 90 percent and the PWL for pavement mat and joint densities for the lot equals or exceeds 90 percent, the percentage adjustment to compensation may be between 100 and 106 as set forth in 4.03 C.

   The tolerance limits for Mix 1 are 3.0 and 6.0 percent, and for Mixes 2 and 3 are 2 and 5 percent.

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[3] If six inch molds are required as set forth in 1.03 B.2 Marshall stability shall be 4000 lbs. minimum at 113 blows with 22.5 lb. hammer, 18 inch drop and the flow value shall be within the 12 to 24 range.

D. In-Place Pavement Requirements

1. Surface Smoothness

a. Longitudinal Within Runway or Taxiway Edge Markings

The final surface shall have a Profile Index of 15.0 inches per mile or less and no deviations 0.4 inch or greater in 25 feet. Testing and acceptance shall be on a lot basis as set forth in 1.04 E.10.a. Adjustment to contract compensation will be made based on the Profile Index of the lot as set forth in 4.03 E. Make corrections for deficiencies in surface smoothness as set forth in 3.03 A.

b. Transverse direction for areas within runway or taxiway edge markings and longitudinal and transverse direction for aprons and paved areas outside runway or taxiway edge markings:

Final surface shall be smooth and free from roller marks and irregularities greater than 1/4 inch when tested with a 16-foot straight edge. Testing and acceptance shall be on a lot basis as set forth in 1.04 E.10.b. Make corrections for deficiencies in surface smoothness as set forth in 3.03 A.

c. Notwithstanding the requirements of D.1.a and D.1.b, pave to tighter paving tolerances as required to meet surface smoothness requirements if and when using staged final surface paving techniques.

2. Density

a. In-Place Mat Density

The target for in-place mat density shall be 98 percent or better. Acceptance shall be on a lot basis as set forth in 1.04 E.5. The acceptance of each lot will be based on the Percent of Material Within Tolerance Limits (PWL), as set forth in 4.03 B.5. Adjustment to contract compensation will be made based on the PWL of the lot as set forth in 4.03 C. The lower tolerance limit for pavement mat density is 96.3 percent.

b. In-Place Joint Density

The target for in-place joint density shall be 97 percent or better. Acceptance will be on a lot basis as set forth in 1.04 E.6. The acceptance of each lot will be based on the Percent of Material Within Tolerance Limits (PWL), as set forth in 4.03 B.5. Adjustment to contract compensation will be made based on the PWL of the lot for surface course only as set forth in 4.03 F. The lower tolerance limit for pavement joint density is 94.3 percent.

c. Plant mix macadam base course shall have stone thoroughly interlocked, interstices reduced to a minimum and creeping of mixture no longer visible and with no further increase in density achievable by additional rolling.

3. Thickness

The Engineer will test for thickness only after all corrections for surface smoothness and final surface grade have been completed.

Pavement courses shall conform to thicknesses shown on the Contract Drawings within the following tolerances:

Course or Combination of Courses	Tolerance (in inches) Plus or Minus[4]
Thickness of top course	1/4
Total thickness of top course and bottom course	1/4
Total thickness of plant mix macadam base course, bottom course, and top course	1/4
Overlay thickness shall be as required to meet the final surface grade tolerance	--

4. Final Surface Grade

The final surface shall conform to the finished grades shown on the Contract Drawings within a target tolerance of plus or minus 0.04 foot, except where closer tolerance is required for proper functioning of appurtenant structures and drainage. The final surface abutting existing pavements shall smoothly transition to the existing surface grades. The Engineer will test the final surface, which he will accept or reject on a lot basis as set forth in 1.04 E.11. For areas within the runway or taxiway edge markings, the Engineer will adjust contract compensation based on the percentage of grade measurements exceeding the target tolerance as set forth in 4.03 D. For all areas when 15% or more of the grade measurements exceed the target grade tolerance or any individual measurement exceeds a 0.06 foot grade tolerance, make corrections for deficiencies in final surface grade as set forth in 3.03 D.

5. In-Place Air Voids

Asphalt concrete shall have in-place mat air voids between 2.0 percent and 8.0 percent (9.0 percent for bottom course). The Engineer will test in-place air voids in accordance with 1.04 E.7. When material fails to meet the requirements, correct in accordance with 3.03 B.

1.04 QUALITY CONTROL/ASSURANCE

A. General

1. Establish and maintain effective quality control procedures which shall ensure that the materials and completed construction submitted for acceptance conform to Contract requirements whether manufactured or processed by the Contractor or procured from subcontractors or vendors.

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[4] All measurements for this purpose shall be to the nearest 1/8th inch.

2. Pre-Pavement Construction Meeting

a. A pre-paving meeting will be conducted at the construction site by the Engineer a minimum of 20 days prior to the first day of laydown to discuss Contractor (suppliers) mixes, plant quality control, field quality control, tack coat, control strip, requirements for mat and joint densities, equipment –(rollers, material transfer unit and paver), smoothness and grade control, segregation, workmanship, quality assurance testing, incentive and disincentive criteria, and any other pertinent specified requirements.

At no additional cost to the Authority, make arrangements for the project superintendent and a qualified Contractor's representative to be present at every segment of the paving operations, including but not limited to the following:

(1) Asphalt Producer's Quality Control Manager

(2) Contractor's representative for site quality control testing

(3) Paving crew foreman

(4) Smoothness testing personnel

(5) Survey crew chief

b. Record, type and distribute meeting minutes to all attendees of the meeting within 5 days of the date of the meeting.

c. Do not schedule the pre-paving construction meeting until all submittals pertaining to the paving operation have been submitted and approved.

3. Provide the Engineer certification in writing stating that all of the testing equipment to be used is properly calibrated and will meet the specifications applicable for the specified test procedures. Upon Engineer's request, test samples to demonstrate an acceptable level of performance.

4. Perform quality control sampling, testing, and inspection during all phases of the work at rates sufficient to ensure that the work conforms to the contract requirements, and at minimum test frequencies required by 1.04 D.

B. Quality Control Plan

1. Establish and maintain a Quality Control Plan (Plan) along with all the personnel, equipment, supplies and facilities necessary to obtain samples, perform and document tests and meet specification requirements. For Contracts requiring 10,000 tons of asphalt concrete or greater, the Plan is required. For Contracts requiring less than 10,000 tons of asphalt concrete, the Plan is optional.

2. Describe the Plan in a written document. Submit the written Plan to the Chief of Materials, Materials Engineering Unit for review at least 28 calendar days prior to the start of paving operations.

3. In the absence of an approved Quality Control Plan the Authority will make no payments for materials which are subject to specific quality control.

4. The Plan may be carried out wholly or in part by the Contractor or by an independent organization but it shall in all cases remain the responsibility of the Contractor.

5. Plan Contents - The Plan shall be organized to address at least the following items:

   a. Quality control organization chart.

   b. Area of responsibility and authority of each individual.

   c. Names and qualifications of personnel as required by 1.04 B.7.d.

   d. A listing of any outside organizations such as testing laboratories that will be employed by the Contractor and a description of the services they will provide.

   e. A testing plan which lists the tests required to be performed by the Contractor, the frequency of testing, sampling locations and the location of the testing facilities.

   f. Procedures for ensuring that tests are taken in accordance with the testing plan, that they are documented and that proper corrective actions are taken when necessary.

   g. Procedures for ensuring that testing equipment is available, that it complies with specified standards and that it has been calibrated against certified standards.

   h. Procedures for verifying that tests are taken in accordance with the appropriate AASHTO and ASTM standards.

   i. Procedures for daily submittal of test results to the Engineer.

   j. An action plan detailing procedures to be used to correct unsatisfactory production processes and construction practices, when tests indicate materials are failing to meet specification for the following:

      (1) Aggregate gradation

      (2) Mat and joint density

      (3) Marshall air voids

      (4) Surface smoothness

      (5) Grades

6. Plan Elements. The Plan shall address all elements which affect the quality of the pavement including but not limited to:

   a. Mix Design

   b. Aggregate Gradation

   c. Quality of Materials

   d. Stockpile Management

   e. Proportioning/temperature control of mixture components

   f. Mixing and Transportation

   g. Placing and Finishing

   h. Joints

   i. Compaction

   j. Surface smoothness and grades

7. Quality Control Organization

a. Implement the Quality Control Plan by the establishment of a separate Quality Control Organization. Develop and submit an organization chart to show all quality control personnel integrated with other management, production and construction functions and personnel.

b. The organization chart shall identify all quality control staff required to implement all elements of the quality control program, including inspection and testing functions for different items of work.

c. If an outside organization or independent testing laboratory is used for implementation of all or part of the Plan, the personnel assigned will be subject to the qualification requirements of this 1.04B.7.d. The organization chart shall indicate which personnel are contractor employees and which are provided by an outside organization.

d. The Quality Control Organization shall consist of at least the following personnel:

(1) Plan Administrator

The Plan Administrator shall be an employee of the Contractor. The Plan Administrator shall have prior quality control experience on a project of size and scope comparable to this Contract. In addition, the Plan Administrator shall meet one of the following requirements:

(a.) Licensed Professional Engineer with one year of airport paving experience as approved by the Engineer.

(b.) Engineer-in-Training with two years of airport paving experience as approved by the Engineer.

(c.) An individual with three years of highway and/or airport paving experience as approved by the Engineer and with a Bachelor Degree in Civil Engineering, Civil Engineering Technology or Construction.

(d.) Construction Materials Technician certified at Level III by the National Institute for Certification in Engineering Technologies (NICET).

(e.) Highway Materials Technician certified at Level III by NICET.

(f.) Highway Construction Technician certified at Level III by NICET.

(g.) A NICET certified Engineering Technician in Civil Engineering Technology with 5 years of highway and/or airport paving experience as approved by the Engineer.

Certification at an equivalent level by a State or nationally recognized organization will be acceptable in lieu of NICET certification. The Plan Administrator shall have full authority to institute any and all actions necessary for the successful operation of the Plan to ensure compliance with the Specifications. The Plan Administrator shall report directly to a responsible officer in the Contractor's organization. The Administrator may supervise the Plan on more than one project provided that he can upon request be at the job site within one hour.

(2) Quality Control Technicians

Provide a sufficient number of Quality Control Technicians to adequately implement the Plan. Quality Control Technicians shall be engineers, engineering technicians or experienced craftsmen holding a current certificate issued by the New Jersey Society of Asphalt Technologists, Inc. (NJSAT) or other Engineer-approved certifying agency or organization. (Information regarding the certification procedure can be obtained by contacting NJSAT.)

The Quality Control Technicians shall report directly to the Plan Administrator and shall perform the following functions:

(a.) Inspection of all plant equipment used in proportioning and mixing to ensure proper calibration and operating conditions.

(b.) Performance of quality control tests necessary or desirable to adjust and control mix proportioning in accordance with the job mix formula.

(c.) Inspection of all equipment used in placing, finishing and compacting material to ensure proper operating condition.

(d.) Inspection during construction to ensure that placement, joint construction and compaction is in conformance with the specifications and will produce a finished product that meets specification requirements.

(e.) Performance of all quality control testing as required by 1.04 D, including density monitoring.

8. Testing Laboratory.

The Plan must provide for a fully equipped asphalt laboratory located at the plant or job site. It shall be available for joint use by the Contractor for quality control testing and by the Engineer for acceptance testing and must have adequate equipment for the performance of the tests required by these specifications. The Engineer shall have priority in use of the equipment necessary for acceptance testing.

The effective working area of the laboratory shall be a minimum of 250 square feet with a ceiling height of not less than 7.5 feet. Lighting shall be adequate to illuminate all working areas. It shall be equipped with heating and air conditioning units to maintain a temperature of 70°F + 5°F.

In addition to the equipment required for testing, the laboratory shall be equipped with a paper copier and facsimile machine to be utilized by the Engineer.

Keep laboratory facilities clean and maintain all equipment in proper working condition. Allow the Engineer unrestricted access to inspect the Contractor's laboratory facility and to witness quality control activities. The Engineer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies or testing personnel and procedures. When in the Engineer's opinion deficiencies may adversely affect test results, immediately suspend delivery and placement of asphalt materials and do not resume until the deficiencies are satisfactorily corrected.

9. Noncompliance.

In cases where quality control activities do not comply with either the Contractor's Quality Control Program or the Contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, the Engineer may order the Contractor to replace ineffective or unqualified quality control personnel.

C. Source of Aggregate and Sampling

1. Virgin Aggregate

a. Select sources of virgin aggregates well in advance of the time the materials are required for the construction. When the aggregates are obtained from a previously approved source, submit random hot bin samples, if requested by the Chief of Materials, Materials Engineering Unit, a minimum of 14 calendar days prior to the start of production and if from a source not previously approved, submit random hot bin samples a minimum 45 calendar days prior to the start of production. Sampling of the hot bin materials for job mix formulation will be observed by the Engineer and identical samples will be obtained for verification of the job mix formulation by the Authority's Materials Engineering Unit Laboratory. The Engineer may require the proposed mix formulation to be batched at the asphalt plant and tested in the presence of the Engineer.

b. Where previously used or concurrent job mix formulations are to be used, the taking of hot bin samples may be waived by the Engineer.

2. Reclaimed Asphalt Pavement

a. Where reclaimed asphalt pavement material is permitted, it shall have 100 percent passing 1/2 inch sieve and shall be a mixture of only coarse aggregate, fine aggregate, and asphalt cement, free of solvents or other contaminating substances. The fine aggregate contained in the reclaimed asphalt pavement shall have a plasticity index of not greater than 4 when tested in accordance with ASTM D 4318.

Maintain stockpiles of reclaimed asphalt pavement in a manner to prevent contamination with other aggregates and keep covered in order to maintain a low moisture content of the reclaimed asphalt pavement.

b. Unless otherwise shown on the Contract Drawings, A minimum of 10% to a maximum of 25% recycled asphalt pavement will be required in all asphalt mixes, other than the surface course. Asphalt mixes that contain recycled asphalt pavement will have a tolerance range for plant voids of 1.5-5.5%. Fifty percent of the asphalt cement content contained in the recycled asphalt pavement will be deducted from the optimum asphalt content for an asphalt mix design.

c. Contractor's reclaimed asphalt pavement will be considered for use provided that the Engineer is notified of the intended use and that he approves the reclaimed asphalt pavement. Take at least six representative samples, each at least 7 pounds, from each stockpile. Stockpiles shall not exceed 3000 tons. Sample in accordance with ASTM D 75. Sampling will be observed by the Engineer. Take duplicate samples and submit them with mix design for verification. Test samples in accordance with ASTM D 2172 to determine asphalt cement content; test recovered aggregate in accordance with ASTM C 136 for gradation.

d. Once a reclaimed asphalt pavement stockpile has been approved for use, the stockpile shall be dedicated to the Contract and no reclaimed asphalt pavement may be added to the stockpile. If there is an insufficient amount of reclaimed asphalt pavement in the stockpile to complete the work, a new separate stockpile may be made and shall be tested for acceptance as aforementioned.

3. Locate stockpiles of reclaimed asphalt pavement and of new aggregate so as to prevent intermingling.

4. When more than one asphalt plant is to be used to supply asphalt concrete to the construction site, each asphalt plant shall use a similar job mix formula, as approved by the Engineer.

5. Locations and timing of random sampling shall be determined in accordance with Section 6 of FAA ERLPM.

D. Contractor's Quality Control Tests

1. Perform all quality control tests necessary to control the production and construction processes. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, Marshall properties and temperatures. Obtain samples at the direction of the Engineer for the purpose of quality control testing. Random sampling procedures specified in Section 6 of FAA ERLPM shall be used for determining the selection of samples as follows:

a. Take four samples of freshly mixed material per each lot (one sample from each sublot) for top, bottom and base courses. Take samples in accordance with ASTM D 979 from material at the mixing plant.

A lot will be defined as one day's production for each mix. Production rates for each mix will be obtained by the Engineer from the asphalt plant at the start of each day's production. A sublot will be defined as a quarter of a lot based on the initial production forecast for the mix. Maximum lot size will be 2000 tons. If a day's production is forecast over 2000 tons, the forecast quantity shall be divided into two or more equal lots. Should actual production be greater than the initial forecast of production for a given mix, the additional production will be divided into the same sublot sizes as initially calculated. If one or two additional sublots are produced they will be added to that day's lot with n=5 or 6 for sublots. If three or more additional sublots are produced in a day, an additional lot will be established for that particular day.

If actual production is less than the initial forecast for a given mix but sufficient material was produced to constitute three sublots, a lot will be formed with three sublots (n=3). Should actual production constitute only one or two sublots, the sublots will be added either to the previous lot or the next production lot, whichever is closer in time. Each sublot shall contain a minimum of 75 tons of material.

Where more than one plant is simultaneously producing material for the job, the lot sizes shall apply separately for each plant.

b. Test samples to determine asphalt content in accordance with ASTM D 2172, ASTM D 4125 or ASTM D 6307. Test recovered aggregate to determine gradation in accordance with ASTM D 5444. In addition, when automated recording plants are used, submit printouts of asphalt content to the Engineer.

c. Prepare three plugs from each sample and test them in accordance with ASTM D 6926 using automatic compaction procedures. Marshall air voids shall be determined in accordance with ASTM D 3203. For each sublot, the maximum theoretical density shall be determined in accordance with ASTM D 2041.

Voids filled with asphalt, for each plant sample, shall be computed as follows:

(1) Determine asphalt content in percentage by volume (I) using:

$$I = \frac{P_b \times G_{mb}}{G_b}$$

Where:

I = Percentage by volume of asphalt

P_b = Percentage by weight of asphalt

G_{mb} = Bulk specific gravity of compacted mixture

G_b = Specific gravity of asphalt

(2) Determine percent voids filled with asphalt (VF) as follows:

$$VF = \frac{I \times 100}{I + P_a}$$

Where:

VF = Percent voids filled with asphalt

I = Percentage by volume of asphalt

Pa = Percent Marshall air voids

Voids in the Mineral Aggregate (VMA) will be estimated by adding the asphalt content in percentage by volume to the percent of air voids. Bulk specific gravities will be used to calculate VMA.

d. Take hot bin or feeder belt composite samples of top, bottom and base course aggregates for mixes at least twice daily and check gradation in accordance with ASTM C 136, including washing material passing No. 8 sieve in accordance with ASTM C 117.

e. At least six times daily, check and record temperatures at necessary locations to determine the temperatures of:

(1) aggregates and asphalt immediately before introduction to the pugmill or dryer drum;

(2) the mixture immediately after discharge from the pugmill or dryer drum;

(3) the mixture at the spreader on the construction site.

f. Reclaimed Asphalt Pavement

(1) Where reclaimed asphalt pavement is being used as a substitute for some of the virgin aggregate, take a sample of freshly mixed recycled asphalt concrete in accordance with ASTM D 979 and determine the moisture content at least twice daily. Moisture determinations shall be based on the weight loss by heating an approximately 4 pound sample of the freshly mixed materials for one hour in an oven at 280 plus or minus 5 degrees F. The moisture content of the freshly mixed recycled asphalt concrete shall not exceed 0.5 percent.

(2) Take a sample of reclaimed asphalt pavement from the approved stockpile at least once daily and test in accordance with ASTM D 2172 to determine asphalt content and gradation in accordance with ASTM D 5444. The resulting asphalt content and aggregate gradation shall be similar to the average test results of the reclaimed asphalt pavement submitted with Design Job Mix Formula. If there is a variation of plus or minus 1.0 percent in the asphalt content or plus or minus 10 percent in aggregate gradation on any sieve, a second sample shall be taken and tested in the same manner as the first sample. If the results are similar to that of the first sample, appropriate measures shall be taken to adjust the mixture to compensate for the variation in the reclaimed asphalt pavement.

g. Moisture Content of Aggregate

For drum plants the moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

h. Moisture Content of Mixture

The moisture content of the mixture shall be determined once per lot in accordance with the procedure given in Section 1.04.D.1.f. (1). The moisture content in the freshly mixed asphalt concrete shall not exceed 0.5%. If the moisture content is 0.5% or greater, stop production and adjust plant operation

i. Perform additional testing as required to ensure that mixtures produced meet the requirements of this Section.

2. Control Charts

Maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for aggregate gradation and asphalt content. When test results exceed certain limiting values, take action to bring the asphalt concrete production process under tighter control. The Action Limit is the limiting value at which corrective actions shall be made while production may continue. The Suspension Limit is the limiting value at which production must be suspended while corrections are made. Production shall not resume until Contractor's corrections are approved by the Engineer.

Post control charts in a location satisfactory to the Engineer and keep charts current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter and the Contractor's test results. Use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If in the Engineer's opinion the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the Engineer may suspend production or acceptance of the material.

a. Individual Measurements

Establish control charts for individual measurements to maintain process control within tolerance for aggregate gradation and asphalt content. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

CONTROL CHART LIMITS FOR INDIVIDUAL MEASUREMENTS		
Sieve	Action Limit	Suspension Limit
1"	±6 %	±9 %
3/4"	±6 %	±9 %
1/2"	±6 %	±9 %
3/8"	±6 %	±9 %
No. 4	±6 %	±9 %
No. 8	±5 %	±7.5 %
No. 16	±5 %	±7.5 %
No. 30	±3 %	±4.5 %
No. 50	±3 %	±4.5 %
No. 100	±2 %	±3 %
No. 200	±2 %	±3 %
Asphalt Content	±0.45 %	±0.7 %

b. Range.

Establish control charts for range to control process variability for the test parameters and Suspension Limits listed below. Compute the range for each lot as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

CONTROL CHART LIMITS BASED ON RANGE	
(Based on n = 2)	
Sieve	Suspension Limit
1"	11 %
3/4"	11 %
1/2"	11 %
3/8"	11 %
No. 4	11 %
No. 8	9 %
No. 16	9 %
No. 30	6 %
No. 50	6%
No. 100	3.5%
No. 200	3.5%
Asphalt Content	0.8%

c. Corrective Action.

The Quality Control Plan shall provide for appropriate action to be taken when the asphalt concrete production process is out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and shall describe Contractor's actions to bring the process into control. A process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or

(2) Two consecutive points fall outside the Action Limit line for individual measurements.

3. Document quality control efforts using copies of the sample forms contained in the FAA ERLPM, Appendix C, in its entirety, or use Port Authority forms obtained from the Engineer. Make test results available to the Engineer daily.

4. If a storage silo is used:

   a. Check the silo to see that it can properly store the asphalt concrete for the time involved.

   b. Take samples of asphalt concrete as it is unloaded from the silo and check them for conformance to this Section. If the asphalt concrete appears segregated, stop using the storage silo until it is demonstrated to the Engineer that the condition has been corrected.

   c. Silo storage time shall be governed by previous State DOT approval, not to exceed 24 hours.

5. Unless otherwise noted on the Contract Drawings, and subject to the approval of the Engineer, select an area to be called a Control Strip from the first day's production of each mix. Each Control Strip shall be a minimum of 100 feet long and two spreader widths wide and shall be constructed to meet the requirements of this Section and in the same manner as the remainder of the course it represents. Take three random samples at the plant and test them for stability, flow and air voids in accordance with ASTM D 6927 and 1.04 D.1.c. Take three randomly selected cores from the pavement mat and three along the longitudinal pavement joint and test them to determine density in accordance with 1.04 E.5 and E.6. Use the same means and methods which will be used to construct longitudinal and transverse joints as referred to in 1.04.B.6.h and 3.02.F.1 and 2.

   The purpose of the Control Strip is to demonstrate that the pavement may be constructed using the proposed equipment and methods of operation and to obtain all quality requirements prior to the start of full production. Construct a new Control Strip whenever a change is made in equipment, methods of operation or type or source of material or whenever there is a change in the job mix formula. The Control Strip may become part of the completed pavement if it meets the requirements of this Section.

6. Include, as part of the quality control plan, the use of a nuclear density device to aid in meeting the specified target densities. Calibrate the nuclear density device with the control strip cores. If other than a nuclear density device is used it shall be calibrated with an additional set of pavement cores.

7. Surface Smoothness

   Perform quality control smoothness testing of the final surface. Testing equipment shall be capable of measuring the Profile Index of the final surface in inches per mile using a 0.2 inch blanking band, in accordance with ASTM E 1274. As a minimum test the final surface of pavement, along the center of each paving lane once during each day of paving. Provide written test results to the Engineer after each test. Test results shall identify the location of each test including starting and end stations and offset from centerline of pavement. Upon completion of all quality control testing and any required corrective work, the Engineer, in accordance with 1.04 E.10, will perform acceptance testing.

8. Final Surface Grade.

Perform quality control surveys immediately after the top course has been compacted, to check final grades. Measure elevations at the finished grade locations shown on the Contract Drawings. Provide the Engineer with the survey results at the end of each work period. The survey results shall identify the location of each measurement by station and offset, measured elevations to the nearest 0.01 foot, required finished grades from the Contract Drawings and the difference between measured elevations and required elevations to the nearest 0.01 foot. This survey is for Contractor's quality control. Acceptance of the finished surface shall be as specified in 1.04 E.11.

9. For Work performed, either wholly or in part, in the State of New Jersey, provide a representative present during all paving operations who shall be certified by the New Jersey Society of Asphalt Technologists, Inc. (NJSAT) as an Asphalt Paving Construction Technologist.

E. Engineer's Sampling and Testing

1. Produce asphalt concrete in approved automated plants equipped with interlocks and printouts meeting the requirements of ASTM D 995 and subject to the following:

   a. Plant interlocks and printouts shall be in operation during production and two (2) copies of all printouts shall be furnished to the Engineer daily.

   b. Scales shall be certified by an approved agency at least every 180 calendar days and copies of certifications shall be submitted to the Engineer upon request.

2. Provide labor and equipment to take samples, except cores, to check thickness and density.

3. The Engineer will perform acceptance testing for Marshall air voids, stability and flow. Samples will be taken from trucks at the plant, in accordance with FAA ERLPM, Section 6. These samples will be from the sublots that were sampled in 1.04 D.1.a. The Engineer will prepare three plugs from each sample and test them in accordance with ASTM D 6926 and ASTM D 6927 using automatic compaction procedures. The specimen compaction temperatures will be within the following range as measured within 1/2 inch from the outside edge:

Performance Grade	Temperature Degrees F°
PG 64-22, PG 70-22	275 – 295
PG 76-22	300 – 320
PG 82-22	305 - 325

Air voids, voids in mineral aggregate and voids filled with asphalt will be determined in accordance with ASTM D 3203 and 1.04 D.1.c. The average test values obtained from each lot of top and bottom courses must conform to the parameters specified in 1.03 C.

In lieu of sampling and testing in the field, the Engineer may sample and perform acceptance testing at the plant. The Contractor will be advised at the start of Work where the Engineer will sample and test.

4. For thickness determination, exclusive of overlay pavement, the Engineer will divide each course into area lots consisting of the area covered by the lot sampled as specified in 1.04 D.1.a and he will further subdivide each lot into four equal sublots. The Engineer will take one 4-inch diameter core randomly in each sublot to check thickness of the top and bottom courses. One fourth of all such cores will continue through the plant mix macadam base course. Thickness will be determined in accordance with ASTM D 3549.

5. Mat Density

a. The Engineer will determine the in-place density of the control strip and subsequently placed pavements by taking cores at random locations as specified below.

b. Cores taken from the top and bottom course in place and any other specimens taken at the jobsite, sampled in accordance with the random sampling procedures as specified in 1.04 D.l, will be tested by the Engineer for bulk specific gravity in accordance with ASTM D 2726. Cores shall not be taken closer than one foot from a transverse or longitudinal joint for pavement mat density determination. The in-place density of the pavement course will be the ratio of the in-place specific gravity to the laboratory Marshall bulk specific gravity expressed as a percentage.

c. Cores taken from courses containing more than 10 percent air voids will be tested by the Engineer for density (Bulk Specific Gravity) according to the following equation:

$$S.G. = \frac{W}{12.87\, d^2 h}$$

S.G. = Bulk Specific Gravity

W = Weight, Dry Specimen (grams)

d = Measured Diameter[5] (inches)

h = Measured Height[5] (inches)

Laboratory bulk specific gravity and computation of in-place density will be as specified in 1.04 E.5.b above.

d. The average in-place density determination, taken from the area covered by the lot sampled as specified in 1.04 D.l.a, will be determined by the Engineer by summing up the sublot in-place density readings obtained from a lot and dividing the total by the number of sublots. The in-place density from each sublot will be obtained using a core reading taken from each sublot on a random basis and dividing by the Marshall bulk density (ASTM D 6926 and ASTM D 2726) taken for that sublot. Any core with a thickness less than twice the largest sieve size to retain more than 5 percent of any aggregate will be discarded and additional random cores will be taken as required to ensure representative readings.

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5 Average of 5 equally spaced measurements around the core.

e. The Engineer will repeat the procedure specified in a. through d. above whenever a change is made in the type or source of material or whenever a new job mix formula is approved for material from the same source.

6. Joint Density

The Engineer will take one core from each sublot of all surface courses or from the underlying lifts as defined in 1.04 D.l.a and will test it in accordance with 1.04 E.5. For joint cores the lowest Marshall bulk density for sublots forming the joint will be used to compute the in-place density. The Engineer will take cores from directly over the longitudinal joint in line with the location of the random cores taken under 1.04 E.5.b. When a paving lane has two longitudinal joints, both joints will be cored. The in-place joint density will be determined separately for each joint, and the joint producing the lowest in-place density will be used to determine payment. Based on site and placement conditions the Engineer may elect to core only one joint.

7. In-place Air Voids

The Engineer will calculate the in-place mat air voids for each sublot in accordance with ASTM D3203, by comparing the bulk specific gravity (ASTM D 2726) of the cores taken as specified in 1.04 E.5b to the maximum laboratory specific gravity (ASTM D 2041)

8. Patch all areas where samples are taken with an approved asphalt concrete or Portland cement concrete properly tamped to fill all voids and struck off flush with the surface within 24 hours after sampling.

9. The Engineer may at any time, notwithstanding previous plant approval, reject and require the Contractor to dispose of any batch of asphalt concrete mixture which is rendered unfit for use due to contamination, segregation or incomplete coating of aggregate. Such rejection may be based on only visual inspection. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer and, if the Contractor can demonstrate in the laboratory, in the presence of and to the satisfaction of the Engineer, that such material was erroneously rejected, the Contractor will be compensated for the material.

10. Surface Smoothness

a. Longitudinal Within Runway or Taxiway Edge Markings

(1) The Engineer will test the final surface of the pavement parallel to the direction of paving for smoothness. A lightweight profilometer meeting the requirements of ASTM E 950 Class 1 will be used to measure the pavement surface profile.

(2) The profilometer test results will be used to simulate California profilograph testing of the pavement. The simulation will be used to compute the Profile Index in inches per mile using a 0.2 inch blanking band, in accordance with ASTM E 1274. A third-order Butterworth low pass filter with a filter length (cutoff wavelength) of 2.0 feet will be used. Scallops will be rounded to the nearest 0.01-inch. The blanking band will be centered on a straight line determined by least - squares fit over the length of the lot. The simulation will also be used to identify any surface deviations in excess of 0.4 inch in 25 feet. Designed breaks in grade shown on the Contract Drawings will not be included in the Profile Index Computations.

(3) Testing will be performed on a lot basis. A lot is defined as 500 linear feet of paving lane. When less than 250 feet remains after dividing the pavement into 500 linear foot lots, the remaining length will be added to the adjacent lot. When more than 250 feet remains a short lot will be tested.

(4) For paving lanes up to 20 feet in width, three measurements will be made along the centerline of paving lanes. The profile index of the lot will be computed by averaging the profile index of each measurement.

(5) For paving lanes greater than 20 feet in width, three measurements will be made at two locations, each six feet from and parallel to the centerline of the paving lane. The Profile Index of the lot will be computed by averaging the Profile Index of each of the measured profiles.

(6) The Profile Index for the length of paving lane in each lot is converted to the Profile Index of the lot in inches per mile using the following formula:

$$PI = PT \times \frac{5280}{L}$$

Where:

PI = Profile Index, inches per mile

PT = Profile Index, inches per length in feet of paving lane in a lot

L = Length of the paving lane in the lot in feet.

b. Transverse direction for areas within runway or taxiway edge markings and longitudinal and transverse direction for aprons and paved areas outside runway or taxiway edge markings:

(1) A lot is defined as 50,000 SF of final paved surface. Where paving areas are not equally divisible into 50,000 square foot lots, odd sized lots between 25,000 and 75,000 square feet will be used. The odd sized lots will be used for the area remaining after the paved area is divided into 50,000 square foot lots.

(2) Each lot will be evaluated by the Engineer with a 16-foot rolling straightedge provided by the Contractor and subject to approval by the Engineer. The Engineer at his sole discretion may elect to use a lightweight profilometer and straightedge simulation in lieu of rolling straightedge testing. Measurements will be made perpendicular to the centerline of the paving lanes at distances not to exceed 25 feet; longitudinal measurements will be made along the centerline of the paving lane. Designed breaks in grade shown on the Contract Drawings will not be included in the measurements. When more than 15 percent of all measurements within a lot exceed the tolerance specified in 1.03 D.1.b, the Contractor shall correct the deficiency in accordance with 3.03 A.

11. Final Surface Grade

The grades of the final surface of each lot will be measured at the finished grade locations shown on the Contract Drawings. Where paving lanes are 20 feet or greater in width, an additional line of grades, located at the center of the paving lane and spaced at 25 feet longitudinally, will be measured. A lot is defined as 50,000 square feet of final pavement surface. The transverse limit of the lot will be the transverse limit of paving. Lots will be divided into areas within the runway or taxiway edge markings and areas outside the edge marking. Where paving areas are not equally divisible into 50,000 square foot lots, odd sized lots between 25,000 and 75,000 square feet will be used. The odd sized lots will be used for the area remaining after the paved area is divided into 50,000 square foot lots. The Contractor shall perform the survey jointly with the Engineer.

12. The Engineer will perform acceptance testing of modified asphalt to determine if it meets the performance grade requirements set forth in 2.02 B. Samples will be collected at the asphalt plant for each lot of asphalt concrete produced, as specified in 1.04 D1.a. The Engineer will sample the liquid asphalt from the plant storage tanks which must be equipped with a sample valve.

13. The Engineer will measure the temperature of each load of asphalt concrete. Any load of asphalt concrete with temperature exceeding 350°F will be rejected.

14. Where there is a discrepancy between the Contractor's test results and those of the Engineer, the Engineer's test results shall govern.

1.05 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer of asphalt cement shall be approved by either the New York State Department of Transportation (NYSDOT) or the New Jersey Department of Transportation (NJDOT).

B. Modified Asphalt shall be one of the following. No Substitution is permitted.

1. Stylink - Koch Materials; Gloucester City, NJ

2. Vestoplast "S" Modifier - Creanova, Inc.; Somerset, NJ

3. Kraton - Shell Chemical Co.; Houston, TX

4. Citgoflex SP - Citgo Asphalt Refining Co.; Paulsboro, NJ

5. Polykote - Suite - Kote Corp.; Cortland, NY

6. Elvaloy RET - E. I. DuPont Co.; Wilmington, DE

2.02 MATERIALS

A. Aggregates

1. If the tensile strength ratio of the specimens of composite mixture is less than 80 percent, as specified in 1.03 B.6, the aggregates will be rejected unless the Contractor treats the asphalt with an approved anti-stripping agent. The amount of anti-stripping agent added to the asphalt shall be sufficient to produce a tensile strength ratio of not less than 80 percent.

2. Coarse Aggregate - Material retained on the No. 8 sieve.

   a. Except for use in the top lift of the top course within the roadway pavement edge markings as shown on the Contract Drawings, coarse aggregate shall conform to ASTM D 692, except as follows: use broken stone or crushed gravel having not less than 75 percent by weight of pieces with two or more fractured faces and 85 percent by weight having at least one fractured face (ASTM D 5821), with a maximum of 8 percent of flat or elongated pieces (ASTM D 4791), with a maximum percentage of wear (ASTM C 131) of 40 percent and with a magnesium sulfate loss (ASTM C 88) of not more than 12 percent for a five-cycle test period.

   b. For the top lift of the top course within the roadway pavement edge markings as shown on the Contract Drawings, coarse aggregate shall conform to ASTM D 692 except as follows: use broken stone which shall be trap rock or gneiss of uniform quality obtained from a source approved by the New York State Department of Transportation (NYSDOT) or the New Jersey Department of Transportation (NJDOT) for use in asphalt concrete. The aggregate shall have not less than 75 percent by weight of pieces with two or more fractured faces, with a maximum of 8 percent of flat or elongated pieces (ASTM D 4791), with a maximum percentage of wear (ASTM C 131) of 30 percent and with a magnesium sulfate loss (ASTM C 88) of not more than 12 percent for a five-cycle test period.

   c. A flat particle is one having a ratio of width to thickness greater than five; an elongated particle is one having a ratio of length to width greater than five.

3. Fine Aggregate - Material passing the No. 8 sieve and retained on the No. 200 sieve.

   Fine aggregate shall be a blend of washed, textured sand and stone screenings conforming to ASTM D 1073, with a maximum percentage of wear (ASTM C 131) of 30 percent and with a magnesium sulfate loss (ASTM C 88) of not more than 18 percent for a five-cycle test period, a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318. When tested in accordance with ASTM D 2419, the sand equivalent value shall be 35 or greater.

Textured sand shall be defined as a sand which when tested in accordance with ASTM C 1252, Method A, and results in uncompacted voids greater than 45.0 percent. Sand that has a low texture value and slag shall not be used.

4. Mineral filler shall conform to ASTM D 242 and have a ratio to asphalt cement by weight not exceeding 1.2.

B. Asphalt

Asphalt shall be one of the following conforming to the requirements of AASHTO MP1 and as specified within the table entitled "Requirements for Performance Graded Asphalts" for the Performance Grade (PG) as shown on the Contract Drawings:

1. Asphalt Cement

Asphalt cement shall meet the requirements for PG 64-22, unless otherwise shown on Contract Drawings.

2. Modified Asphalt

Modified Asphalt shall be one of the following. No Substitution is permitted.

a. "Stylink", "Kraton (SEBS)", "Polykote", Elvaloy RET or "Citgoflex SP" meeting the requirements for PG 76-22 or PG 82-22 as shown on the Contract Drawings.

b. Asphalt cement modified with "Vestoplast 'S'", may be used where PG 76-22 is specified and subject to the following:

(1) Add Vestoplast "S" to the asphalt concrete mixture at a rate of 7 percent by weight of asphalt cement, by substitution.

(2) Arrange for the manufacturer to provide a representative at the plant at all times during production to verify that the proper quantity of Vestoplast "S" was added to the asphalt concrete.

C. Tack Coat

Unless otherwise shown on the Contract Drawings, tack coat shall be asphalt cement as specified in 2.02 B.1 above.

D. Resultant Asphalt Cement

Resultant asphalt cement shall be a mixture of new asphalt cement as specified in 2.02B.1 above, asphalt cement extracted from the reclaimed asphalt pavement and recycling agents if required.

REQUIREMENTS FOR PERFORMANCE GRADED ASPHALTS

PERFORMANCE GRADE (PG)	64-22	70-22	76-22	82-22
These Tests Performed on Original Binder:				
Flash Point Temperature (AASHTO T48): Minimum, Degrees Celsius.	230	230	230	230
Dynamic Shear (AASHTO T315): G*/SIN DELTA, Minimum, 1.00 kPa, Test Temperature At 10 Rad/s, Degrees Celsius.	64	70	76	82
Rotational Viscosity (ASTM D 4402): Maximum, 3 Pa-s, Test Temperature, Degrees Celsius.	135	135	135	135
Separation Test - R&B (ASTM D 5976): Percent Difference Maximum Degrees Celsius.	--	--	4.5	4.5
These Tests Performed on Rolling Thin Film Oven Test (RTFOT) Residue:				
Mass Loss (AASHTO T240): Maximum Percent.	1.00	1.00	1.00	1.00
Dynamic Shear (AASHTO T315): G*/SIN DELTA, Minimum, 2.20 kPA, Test Temperature at 10 Rad/s, Degrees Celsius.	64	70	76	82
Elastic Recovery (ASTM D 6084) 25 Degrees Celsius, 5 cm/minute Elongation, 60 Minutes, Minimum Percent.	--	--	75	80
These Tests Performed on Pressure Aging Vessel (PAV) Residue:				
PAV Aging Temperature (AASHTO R28): Degrees Celsius.	100	100	100	100
Dynamic Shear (AASHTO T315): G*/SIN DELTA, Maximum, 5000 kPa, Test Temperature at 10 Rad/s, Degrees Celsius.	25	28	31	34
Creep Stiffness (AASHTO T313): S, Maximum, 300 MPa m-Value, Minimum 0.300, Test Temperature at 60 Seconds, Degrees Celsius	-12	-12	-12	-12

2.03 MIXES

A. Mix Design Table

Mix Designation and Percentage by Weight Passing Sieves				
Sieve Size	Plant Mix Macadam Base Course	Bottom Course Mix 1	Top Course Mix 2	Top Course Mix 3
1 1/4"	100	100	---	---
1"	90 - 100	90 - 100	100	---
3/4"	60 - 80	70 - 84	78 - 98	100
1/2"	---	54 - 68	64 - 77	72 - 98
3/8"	15 - 40	44 - 54	52 - 67	60 - 82
No. 4	0 - 10	28 - 36	33 - 46	40 - 56
No. 8	---	17 - 25	23 - 32	28 - 39
No. 16	---	12 - 20	16 - 20	19 - 24
No. 30	---	7 - 15	12 - 16	13 - 19
No. 50	---	5 - 11	8 - 12	8 - 16
No. 100	---	3 - 9	6 - 10	5 - 10
No. 200	---	1 - 5	3 - 6	3 - 6
Asphalt, Weight by Percent of Total Mixture				
	2.5 - 3.1	3.5 - 4.5	4.4 - 5.2	5.2 - 6.2

Note No. 1 - Material passing the No. 200, sieve may consist of fine particles of the aggregate, mineral filler or both. Material passing the No. 30 sieve shall be non-plastic when tested in accordance with the requirements of ASTM D 4318.

Note No. 2 - Lift Thickness shall be no less than two times the nominal maximum size of the aggregate (See Note No. 6).

Note No. 3 - If the aggregate does not satisfy tensile strength ratio requirements, add an approved anti-stripping agent (See 2.02 A.1)

Note No. 4 - Job Mix Formula shall follow a smooth curve within the specified limits for all sieve sizes of the Mix Design Table, but should not fall on the maximum density line and should not cross the maximum density line below the No. 4 sieve. The maximum density line will be determined by plotting the gradations on a 0.45 power graph paper, and drawing a straight line between the amount passing the No. 200 sieve and the amount which is retained on the largest sieve.

Note No. 5 - Notify the Engineer if a satisfactory Job Mix Formula using the Mix Design Table cannot be obtained.

Note No. 6 - Nominal maximum size is one sieve size larger than the first sieve to retain more than 10 percent of the aggregate, based on the Contractor's job mix formula.

B. Job Mix Formula and Checklist

1. The laboratory used to develop the job mix formula shall meet the requirements of ASTM D 3666. Before construction starts, submit to the Engineer a certification signed by the manager of the laboratory stating that it meets these requirements. The certification shall contain as a minimum:

   a. Qualifications of personnel: laboratory manager, supervising technician and testing technicians.

   b. A listing of equipment to be used in developing the job mix.

   c. A copy of the laboratory's quality control system.

2. Develop Job Mix Formula using procedures contained in Chapter V, "Marshall Method of Mix Design" of the Asphalt Institute's Manual Series No. 2 (MS-2) and where applicable, "Asphalt Hot-Mix Recycling", Manual Series No. 20 (MS-20) and provide information for the following checklist:

   a. General

      (1) Contractor and Contract number

      (2) Type of bituminous mixture

      (3) Type and source of aggregates

      (4) Type and source of asphalt

   b. Aggregates

      (1) Sieve analysis of each aggregate to be used in mixture in accordance with ASTM C 136. The minus 200 fraction shall be tested in accordance with ASTM C 117.

      (2) Physical test of aggregates - soundness, wear, percent fractured faces and percent flat or elongated particles.

      (3) Bulk specific gravity and absorption in accordance with ASTM C 127 for coarse aggregate and ASTM C 128 for fine aggregate. The aggregate shall be sampled from the plant hot bins or feeder belt.

      (4) Proportion used of each type aggregate.

      (5) Theoretical gradation of combined proportions of aggregates.

   c. Asphalt

      (1) Type and grade

      (2) Specific gravity

      (3) Type of antistripping agent (if required)

   d. Optimum Asphalt Content Determination in accordance with ASTM D 6926 and ASTM D 6927

      (1) Compactive effort (75 or 113 blows applied to specimen, each face, as appropriate)

      (2) Actual specific gravity and unit weight of each specimen

(3) Percentage of asphalt in each specimen

(4) Theoretical specific gravity of each specimen calculated

(5) Graph of stabilities vs. asphalt content

(6) Graph of flow values vs. asphalt content

(7) Graph of voids filled with asphalt vs. asphalt content

(8) Graph of Marshall air voids vs. asphalt content

(9) Graph of voids in the mineral aggregate vs. asphalt content

(10) Graph of unit weight vs. asphalt content

(11) Visual description of specimens at optimum asphalt content (i.e., dry, flushing, etc.)

(12) Graph of Temperature vs. Viscosity of Asphalt

e. Summation of Established Job Mix Formula

(1) Combined gradation of aggregates

(2) Optimum asphalt content from above graphs

(3) Specified job mix tolerance range

(4) Mixing temperature

(5) Temperature of mix at point of discharge into haul units

(6) Compaction temperature

f. Summation of the Characteristics of the Mixture at Optimum Asphalt Content

(1) Stability, pounds

(2) Flow value, hundredths of an inch

(3) Actual specific gravity of laboratory compacted mixture

(4) Maximum specific gravity of paving mix at optimum asphalt content in accordance with ASTM D 2041

(5) Total voids (air), percent, in laboratory compacted mixture

(6) Voids filled with asphalt, percent, in laboratory compacted mixture

(7) Voids in the mineral aggregate, percent, in laboratory compacted mixture.

(8) Actual unit weight, lbs./cu. ft. of laboratory compacted mixture

(9) Tensile Strength Ratio - ASTM D 4867

g. Verification of Job Mix Formula Characteristics

Where the asphalt content for the proposed Job Mix Formula does not coincide with the asphalt content used in the trial specimens, prepare an additional set of specimens for the proposed Job Mix Formula asphalt content to verify that actual Marshall results duplicate those anticipated from the curves.

PART 3. EXECUTION

3.01 PREPARATION

A. Clean all underlying pavement surfaces and previous courses of all loose and foreign material by sweeping with hand brooms, power sweepers or blowers as directed by the Engineer.

B. Verify that required grade and density tolerances of previous courses have been obtained before placing asphalt concrete.

C. Construct keyways for overlay pavements as shown on the Contract Drawings by using longitudinal or transverse cuts into the existing pavement, and removing the necessary amount of pavement to provide a smooth transition from the new to existing asphalt concrete surfaces.

D. Verify in-pavement castings are set to finished grade and in-pavement light fixtures are located and covered.

E. Remove pavement markings.

F. Tack Coat

1. Apply tack coat by brush on edges of all previously placed or existing pavement and on surfaces of manholes and other structures that will be in contact with pavement course to be placed.

2. Apply tack coat by pressure distributor to existing pavement surface to receive new pavement course or where a course is not placed within 24 hours for roadway areas (7 days for runway, taxiway and apron areas) after placement of the underlying course, except as specified in 3.02 E.7 and 3.02 F.2. However, if the underlying pavement course has not been exposed to traffic and, in the opinion of the Engineer, is kept clean, tack coat shall not be required when a course is placed beyond the time frame mentioned above.

3. Unless otherwise shown on the Contract Drawings, apply tack coat at a rate of 0.05 to 0.10 gallons per square yard on asphalt concrete pavement surfaces and 0.10 to 0.15 gallons per square yard on Portland Cement Concrete pavement surfaces. Apply tack coat at a temperature between 275 and 350 degrees F.

4. Protect structures such as manhole frames and covers and joints within areas to be tack coated, prior to tack coating, by masking them with tar paper, polyethylene film or other approved materials.

5. After the application of tack coat, follow immediately with placement of asphalt concrete pavement course. Take precautions necessary to maintain and protect the tack coated surface from damage until the next course is placed, including placement and removal of sand as necessary to blot up excess material.

6. Pave or protect all tack coated surfaces prior to opening the area to traffic.

G. Mixing Plant Requirements for Recycled Asphalt Concrete

1. Batch Plants shall have an appropriately located metering device for adding the reclaimed asphalt pavement to the heated new aggregate and shall provide an accurate method for proportioning the reclaimed asphalt pavement into the mixture.

2. The batch plant's dryer may have to be operated at temperatures higher than with all new materials. If necessary, modify the dryer and the dust collection system to prevent damage.

3. Drum-mix plants shall have an appropriately located metering device for adding the reclaimed asphalt concrete to the dryer-mixer in a manner that does not damage the asphalt in the reclaimed material. Ensure that an accurate method for proportioning the reclaimed asphalt concrete into the mixture is provided. Make provisions for compensating for moisture in reclaimed asphalt concrete.

4. The mixing for a drum-mix plant shall be such as to achieve an intimate blending of new and reclaimed materials and a complete coating of all aggregate particles.

5. The batch or drum-mix plant may be equipped with a surge-storage bin at the mixture discharge point.

3.02 APPLICATION

A. Mixing in Plant

1. Place aggregate through a dryer and heat to temperature not exceeding 350 degrees F.

2. Screen aggregate to appropriate fractions and place each fraction in a storage bin over mixer unit.

3. Use equipment conforming to ASTM D 995 for preparation of paving mixtures, except provide one bin for fine aggregate, three for coarse aggregate and one for reclaimed asphalt pavement (if applicable).

4. Introduce aggregate into mixer at between 250 and 350 degrees F and dry mix for minimum of 5 seconds (7 seconds for mixtures containing Vestoplast "S") before adding asphalt. Where reclaimed asphalt pavement or Vestoplast "S" is used, add to mixer after dry mixing and before adding asphalt cement.

5. Heat asphalt cement to a temperature not exceeding 325 degrees F (350 degrees F for modified asphalt) and introduce it into mixer at a temperature of not less than 275 degrees F (300 degrees F for modified asphalt).

6. Mix as long as necessary, but not less than 30 seconds after introduction of asphalt cement, to completely and uniformly coat aggregate particles.

7. Regulate temperature of mixture according to outdoor temperature and as necessary to meet minimum laydown temperatures specified in 1.03 A.3. However, asphalt concrete mix production temperatures leaving the plant shall be as follows:

Type of Asphalt	Temperature Degrees F
Asphalt Cement	275 - 325
Modified Asphalt- PG 76-22	305 - 335
Modified Asphalt - PG 82-22	310 - 340

Any deviation from these temperatures must be approved by the Chief of Materials, Materials Engineering Unit.

8. Use of storage silos will be permitted provided such silos are approved as specified in 1.04 D.4.

B. Delivery, Placing and Spreading

1. Trucks used for hauling asphalt concrete mixtures shall have tight, clean, and smooth metal beds free from kerosene and other solvents. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

2. Load trucks using a minimum of three drops. About 40 percent of the total weight of the mix to be hauled shall be loaded into the center of the front half of the truck. The truck shall then be pulled forward so that the next 40 percent or so of the total load can be deposited into the center of the back half of the bed, near the tailgate. The vehicle shall then be moved backward so that the remaining 20 percent of the mix can be dropped into the center of the bed, between the first two piles.

3. Deliveries shall be scheduled so that placing and compacting of mixture is uniform without stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified herein, and allowed to cool to ambient temperature.

4. Spread evenly, screed and finish each course to tolerances and requirements specified in this Section.

5. Asphalt concrete pavers shall be self-propelled, with an activated screed, heated as necessary, and shall be capable of spreading and finishing courses of asphalt concrete which will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

   The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required smoothness and texture without tearing, shoving, or gouging the mixture.

6. An automatic screed control system shall be used which is capable of automatically maintaining the specified screed elevation and transverse slope. The control system shall be automatically actuated from a reference system by a sensor.

   The control system shall be capable of working in conjunction with any of the following reference systems:

   a. Ski-type device 40 to 60 feet in length.

   b. Taut stringline (wire) set to grade.

c. Laser beam set to grade.

For paving operations within the runway or taxiway pavement edge markings, it is recommended that grade control for each lift be performed using either a taut stringline (wire) or laser control as the automatic grade control system. Taut stringline or laser control should be used on both sides of the paver for the initial pass for each lift. Subsequent passes may be controlled by a ski on the newly paved side of the paver and a taut stringline or laser control on the opposite side.

7. Before commencing each day's paving, clean the paver of any material left from previous paving operations.

8. Place in minimum of 10-foot wide strips, except that the last strip may be a lesser width if necessary.

9. Begin along high sides of areas and proceed towards low side of areas with a one directional slope. Start on centerline and work both ways for crowned pavements.

10. The longitudinal joint in one lift shall offset the longitudinal joint in the lift immediately below by at least 1 foot; however, the longitudinal joint in the surface lift shall be at the centerline of the pavement. Transverse joints in one lift shall be offset by at least 10 feet from transverse joints in the previous lift. Within the same lift, transverse joints in adjacent lanes shall be offset a minimum of 10 feet.

11. When starting paving operations at transverse joints, provide four starting block strips under full length of paver screed. Blocks should be of a thickness appropriate for the lift being placed.

12. The paver's hopper shall be kept half full throughout the paving day. The wings shall not be emptied until the end of the paving day. Residual material shall be disposed of off the Port Authority property.

13. No raked asphalt concrete material shall be broadcast back onto the pavement mat. Raked material shall be placed back in the paver hopper or disposed of.

14. Use hand placing and finishing methods, as approved by the Engineer, in small areas where use of power equipment is impractical. Lutes shall be used for hand spreading.

C. Grade Control

1. Remove grade stakes just prior to rolling of the plant mix macadam base course.

2. The Engineer will provide bench marks and alignment controls adjacent to each area of construction, which shall be checked and maintained by the Contractor.

3. Perform Contractor's quality control surveys immediately after top course has been rolled to check final surface grades, in accordance with 1.04 D.8.

4. Establish and maintain required lines and grades, including crown and cross slope, for each course during paving operations.

5. Use only qualified surveyors licensed in the State in which work is being performed.

D. Compaction Equipment

1. Use power rollers weighing not less than 10 tons, having wheel loads of at least 250 lbs./linear inch of combined static and dynamic force and equipped with adjustable scrapers to keep wheel surfaces clean and with efficient means of keeping them wet to prevent the mixture from sticking to the roller.

2. Use types and quantities of equipment as necessary to meet all quality and production requirements of this Section.

3. Do not use steel rollers with pits, flat spots or grooves worn into rolling surface. Roller shall be capable of reversing without backlash.

4. Keep roller on asphalt concrete to avoid contamination of pavement with foreign material.

E. Rolling

1. Commence as soon as material will sustain roller without undue displacement, cracking or shoving.

2. The speed of the roller shall at all times be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be immediately corrected by the Contractor.

3. The sequence of rolling operations shall be at the discretion of the Contractor.

4. Perform rolling with types and quantity of rollers as may be necessary to satisfy all of the pavement quality requirements specified herein.

5. Do not re-roll cold in-place asphalt concrete with a steel wheel or vibratory roller to attempt to increase density. A pneumatic tire roller may be used, subject to approval by the Engineer.

6. At end of each day's operations or when paving is interrupted sufficiently to allow mixture to cool, make a stop by means of tapering the course and form a transverse joint.

7. When resuming operations, cut back joint to expose a granular surface for full depth of the course, paint exposed edge with tack coat, place fresh mixture against joint, tamp and roll.

8. Any pavement that becomes loose and broken or mixed with dirt, develops check-cracking, or is in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at no cost to the Authority. Skin patching shall not be allowed.

F. Joints

1. Form all joints in such a manner as to ensure a continuous bond between the courses and to obtain the required density, as demonstrated, tested and approved in the control strip. All joints shall have the same texture as other sections of the course and shall meet the requirements for density, smoothness and grade. Minimize raking of joints. Any mix raked from joint shall be discarded and not broadcast back onto the mat.

2. For transverse joints, the roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a temporary stop. After a temporary stop and prior to the continuation of paving, the tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face before placing the adjacent pavement. Apply tack coat on all newly exposed contact surfaces before placing any fresh mixture against the joint.

3.03 CORRECTIONS OF DEFICIENCIES

A. Deficiencies in Surface Smoothness

1. Make corrections as specified below at no cost to the Authority in the event of the following:

   a. Longitudinal Smoothness within Runway or Taxiway Edge Markings – the Profile Index exceeds 22.0 inches per mile, or the surface profile deviations exceed 0.4 inches in 25 feet, when tested in accordance with 1.04.E.10.a., unless the Engineer elects to accept the deficient surface subject to an adjustment to Contract compensation. Adjustments to Contract compensation will be made as set forth in 4.01 I.

   b. Transverse direction within runway or taxiway edge markings, longitudinal and transverse for aprons and paved areas outside runway or taxiway

      (1) 15 percent of all measurements in a lot exceed the requirements of 1.03 D.1.b when tested in accordance with 1.04.E.10.b.

      (2) Any deviations exceed 1/2 inch when tested with a 16 foot straightedge.

2. The area of deficiencies in surface smoothness and/or surface grade tolerance shall be defined as the area of the lot defined in 1.04 E.10.a.(3), b.(1).

3. Remove and replace, or diamond grind, pavement deficient in surface smoothness, in accordance with all applicable requirements of the Contract Drawings and this Section, at times approved by the Engineer, so as not to interfere with operations of the Authority or others using the area.

4. Remove and replace shall mean milling a minimum thickness of 3 inches within runway and taxiway pavement edge markings and a minimum of 1 1/2 inches elsewhere and repaving to the finished grade shown on the Contract Drawings with the same type asphalt concrete mix as removed.

5. Diamond grinding may be used to correct deficiencies in surface smoothness and surface grade tolerance subject to approval by the Engineer. However, if removal of more than 3/4 inch of pavement is required to correct any deficiency, the deficient area shall be removed and replaced.

6. Diamond grinding equipment shall be approved by the Engineer and have a minimum grinding head of 36 inches and at least 5 blades per inch of shaft. Diamond grinding shall not be performed when the temperature of the asphalt concrete surface exceeds 80 degrees Fahrenheit. Slurry produced from grinding operations shall be properly disposed of off Authority property.

7. Where corrections are required, the entire width of the paving lane by the length of defective area shall be corrected. In the sole opinion of the Engineer, if the deficiencies are closely spaced and correcting individual areas will adversely affect ride, the entire pavement surface shall be corrected.

8. Following the correction of deficiencies, the Engineer will retest the finished surface of the asphalt concrete. In the event the Profile Index or surface profile deviations exceed the required values, make additional corrections at no cost to the Authority.

B. Deficiencies in In-Place Air Voids of Top and Bottom Courses

1. Runway, Taxiway and Apron Pavements

Any pavement sublot with in-place mat air voids less than 2.0 percent or greater than 8.0 percent (9.0 percent for bottom course) shall be removed and replaced at no additional cost to the Authority. For paving lifts other than the top lift of asphalt concrete the Engineer may elect to accept deficient material subject to an adjustment to Contract compensation. Adjustments to contract compensation will be made as set forth in 4.01G.

2. Shoulder and In-field Area Pavements

Remove and replace material on a sublot basis, unless the Engineer elects to accept the deficient material subject to an adjustment to Contract compensation. Adjustments to Contract compensation will be made as set forth in 4.01G.

C. Deficiencies in Marshall Stability and Flow

In accordance with 1.03 C.2 for Marshall stability and flow, if the Percentage of Material Within Tolerance Limits (PWL) of a lot for either parameter as set forth in 4.03 B.5 equals or exceeds 90 percent, the lot will be acceptable. If the PWL for either parameter is less than 90 percent, determine the reason and take corrective action immediately. If the PWL is below 80 percent for either parameter, stop production and make adjustments to the mix.

D. Deficiency in Final Surface Grade

1. When more than 15 percent of all measurements within a lot exceed the grade tolerance, measured in accordance with 1.04 E.11, remove and replace or diamond grind the entire lot in accordance with 3.03 A.

2. When any individual measurement exceeds a grade tolerance of plus or minus 0.06 foot, remove and replace the surface of the area exceeding the tolerance in accordance with 3.03 A.

3. Following the correction of deficiencies, the Engineer will retest the final surface of the asphalt concrete. In the event grade tolerance is exceeded, make additional corrections at no cost to the Authority.

E. Deficiencies in the Performance Grade Requirements of Modified Asphalt

Remove and replace the deficient material on a lot basis, unless the Engineer elects to accept the deficient material subject to an adjustment to Contract compensation. Adjustments to Contract compensation will be made as set forth in 4.01G.

PART 4. ADJUSTMENTS TO CONTRACT COMPENSATION

4.01 GENERAL

A. Where the Contract requires less than 500 tons of asphalt concrete, no adjustments to Contract compensation will be made as specified herein.

B. Where the Contract requires 500 tons or more of asphalt concrete, adjustments to Contract compensation, if made, will be made as specified in 4.03 A, B, C, D and E.

C. Notwithstanding other adjustments to Contract compensation or corrections specified herein for various deficiencies, no payment will be made for material placed above the allowable tolerance above required grade as specified in 1.03 D.4, or for material that must be removed to correct deficiencies, or for that material placed in excess of the plus tolerance for the total thickness of each course as specified in 1.03 D.3.

D. The computations for adjustments to Contract compensation may require conversion between tons and square yards. Such conversion will be made using the actual computed weight per square yard per inch of thickness determined from the lot's average bulk specific gravity for each type of course times the density of water at 70 degrees F.

E. Adjustments to Contract Compensation for in-place mat densities, in-place joint densities for surface courses and Marshall air voids shall be determined by applying percentages, calculated as specified in 4.03 B, to the assigned unit price of sixty dollars ($60.00) per ton of asphalt concrete; or in the case of Classified Work, by applying such percentages to the actual Contract Unit Price bid for the appropriate asphalt concrete item in the Schedule of Unit Prices For Classified Work, but in no case less than sixty dollars ($60.00) per ton of asphalt concrete.

F. The percentage adjustment to the unit price specified in 4.01 E for Marshall air voids, mat density and joint density of the surface course shall be as follows, except as set forth in 4.01G:

When all values calculated in accordance with 4.03 B are 100 percent or greater, the highest value will be used to adjust Contract compensation.

When all values calculated in accordance with 4.03 B are less than 100 percent, the lowest value will be used to adjust Contract compensation.

When values calculated in accordance with 4.03 B are both greater and less than 100 percent, the product of the highest and lowest value will be used to adjust Contract compensation.

G. When the Engineer elects to adjust Contract compensation in lieu of removal and replacement of material with deficient in-place mat air voids in shoulder and in-field area pavements or deficiencies in the modified asphalt performance grade, the percentage adjustment to the unit price specified in 4.01E will be set at 50 percent. No further adjustment will be made for Marshall air voids, mat density or joint density of the surface course.

H. Adjustments for surface smoothness and final surface grade will be based on the final test results, which will be determined after the correction of deficiencies. Reductions in payment will be determined by the following:

$R = A \times D \times F \times 0.01938$

Where:

R =	Reduction in payment per lot for surface smoothness or final surface grade, dollars
A =	Area of lot, square feet
D =	Price per ton of asphalt concrete, assigned unit price or contract unit price as set forth in 4.01 E.
F =	Contract Unit Price Adjustment Factor specified in 4.03 D and 4.03 E.

Reductions in payment for failure to meet surface smoothness and final surface grades will be calculated separately for the entire pavement or overlay surface. Deductions from Contract compensation will be made for the requirement (surface smoothness or final surface grade) which results in the greatest payment reduction. Reductions for surface smoothness or final surface grade will be in addition to all other adjustments to Contract compensation.

I. When the Engineer elects to adjust Contract compensation in lieu of correcting areas with deficiencies in surface smoothness, the Contract Unit Price Adjustment Factor specified in 4.01 H will set at 0.10.

4.02 ADJUSTMENT TO CONTRACT COMPENSATION FOR THICKNESS DEFICIENCY IN PLANT MIX MACADAM BASE COURSE

A. Where the deficiency of a plant mix macadam base course core exceeds the allowable minus tolerance in plant mix macadam base course thickness, one additional core will be taken by the Engineer in each of the other three sublots adjacent to the core taken in accordance with 1.04 E.4. Plant mix thickness for the area of entire lot will be the average of the four cores[6]. Where there is a deficiency in the average of the four cores in excess of the allowable minus tolerance, the total thickness of succeeding courses in the area of entire lot shall be increased by the amount by which the deficiency exceeds the allowable tolerance.

B. For each additional lot resampled in accordance with 4.02 A above, there will be deducted from the Contract compensation, in addition to adjustments for deficiencies as hereinafter specified, an amount of One Thousand Dollars ($1,000.00).

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6 In determining average thickness, if any core exceeds required thickness by more than 1/2 inch, the thickness of that core will be assumed to be 1/2 inch in excess of required thickness.

4.03 ADJUSTMENT TO CONTRACT COMPENSATION FOR DEFICIENCIES IN TOP AND BOTTOM COURSES

A. Deficiency in Thickness

Thickness of each course, excluding overlay, will be the average of the four cores in the lot for each course[7]. Deductions from Contract compensation for deficiencies in thickness of top course or the total of top and bottom courses, modified as may be required by 4.02 A, will be the following amounts (deducted per square yard) for the entire area lot:

Amount of Minus Deficiency (inches)	Amount of Payment Deduction (Dollars per Square Yard)
Greater than 1/4 and up to 1/2	1.00
Greater than 1/2 and up to 3/4	2.00

For minus deficiencies in excess of 3/4 inch either in average of four cores or in any individual core, at the Engineer's option, remove and replace deficient pavement or place an overlay that will satisfy all requirements of this Section.

B. Deficiency in In-Place Mat Density, In-Place Joint Densities and Marshall Air Voids

1. Top and bottom courses will be evaluated on a lot basis with each lot coinciding with that defined in 1.04 D.1.a.

2. Density

   a. In-place mat density specified in 1.03 D.2.a will be evaluated for Section compliance using the average of the random sublot in-place density determinations from cores of the area covered by the lot specified in 1.04 D.l.a.

   b. In-place joint density specified in 1.03 D.2.b will be evaluated for Section compliance using the average of random sublot in place joint density determinations from cores of the area covered by the lot specified in 1.04 D.1.a.

3. Marshall air voids will be evaluated for Section compliance using the average of the random sublot void determinations from hot mix samples from the lot specified in 1.04 D.1.a.

4. The Engineer will check each lot for in-place mat densities, in-place joint densities for surface courses only, and Marshall air voids with adjustments to Contract compensation based on the Percentage of Material Within Tolerance Limits (PWL) as determined by 4.03 B.5 below and by the "Table For Estimating Percent of Lot Within Tolerance Limits-PWL (Standard Deviation Method)". No deficient lot will be approved without an adjustment to Contract compensation made in accordance with the tables entitled "Adjustments to Contract Compensation For In-Place Mat Density and Marshall Air Voids", and "Adjustments to Contract Compensation for In-Place Joint Density".

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[7] In determining average thickness, if any core exceeds required thickness by more than 1/4 inch, the thickness of that core will be assumed to be 1/4 inch in excess of required thickness.

5. Method of estimating Percentage of Material within Tolerance Limits (PWL):

a. Locate sampling positions on the lot by use of random sampling procedures specified in FAA ERLPM, Section 6.

b. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with 1.04 D and E.

c. Determine the average value of all samples ($\overline{X}$)

d. Find the standard deviation (S_n) by use of the following formula:

$$S_n = \sqrt{d_1^2 + d_2^2 + d_3^2 + \ldots + d_n^2/n-1}$$

Where

S_n = standard deviation of the number in the set

$d_1, d_2,$ = deviation of the individual sample values $X_1, X_2, \ldots$ from the average value that is,

d_1 = $(X_1 - \overline{X})$, $d_2 = (X_2 - \overline{X})$, $d_n = (X_n - \overline{X})$

n = number of sublots

e. Find the Lower Quality Index (Q_L) by subtracting the lower tolerance limit (L) from the average values ($\overline{X}$) and dividing the result by standard deviation (S_n).

$$Q_L = \frac{\overline{X} - L}{S_n}$$

f. Find the Upper Quality Index (Q_U) by subtracting the average value ($\overline{X}$) from the upper tolerance limit (U) and dividing the result by standard deviation (S_n).

$$Q_U = \frac{U - \overline{X}}{S_n}$$

g. The percentage of material above lower tolerance limit (P_L) and the percentage of material below upper tolerance limit (P_U) will be found by entering the "Table For Estimating Percent of Lot Within Tolerance Limits - PWL (Standard Deviation Method)" with Q_L and Q_u, using the column appropriate to the total number (n) of sublots and reading the number under the column headed "Percent Within Tolerance Limits (PWL)". If the values fall between values shown on the table, use the next higher value for P_L or P_U.

h. For asphalt concrete properties with only a lower tolerance limit (stability, mat density, joint density), the Percentage of Material Within Tolerance Limits (PWL) equals P_L. For asphalt properties with upper and lower tolerance limits (air voids and flow) determine PWL using the following formula:

$$PWL = (P_U + P_L) - 100$$

i. If the tests within a lot include a very large or a very small value which appears to be outside the limits of variation, the Engineer will check for an outlier in accordance with ASTM E 178, at a significance level of 5 percent, to determine if this value will be discarded when computing Percentage of Material Within Tolerance Limits (PWL).

C. Adjustment to Contract compensation for each lot will be made in accordance with the formula contained in the table entitled "Adjustment to Contract Compensation For In Place Mat Density and Marshall Air Voids" by entering the appropriate row with the value of PWL and performing the calculation indicated for that PWL to determine the percentage adjustment of the unit price (specified in 4.01 E).

ADJUSTMENT TO CONTRACT COMPENSATION FOR IN-PLACE MAT DENSITY AND MARSHALL AIR VOIDS	
Percentage of Material Within Tolerance Limits (PWL)	Percentage Adjustment of the Unit Price (specified in 4.01 E and 4.01 F)
96-100	106
90-96	PWL + 10
80-90	0.5 (PWL) + 55
65-80	2.0 (PWL) - 65
Below 65	[8]

D. Deficiency in Final Surface Grade Tolerance

Adjustment to Contract Compensation for each lot will be made using the table entitled "Adjustment to Contract Compensation for Exceeding Final Surface Grade Tolerance" by entering the appropriate row with the percentage of all measurements within a lot which exceed the grade tolerance, measured in accordance with 1.04 E.11, and reading the number under the column headed "Contract Unit Price Adjustment Factor".

ADJUSTMENT TO CONTRACT COMPENSATION FOR EXCEEDING FINAL SURFACE GRADE TOLERANCE	
Measurements Exceeding Grade Tolerance (Percent)	Contract Unit Price Adjustment Factor
0.0 – 5.0	0
5.1 – 10.0	0.05
10.1 – 15.0	0.25
15.1 and up	Corrective Work Required as specified in 3.03 D.

The Contract Unit Price Adjustment Factor is used to calculate adjustments to Contract Compensation as Specified in 4.01 H.

[8] Remove and replace the lot to meet Section requirements as ordered by the Engineer. In lieu thereof, and subject to the provisions in 3.03 B for mandatory removal and replacement, the Contractor and the Engineer may agree in writing that, for purposes of practicality, the deficient lot shall not be removed and adjustment to Contract compensation shall be made at 50 percent of the unit price specified in 4.01 E.

E. Deficiency in Surface Smoothness

Adjustment to Contract Compensation for each lot will be made using the table entitled "Adjustment to Contract Compensation for Surface Smoothness", by entering the appropriate row with the Profile Index, measured and calculated in accordance with 1.04 E.10., and reading the number under the column headed "Contract Unit Price Adjustment Factor".

ADJUSTMENT TO CONTRACT COMPENSATION FOR SURFACE SMOOTHNESS	
Average Profile Index (inches per mile)	Contract Unit Price Adjustment Factor
0.0 - 15.0	0.00
15.1 - 16.0	.02
16.1 - 17.0	.04
17.1 - 18.0	.06
18.1 - 20.0	.08
20.1 - 22.0	.10
22.1 and up	corrective work required as specified in 3.03A

The Contract Unit Price Adjustment Factor is used to calculate adjustments to Contract Compensation as Specified in 4.01 H.

F. Adjustment to Contract compensation for each lot will be made in accordance with the formula contained in the table entitled "Adjustment to Contract Compensation for In-Place Joint Density" by entering the appropriate row with the value of PWL and performing the calculation indicated for that PWL to determine the percentage adjustment of the unit price (specified in 4.01 E.).

ADJUSTMENT TO CONTRACT COMPENSATION FOR IN-PLACE JOINT DENSITY	
Percentage of Material Within Tolerance Limits (PWL)	Percentage Adjustment of the Unit Price (specified in 4.01 E and 4.01 F)
96 - 100	106
90 - 96	PWL + 10
80 - 90	0.25 x PWL + 77.5
65 - 80	PWL + 17.5
Below 65	[9]

[9] Remove and replace the lot to meet Section requirements as ordered by the Engineer. In lieu thereof, and subject to the provisions in 3.03 B for mandatory removal and replacement, the Contractor and the Engineer may agree in writing that, for purposes of practicality, the deficient lot shall not be removed and adjustment to Contract compensation shall be made at 75 percent of the unit price specified in 4.01 E.

TABLE FOR ESTIMATING PERCENT OF LOT WITHIN TOLERANCE LIMITS - PWL
(STANDARD DEVIATION METHOD)

Percent Within Tolerance Limits (PWL)	Positive Values of Q_L or Q_U n = Number of Sublots					
	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4716
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630
87	1.0597	1.1100	1.1173	1.1191	1.1199	1.1204
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015
83	0.9939	0.9900	0.9785	0.9715	0.9672	0.9643
82	0.9749	0.9600	0.9452	0.9367	0.9325	0.9281
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958

TABLE FOR ESTIMATING PERCENT OF LOT WITHIN TOLERANCE LIMITS - PWL
(STANDARD DEVIATION METHOD)

Percent Within Tolerance Limits (PWL)	Positive Values of Q_L or Q_U n = Number of Sublots					
	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747
70	0.6787	0.6000	0.5719	0.5583	0.5504	0.5454
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592
66	0.5563	0.4800	0.4545	0.4424	0.4354	0.4310
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4031
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855
56	0.2164	0.1800	0.1688	0.1636	0.1613	0.1592
55	0.1806	0.1500	0.1408	0.1363	0.1338	0.1322
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0792
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264
50	0.0	0.0	0.0	0.0	0.0	0.0

G. Additional Tests

1. In the event the Contractor elects to question the original density test results obtained from a particular lot for either the mat density or joint density, the Contractor may request additional testing of that lot in writing within 48 hours of receipt of the written test results from the Engineer. Upon written request received from the Contractor for such additional testing, the Engineer will test one additional sample from each sublot from randomly selected locations in the pavement where the lot was placed. The redefined test will consist of the Engineer's original samples and the additional Contractor's requested samples. The "Percent of Material Within Tolerance Limits-PWL" will be determined in accordance with 4.03 B.5. The value will be used to determine any adjustment to Contract Compensation. Only one resampling per lot will be permitted.

2. Additional tests requested by the Contractor shall be paid for by the Contractor to the Authority at a cost of One Thousand Dollars ($1,000.00) per lot tested.

4.04 ADJUSTMENT TO CONTRACT COMPENSATION FOR CHANGES IN THE INDEX PRICE OF ASPHALT CEMENT

A. General

An adjustment to Contract compensation will be made for changes in the index price of the asphalt cement in asphalt concrete and plant mix macadam base course and for tack coat, as set forth in 4.04C, provided that the Contract requires a total of 500 tons or more of asphalt concrete and plant mix macadam base course.

B. Method of Measurement

1. Asphalt concrete including top course and bottom course and plant mix macadam base course will be measured by the ton. The weight will be determined by one of the following methods:

a. A weigh ticket printed by an automatic printer system used in conjunction with an automated batching and mixing system. The printed ticket shall show the date, the individual weights of the various components of the asphalt concrete or plant mix macadam base course mixture in a batch, the total weight of each batch, and the sum of the all batch weights in the truckload. At the completion of each day's work, a producer's representative shall certify in writing that the total weight supplied was correct.

b. A weigh ticket printed by an automatic scale showing the tare and gross weights of the truck as determined for each trip and the time and date indicating when the empty truck was tarred and when the loaded truck departed from the plant. Time and date may be printed automatically by a time clock. However, the net weight must be documented on each delivery ticket by a State certified weigh master.

In the event of a breakdown of an automatic printer system, weigh tickets showing the gross, tare and net weight of each truck, as entered and certified by a weigh master, will be accepted for a period not exceeding the necessary repair time as certified by a State licensed repairman.

Provide a weigh ticket for each truckload. Material will not be accepted unless accompanied by a weigh ticket, which shall be legible and which shall clearly indicate the printed heading of the supplier and location of the batch plant, the title of the Contract for which delivery is intended, the time and date, truck number, lot number and mix number of material being furnished and the total net weight in each truckload.

2. Tack coat will be measured by the gallon at a temperature of 285 °F.

C. Asphalt Price Adjustment

1. The asphalt price adjustment for the asphalt cement in asphalt concrete or plant mix macadam base course will be determined monthly using the following formula:

$$Ac = (A - BA) \times T$$

Where Ac = Asphalt Cement Price Adjustment, in dollars

A = Asphalt Cement Price Index[10], in dollars per ton

BA = Basic Asphalt Cement Price Index[11], in dollars per ton

T = Tons of New Asphalt Cement[12]

2. The asphalt price adjustment for tack coat will be determined on a monthly basis using the following formula:

$$At = (A - BA) \times (C) \times (G) \times 0.003986$$

Where At = Asphalt Cement Price Adjustment for tack coat, in dollars

C = Petroleum Content of the Tack Coat in Percent by Volume: Use 1.0 for asphalt cement and cutbacks

A = Asphalt Cement Price Index[10], in dollars per ton

G = Tack Coat Furnished in Gallons and Applied at 285°F, where one gallon is equal to 0.003986 ton.

BA = Basic Asphalt Cement Price Index[11], in dollars per ton

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10 The Asphalt Cement Price Index is the price in dollars per English ton published by the New Jersey Department of Transportation for the area North of Route 195, for the month during which the asphalt concrete paving or tack coat application occurred.

11 The Basic Asphalt Cement Price Index is the price in dollars per English ton, published by the New Jersey Department of Transportation, for the area North of Route 195, for the month immediately prior to the month during which bids are received.

12 The weight of asphalt cement eligible for price adjustment including all conventional and modified asphalt concrete and plant mix macadam base course will be determined by multiplying the percentage of new asphalt cement in the approved job mix formula by the weight of asphalt concrete mixture, measured in accordance with 4.04 B.

3. Should a Monthly Asphalt Cement Price Index increase 50 percent or more over the Basic Asphalt Cement Price Index, no additional asphalt concrete, or plant mix macadam base shall be furnished for the Project without written approval from the Engineer.

4. Should a Monthly Asphalt Price Index decrease from the Basic Asphalt Cement Price Index, payments will be decreased accordingly.

5. Asphalt price adjustments will not be made in those months for which the Monthly Asphalt Cement Price Index has changed by less than five percent from the Basic Asphalt Cement Price Index.

6. If the Asphalt Cement Price Index is adjusted more than once in a month, the asphalt price adjustment may be made.

END OF SECTION

SECTION 02561

Asphalt Concrete Paving (FAA)

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Samples

02561C01 Submit to the General Manager, Materials Engineering Division for approval four one-quart samples of the asphalt cement proposed for use together with the following data:
1. The name of the supplier.
2. An analysis of such asphalt cement by the supplier, certifying that the results of tests comply with the requirements of AASHTO MP1 and this Section.
Resubmit the above data each time asphalt cement from a different source is proposed.

END OF APPENDIX "A"

DIVISION 2

SECTION 02572

KERF CUTS FOR ELECTRICAL CONDUITS

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for cutting kerfs for installation of electrical conduit in existing runway and taxiway pavement and for placing concrete in such kerfs.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Society for Testing and Materials International (ASTM)

ASTM C 33	Specification for Concrete Aggregates.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 94	Specification for Ready-Mixed Concrete.
ASTM C 150	Specification for Portland Cement.
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM C 494	Specification for Chemical Admixtures for Concrete.
ASTM C 1074	Standard Practice for Estimating Concrete Strength by the Maturity Method.

American Concrete Institute (ACI)

ACI 304R	Guide for Measuring, Mixing, Transporting and Placing Concrete.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Do not place concrete when:

1. Ambient temperature is below 40 degrees F or is apt to fall below 40 degrees F.
2. Pavement which concrete will contact is not frost-free.
3. Weather conditions would result in rapid drying or stiffening of concrete before it can be consolidated, or would result in excessive evaporation of mixing water.

B. Unless otherwise specified, concrete, when deposited, shall have a temperature of not less than 50 degrees F and not more than 90 degrees F.

C. In-Place Concrete Strength

Concrete shall reach a minimum compressive strength of 1500 psi within the available curing time after placement and at the actual site conditions and temperatures at the time.

D. Ready-Mix, High Early Strength Concrete

In order to avoid premature setting of ready-mix concrete when using 2 or 4 hour mixes, both the ambient temperature and concrete temperature shall not exceed 80 degrees F. The concrete quantity shall be limited to 4 cubic yards per truck.

1.04 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MANUFACTURERS

A. Model CC-155 "Concrete Cutter" manufactured by Vermeer Manufacturing Co., Holbrook, NY, or approved equal.

2.02 MATERIALS

A. Cement – For uses as specified in 2.03 – no substitutions will be permitted. Use one of the following:

1. Portland Cement: ASTM C 150, Type I, II or III from a manufacturer approved by either New York State Department of Transportation or New Jersey Department of Transportation.
2. "Five Star Fast Set Cement" as manufactured by Five Star Products, Fairfield, CT.
3. "Rapid Set" as manufactured by CTS Cement Manufacturing Corp., Cypress, CA.
4. "Ultimax" as manufactured by Ultimax Cement Co., Inc, Garden Grove, CA.

B. Fine Aggregate: ASTM C 33.

C. Coarse Aggregate: ASTM C 33, size No. 8, Class 4S (regardless of type).

D. Water: Clean water suitable for drinking purposes, for both mixing and curing concrete.

E. Air Entraining Agent (AEA): ASTM C 260.

F. High Range Water Reducer (High Range WR): ASTM C 494, Type F or G.

G. Water Reducer Retarder (WR, Retarder): ASTM C 494, Type D.

H. Preblended Concrete (for 2 hour cure at 70 degrees F) – no substitutions will be permitted. Use one of the following:

1. "EMACO T415" as manufactured by BASF Building Systems, Shakopee, MN.
2. "Five Star Highway Patch" as manufactured by Five Star Products, Fairfield, CT.
3. "Dayton HD-50" as manufactured by Dayton Superior, Kansas City, KS.
4. "Rapid Set DOT Repair Mortar" as manufactured by CTS Cement Manufacturing Corp., Cypress, CA.
5. "Rapid Set Mortar Mix" as manufactured by CTS Cement Manufacturing Corp., Cypress, CA.

I. Liquid Curing Membrane: ASTM C 309, Class A or B.

1. Type 1D, with fugitive dye when requested by the Engineer, to identify areas coated.

2. Type 2, white pigmented, where exposed to the sun in warm weather.

2.03 ACCELERATOR

Accelerator shall conform to ASTM C 494, Type C, non-chloride. In addition, when mixed in the proportions hereinafter specified, concrete containing accelerator shall develop a minimum compressive strength of 1500 psi within 10 or 16 hours of placement depending on the mix, based on an ambient temperature of 70 degrees F or above, and an internal concrete temperature of 70 degrees F or higher. Accelerator shall be compatible with and shall be a product of the air entraining agent manufacturer.

2.04 PROPORTIONING OF INGREDIENTS

A. Design Mix Strength: The below mixes were designed to produce concrete in the laboratory with compressive strength, F'c = 2000 psi, within the specified curing times based on ambient temperature of 70 degrees F. Allow longer cure time or supply a faster mix (e.g., 4 hour in lieu of a 6 hour) if temperature is forecast to fall to below 70 degrees F before the cure time has been reached.

1. Where 2 hour cure time is available prior to overlay or opening to traffic, mix concrete in the proportions specified in the following table:

	Rapid Set (Mobile Mixer or Cement Bulk Bagged on Site Only)	Ultimax (Truck Mixer Permitted)
Cement	658 pounds	675 pounds
Fine Aggregate	1472 pounds	1350 pounds
Coarse Aggregate	1500 pounds	1755 pounds
Water	303 pounds	270 pounds
High Range WR	158 ounces	As required
AEA	As required	As required
Retarder	As required	As required

In lieu of the above, use one of the preblended concrete mixes specified, extended with coarse aggregate (size No. 8) as per manufacturer's recommendation.

2. Where 4 hour cure time is available prior to overlay or opening to traffic, mix concrete in proportions specified in the following table:

	(Truck Mixer or Cement Bulk Bagged On Site)
Cement: Five Star Fast Set	750 pounds
Fine Aggregate	1450 pounds
Coarse Aggregate	1500 pounds
Water	250 pounds
Retarder	0.5% to 1.0% as required

3. Where 6 hour cure time is available prior to overlay or opening to traffic, mix concrete in proportions specified in the following table:

	(Truck Mixer or Rapid-Set Bulk Bagged On Site)
Cement 1: Rapid Set	500 pounds
Cement 2: Type I or II	150 pounds
Fine Aggregate	1245 pounds
Coarse Aggregate	1770 pounds
Water	300 pounds
Retarder	0 to 2% as required
AEA	As required to obtain 4.5% to 7.5% Retained Air

4. Where 10 hour cure time is available prior to overlay or opening to traffic, mix concrete in proportions specified in the following table:

	(Truck Mixer Permitted)
Cement: Type III	826 pounds
Fine Aggregate	1200 pounds
Coarse Aggregate	1650 pounds
Water	270 pounds
High Range WR	145 ounces
Accelerator, non-chloride	334 ounces
AEA	As required to obtain 4.5% to 7.5% Retained Air

5. Where 16 hour cure time is available prior to overlay or opening to traffic, mix concrete in proportions specified in the following table:

	(Truck Mixer Permitted)
Cement: Type III	705 pounds
Fine Aggregate	1350 pounds
Coarse Aggregate	1600 pounds
Water	255 pounds
High Range WR	130 ounces
Accelerator, non-chloride	320 ounces
AEA	As required to obtain 4.5% to 7.5% Retained Air

B. Adjustment of Proportions

Design Mixture Aggregates: The above mixes for standard weight concrete were designed using fine aggregates with a specific gravity of 2.65 in a saturated surface-dry condition and coarse aggregate with a specific gravity of 2.83. If the materials proposed for use differ from the above, adjust the listed proportions to achieve proper yield.

PART 3. EXECUTION

3.01 CUTTING AND CLEANING

A. Cut kerfs in existing pavement in one pass, leaving a neat vertical edge in the existing pavement at the locations and to the dimensions shown on the Contract Drawings.

B. Clean all kerfs using compressed air at not less than 90 psi and 100 cubic feet per minute. Compressed air shall be free from oil and moisture.

3.02 CONDUIT INSTALLATION

Secure conduit at intervals sufficient to prevent movement, including "floating" during placement of concrete.

3.03 MIXING CONCRETE

A. All concrete batching shall be in conformance with ASTM C 94 and ACI 304R.

B. Where preblended concrete specified in 2.01 H. is used, mix concrete in a power operated batch mixer in accordance with manufacturer's written instructions.

C. Where Truck Mixers Are Used:

1. Plants and truck mixers shall conform to ASTM C 94, and shall be New Jersey or New York State Department of Transportation approved. Make documentation of such conformance available to the Engineer at all times.
2. Use a sufficient number of trucks to ensure continuous delivery of the concrete.
3. Limit load sizes to prevent concrete from approaching initial set prior to total discharge of batch.
4. The Engineer will permit one re-tempering of the concrete. The redosage of high range water reducer shall not exceed the manufacturer's recommended limitation, nor shall it retard the initial set of the concrete by more than 30 minutes.
5. Concrete that has partially hardened or has attained its initial set shall not be re-mixed or re-tempered, will be rejected and must be disposed of away from Authority property at no additional cost to the Authority.

D. Where Truck Mixers Are Used:

1. Mixers shall be of a self-contained, self-propelled, continuous mixing type capable of carrying sufficient cement, aggregates, water and admixtures to produce not less than 6 cubic yards of concrete. Maintain a back-up unit on-site, calibrated, and available for use where the pavement is to be reopened to traffic at the end of the work period.
2. Mixer shall be capable of being calibrated to automatically proportion and blend all components. Notify the Engineer a minimum of 48 hours prior to when the calibration of the truck mixers take place. The Engineer will witness the calibration of the truck mixer.

3. The Contractor is responsible for the calibration, within the following tolerances (by weight):

Coarse Aggregate	+/- 2%
Fine Aggregate	+/- 2%
Cement	+/- 1%
Water	+/- 1%
Admixture	+/- 3%

3.04 DEPOSITING CONCRETE

A. After the installation of electrical conduit in kerfs has been approved by the Engineer, deposit concrete in the presence of the Engineer and by methods approved by the Engineer.

B. Thoroughly consolidate the concrete so that it is worked into all corners and around all embedded conduits. Vibrate by hand or with spud vibrators and float the surface so that the resulting concrete does not have excessive voids or honeycombing of the surface.

3.05 FINISHING, CURING, TESTING AND PROTECTION OF CONCRETE

A. Concrete which is to remain exposed shall receive a "Broom Finish" and shall be treated with liquid curing compound in accordance with the manufacturer's printed instructions. Concrete to be overlaid with asphalt concrete shall receive a float finish.

B. Do not open to traffic or overlay with asphalt concrete until concrete attains a minimum compressive strength of 1500 psi.

C. The Engineer will determine in-situ strength by the molding and testing of cylinders in accordance with ASTM C 39, or by the use of a calibrated maturity testing method in accordance with ASTM C 1074.

END OF SECTION

SECTION 02572

KERF CUTS FOR ELECTRICAL CONDUITS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Construction and Installation Procedures

02572G01 Submit plans, methods, equipment and procedures as applicable for:
1. Concrete cutting equipment as specified in 3.01 A.
2. Power operated batch mixer as specified in 3.03 B.
3. Type and method of operation when using mobile mixers or ready-mixed truck mixers as specified in 3.03 C and D.
4. Method of depositing concrete as specified in 3.04 A.

END OF APPENDIX "A"

DIVISION 2

SECTION 02574

ABRASIVE BLASTING OF PAVEMENTS

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for abrasive blasting of the following pavement items:

A. Existing concrete to which new concrete is to be bonded.

B. Concrete surfaces to which waterproofing, coatings and other finishes are to be applied

C. Steel surfaces, including corroded reinforcement, to which concrete or joint material is to be applied

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

Steel Structures Painting Council (SSPC)

SP6 Commercial Blast Cleaning

1.03 JOB CONDITIONS

A. Do not conduct abrasive blasting operations if U.S. Weather Bureau forecasts precipitation within the 24-hour period following proposed operations.

B. Do not conduct abrasive blasting operations unless the application of new materials is to follow the abrasive blasting within the same work period.

PART 2. PRODUCTS

2.01 MATERIALS

Abrasive grit shall be "Black Beauty" as manufactured by Reed Minerals, a division of Harsco Corp., South Kearny, NJ, or approved equal.

PART 3. EXECUTION

3.01 PREPARATION

A. Clear surfaces to be abrasive blasted of equipment and debris.

B. Erect curtains or temporary partitions or otherwise protect work area to safeguard persons, traffic, adjacent structures, properties, waterbodies, and vehicles from abrasive blasting operations and prevent excessive airborne debris, all to the satisfaction of the Engineer.

3.02 ABRASIVE BLASTING

A. Abrasive grit nozzle blasting equipment shall be the following, or approved equal:

1. "Clemco" manufactured by Clementina, Oakland, CA;
2. "Pauli and Griffin" manufactured by Pauli Griffin, Vacaville, CA;
3. "Sandstorm" manufactured by Bowen Tools, Inc., Houston, TX.

B. Where relatively smooth, horizontal concrete surfaces require abrasive blasting, whether in enclosed areas or elsewhere, and where dust would be a problem, use the self-contained steel shot system in lieu of abrasive grit blasting.

Self-contained steel shot blasting equipment shall be the following, or approved equal:

1. "Blastrac" manufactured by Wheelabrator-Frye, Mishawaka, Indiana;
2. "Portable Power Blast Equipment" manufactured by Goff Corporation, Seminole, Oklahoma.

C. Abrasive blast surfaces of concrete or steel to remove all dirt, grease, oil, asphalt, rubber, laitance formed on concrete, curing compounds, and all other deleterious material.

D. For concrete surfaces, remove a thin layer of mortar to expose the aggregate.

E. For steel surfaces, abrasive blast in conformance with SSPC-SP6, except where stricter requirements are specified elsewhere in the Specifications or shown on the Contract Drawings.

F. Clean blasted surfaces of dust and loose residue, and properly dispose of same away from Authority property

END OF SECTION

DIVISION 2

SECTION 02575

PAVEMENT MILLING

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for the removal of asphalt concrete and Portland cement concrete pavement by milling.

1.02 JOB CONDITIONS

Prior to commencement of milling work, ensure that all equipment is in proper working order.

1.03 PERFORMANCE REQUIREMENTS

A. Milled Surface Grade

As shown on the Contract Drawings, mill the asphalt concrete or Portland cement concrete to a certain depth below finished or existing grade elevation. The grade of the milled surface shall be within a tolerance of plus or minus ¼ inch of the required depth as shown on the Contract Drawings. If necessary, correct any deficiency in the milled surface grade in accordance with 3.02 A.

B. Milled Surface Smoothness

When a 10-foot straight edge is laid on the milled surface parallel to the centerline of roadway, runway or taxiway, the milled surface shall not vary from edge of straight edge more than ¼ inch, except at intersections or any change of grade. If necessary, correct any deficiency in the smoothness of the milled surface in accordance with 3.02 B.

C. Milled Surface Texture

The milled surface shall be free from gouges, continuous grooves and ridges not greater than 3/8 inch in depth and delaminated areas, and shall have a uniformly textured appearance consisting of discontinuous longitudinal striations.

1.04 QUALITY CONTROL / ASSURANCE

A. Contractor's Quality Control Tests

1. Milled Surface Grade, Smoothness and Texture

During or immediately after milling, perform quality control surveys and straightedge testing of the milled surface to ensure that the grade, texture and smoothness comply with the requirements of 1.03.

2. Test Section

Where shown on the Contract Drawings, mill the existing pavement during construction of a test section. The purpose of the test is for the Contractor to demonstrate that the performance requirements of Paragraph 1.03 can be met using the equipment and methods of operation.

B. Engineer's Sampling and Testing

1. Milled Surface Grade

The Engineer will measure the grade of the milled surface by surveying at the locations that coincide with the finished or existing grade as shown on the Contract Drawings.

2. Milled Surface Smoothness

The Engineer will test the smoothness of the milled surface with a 10-foot straight edge along the centerline of the lane created by each pass of the milling equipment.

3. If necessary, correct any deficiency in the milled surface grade or smoothness in accordance with 3.02.

PART 2. EQUIPMENT

2.01 DESCRIPTION

A. Milling equipment shall be a self-propelled planing, grinding or cutting machine, with variable operating speeds and automatic grade and slope controls. The milling equipment shall be capable of removing asphalt concrete and Portland cement concrete pavement without the use of heat, and equipped with a water supply system to control dust. The milling equipment shall be capable of milling a minimum width of 10 feet in a single pass.

B. Pneumatic hammers shall not be heavier than nominal 30-pound class when used on bridge decks.

PART 3. EXECUTION

3.01 REMOVAL

A. Perform milling parallel to the roadway, runway or taxiway centerline.

B. Remove existing asphalt concrete or Portland cement concrete to the limits and depths shown on the Contract Drawings.

C. Prevent milled asphalt concrete or Portland cement concrete from being deposited in catch basins or other drainage structures. Any material deposited shall be promptly removed.

D. Do not damage existing construction that is to remain in place. Immediately repair any damage to the satisfaction of the Engineer at no cost to the Authority.

E. Use pneumatic hammers in areas not accessible to the milling equipment. On bridge decks, do not operate the pneumatic hammer at an angle exceeding 45 degrees relative to the pavement surface.

F. If milled surfaces are required to be reopened to vehicular traffic, ramp the perimeter of the milled areas, utility castings and other appurtenances with asphalt concrete to ensure a smooth, safe transition.

G. Prior to the conclusion of each Work period, use hand brooms, mechanical sweepers or vacuum equipment to ensure that the area of Work is cleaned to the satisfaction of the Engineer.

3.02 CORRECTIONS OF DEFICIENCIES

A. Deficiency in Milled Surface Grade

1. If the milled surface grade is above the required grade, then perform additional milling at no additional cost to the Authority as required to comply with the requirement of 1.03 A.

2. If the milled surface grade is below the required grade, then perform additonal milling at no additional cost to the Authority as required to place a minimum two inch thick asphalt concrete overlay. The finished surface of the asphalt concrete overlay shall comply with the requirement of 1.03. The type of asphalt concrete and placement requirements shall be as directed by the Engineer at no additional cost to the Authority.

3. Following corrections, the Engineer will perform additional measurements in accordance with 1.04 B.1. If necessary, and as approved by the Engineer, perform additional corrections until the requirements are met at no additional cost to the Authority.

B. Deficiency in Milled Surface Smoothness and Texture

1. If any measurment exceeds the surface smoothness variation tolerance of 1.03 B., or if the texture requirements of 1.03 C. are not met, perform additional milling at no additional cost to the Authority as required to comply with the requirement of 1.03 B. and 1.03 C.

2. If the milled surface cannot be remilled without the surface falling below the grade tolerance, perform additional milling at no additional cost to the Authority as required to place a minimum two inch thick asphalt overlay. The finished surface of the asphalt concrete overlay shall comply with the requirements of 1.03. The type of asphalt concrete and placement requirements shall be as directed by the Engineer at no additional cost to the Authority.

3. Following corrections, the Engineer will perform additional measurements in accordance with 1.04 B.2. If necessary, and as approved by the Engineer, perform additional corrections until the requirements are met at no additional cost to the Authority.

3.03 DISPOSAL REQUIREMENTS

Dispose of material resulting from operations off Authority property and in accordance with Division 1 clause entitled "Recycling of Construction Debris Material".

END OF SECTION

DIVISION 2

SECTION 02578

PAVEMENT JOINT SEALING

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for sealing joints in pavements, sidewalks and curbs located on grade.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American Society for Testing and Materials (ASTM)
ASTM D 3405	Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements
	Federal Specifications
SS-S-1401	Sealant, Joint, Non-Jet-Fuel-Resistant, Hot-Applied, for Portland Cement and Asphalt Concrete Pavements
SS-S-200	Two Component Joint Sealant, Jet Fuel Resistant, Cold Applied for Portland Cement Concrete Pavement

1.03 ENVIRONMENTAL REQUIREMENTS

A. Do not apply any sealant during rain conditions.

B. Do not apply silicone sealant when ambient or pavement temperature is 40 degrees F, or below.

C. Do not apply rubberized asphalt sealant when ambient or pavement temperature is 50 degrees F, or below.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver silicone sealant to the construction site in unopened containers with the manufacturer's lot numbers clearly marked on the containers. Include with the delivery a manufacturer's invoice stating the date(s) of shipment and lot numbers of the silicone sealant to be used.

B. Store silicone sealant at ambient temperatures at or below 90 degrees F.

C. Silicone sealant which has been in storage more than six months shall not be used in the construction and shall be removed from the construction site immediately.

1.05 SUBMITTALS

See Appendix "A" for Submittal requirements

PART 2. PRODUCTS

2.01 MATERIALS

A. Rubberized Asphalt Joint Sealant shall be one of the following and no substitution will be permitted.

1. Road Saver 211 - manufactured by Crafco Inc. Chandler, AZ
2. Hi-Spec - manufactured by W. R. Meadows, Elgin, IL
3. Koch 9005 - manufactured by Koch Materials Company, Pensauken, NJ

B. Silicone Sealant

1. For Concrete Pavement, Sidewalk and Curb Joints
   a. "Dow Corning 888", manufactured by Dow Corning Corp., Midland, MI; or approved equal meeting ASTM D 3405 and Federal Specification SS-S-200.
2. For Asphalt Pavement in Aircraft Apron and Fueling Areas
   a. "Dow Corning 890", manufactured by Dow Corning Corp., Midland, MI; or approved equal meeting ASTM D 3405 and Federal Specification SS-S-1401.

C. Backer Rod - closed cell, expanded polyethylene foam rod, manufactured by A.H. Harris, New Britain, CT; or approved equal.

PART 3. EXECUTION

3.01 PREPARATION

A. Removal and Cleaning Equipment

1. Mechanical joint router shall be "Jiffy" Crack and Joint Router, manufactured by Aeroil Products Co., Inc., South Hackensack, NJ; or approved equal.
2. Air compressor shall be capable of furnishing not less than 100 cubic feet of air per minute at a pressure of not less than 100 pounds per square inch. Compressed air shall be free of oil and moisture.
3. Power driven concrete saw shall be "Compact Concrete and Asphalt Saw" manufactured by Cimline, Inc., Minneapolis, MN; or approved equal.

B. Removal of Existing Joint Material

1. For existing asphalt concrete and Portland cement concrete pavement joints, use a mechanical joint router to remove any joint sealing material present and to reface or modify existing joints to the dimensions shown on the Contract Drawings.

2. For new asphalt concrete pavement joints, use a mechanical joint router or power-driven concrete saw to cut joints to the dimensions shown on the Contract Drawings.

3. For newly sawed Portland cement concrete joints, after a minimum of 72 hours has passed from the completion of concrete placing operations, use a mechanical joint router or power-driven concrete saw to widen sawed joints to their final required dimensions shown on the Contract Drawings.

4. No removals are required for formed joints.

5. During removal and cleaning operations, do not damage any premolded joint filler that is to remain in expansion joints.

C. Cleaning Joints

1. General

   a. Pavement joints shall be cleaned of any routing or cutting debris, and made free of any particles or film of old sealant.

   b. Abrasive blasting operations shall be performed in accordance with requirements specified in the Section entitled "ABRASIVE BLASTING".

2. Asphalt Concrete Pavement Joints (New and Existing)

   Clean joint slots with power-driven wire brush followed by an oil-free compressed air jet.

3. Existing Portland Cement Concrete Pavement Joints

   Clean joint slots with a power-driven wire brush, followed by an abrasive blast, followed by an oil-free compressed air jet.

4. New Portland Cement Concrete Pavement Joints (Sawed or Formed)

   Clean joint slots with an abrasive blast. Follow by an oil-free compressed air jet.

3.02 SEALANT APPLICATION

A. Application Equipment

1. Double Boiler Indirect-Fired Kettle/Rubberized Asphalt Sealant Applicator

   The space between the inner and outer shells of a double boiler indirect-fired kettle shall be filled with suitable heat transfer oil having a flash point of not less than 550 degrees F. The kettle shall be equipped with satisfactory means of agitating the sealant at all times without excessive incorporation of air. The kettle shall be equipped with thermostatic control for automatic regulation of the temperature of the oil bath and sealant and shall have a recording thermometer for recording the temperature of the sealant. A hose shall be directly connected to the melting kettle in such a manner as to permit pumping the melted sealant through the hose to a shoe-type applicator that shall direct and control the filling of the joints. The hose and applicator shall be insulated.

2. Compressed Air-Driven Extrusion Pump/Silicone Sealant Applicator

   a. The applicator shall be one of the following, or approved equal:

      (1) "700 Series Teflon Packed Pumping System" with teflon lined hoses, manufactured by Pyles Industries, Inc., Wixom, MI

      (2) "King" or "Bulldog" Model pumping systems with teflon lined hoses, manufactured by Graco., Inc., Minneapolis, MN

   b. The silicone sealant applicator nozzle shall be shaped to fit inside the joint to introduce the sealant between the joint faces.

B. Rubberized Asphalt Sealant Installation

1. Use rubberized asphalt sealant for sealing joints in asphalt concrete pavement and joints between asphalt concrete pavement and Portland cement concrete pavement and curbs.

2. Seal joints immediately following, and during the same work period as, the cleaning operation.

3. Rubberized asphalt sealant shall be heated using a double boiler indirect-fired kettle/applicator. Apply the sealant to cleaned joints at the manufacturer's recommended application temperature.

4. At the start of each day's sealing operations, one gallon of heated sealant shall be flushed through the applicator into a one-gallon container and disposed of away from Port Authority property.

5. Apply sealant as shown on the Contract Drawings in such a manner that the in-place sealant shall be well bonded to the pavement and be free of voids or entrapped air. Seal the joints so that upon completion of the work, the surface of the sealant material shall be 1/4 inch, plus or minus 1/8 inch, below the adjacent pavement surface. Refill or "spot up" all low areas before final approval. Remove excess material on the surface of the pavement and leave the pavement surface in a clean condition. The period of cure shall be in accordance with the manufacturer's recommendations. Vehicular or heavy equipment traffic shall not be permitted on the pavement in the area of the joints during the curing period.

C. Silicone Sealant Installation

1. Silicone sealant shall be used to seal Portland cement concrete pavement, sidewalks, curb joints and asphalt concrete pavements in aircraft aprons and fueling areas.

2. Seal joints immediately following, and during the same work period as, the cleaning operation.

3. Install backer rods without stretching and as shown on the Contract Drawings.

4. Apply silicone joint sealant to cleaned joints using a compressed air driven extrusion pump/silicone sealant applicator.

5. Apply sealant as shown on the Contract Drawings in such a manner that the in-place sealant will adhere to the concrete and be free of voids. Seal the joints so that material shall be 1/4 inch, plus or minus 1/8 inch, below the pavement surface. Refill or "spot up" all low areas before final approval. Remove excess material on the surface of the pavement and leave the pavement surface in a clean condition.

6. If the silicone sealant is not self-leveling, the sealant material shall be tooled in a manner that causes it to wet the joint surfaces.

7. Allow silicone sealant to cure in accordance with the manufacturer's installation instructions before reopening to traffic. Protect surface of sealer from dirt for one to three hours, until tack-free.

END OF SECTION

SECTION 02578

PAVEMENT JOINT SEALING

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Samples

02578C01 Submit to the Engineer of Materials, Engineering Materials Laboratory, Port Authority Technical Center, 241 Erie Street, Jersey City, NJ 07310-1397, the following samples for approval:

1. Rubberized Asphalt Sealant - 10 pounds from each lot.
2. Silicone Sealant - one 10.3-fluid ounce cartridge.
3. Backer Rod - three-foot length

END OF APPENDIX "A"

DIVISION 2

SECTION 02584

AIRFIELD PAVEMENT MARKINGS

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for permanent and temporary airfield pavement markings.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American Society for Testing and Materials (ASTM)
ASTM D 562	Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.
ASTM D 711	Test Method for No-Pick-Up Time of Traffic Paint.
ASTM D 969	Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint.
ASTM D 1210	Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage.
ASTM D 2369	Test Method for Volatile Content of Coatings.
ASTM D 2697	Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings.
ASTM D 3723	Test Method for Pigment Content of Water-Emulsion Paints by Low-Temperature Ashing.
	Federal Specifications (FS)
TT-B-1325D	Beads (Glass Spheres) Retro-Reflective.
TT-P-1952E	Paint, Traffic and Airfield Marking, Waterborne.
	Federal Standards
FED STD 595B	Colors Used in Government Procurement.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint to the construction site in sealed containers clearly marked with the date of manufacture, expiration date, name of manufacturer and VOC content.

B. Store paint inside at normal room temperature.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Weather Limitations

Apply paint only when the surface is dry, when the atmospheric temperature is above 50 deg F (or is 45 deg F and rising), and when the weather is not foggy or windy.

1.05 WARRANTY

Warrant the completed marking installation, except for temporary markings, to the Authority, from the date of issuance of the Certificate of Final Completion, against peeling, chipping, flaking and delamination for a period of one (1) year.

1.06 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MANUFACTURERS

See Appendix "B" for manufacturers offering products which meet the requirements of 2.02.

2.02 MATERIALS

A. Paint

1. Paint shall be formulated and manufactured from first grade raw materials and shall be free from defects and imperfections that might adversely affect the serviceability of the finished product. Paint shall not show or develop hard settling or gelling upon storage in the sealed containers as received that will affect its performance. Paint shall be furnished ready for use. Daily take a one-quart sample of paint from the paint container to be used for application, in the presence of the Engineer, and seal and mark it for future reference.

2. Daylight Directional Reflectance: The daylight directional reflectance of the white paint (without glass spheres) before and after weathering shall not be less than 85 percent when tested in accordance with Federal Specification TT-P-1952D, Section 4.3.9.2.

3. Flexibility: Paint shall show no cracking, chipping or flaking when tested in accordance with Federal Specification TT-P-1952D, Section 4.3.5 when bent 180 degrees.

4. Bleeding: Paint shall have a minimum bleed ratio of 0.95 when tested in accordance with ASTM D 969.

5. Viscosity: Paint consistency shall be not less than 80 or more than 90 Krebs Units at 77 deg F, when tested in accordance with ASTM D 562.

6. Dry Opacity: Test paint in accordance with Federal Specification TT-P-1952D Section 4.3.11. The minimum contrast ratio of the white and yellow paint shall be 0.92.

7. Water Resistance: Paint shall conform to Federal Specification TT-P-1952D, Section 4.3.6. There shall be no blistering, wrinkling, loss of adhesion, change of color, softening or other deterioration after examination.

8. Field Drying Time: Paint, when applied at 13 mils plus or minus 1 mil wet film thickness and 160 deg F at the gun and with glass spheres at the specified application rate, shall dry to no pickup under 1 minute when tested by passing with a passenger car. A line showing no visual deposition of the paint to the pavement surface when viewed from a distance of fifty feet will be considered non-tracking and conforming to the requirement of the field drying time.

9. Lab No Pickup: Paint dry time when tested in accordance with ASTM D 711 shall not be greater than 10 minutes.

10. Fineness of Grind: Paint shall have a minimum fineness of grind of 3 Hegman when tested in accordance with ASTM D 1210.

11. Abrasion Resistance: No less than 150 liters of sand shall be required for removal of the baked paint film and the weathered paint film. The abrasion resistance test shall be in accordance with Federal Specification TT-P-1952D, Section 4.3.7.

12. Shelf Life: Paint shall have a usable shelf life of not less than 12 months. Store paint indoors at normal room temperature.

13. Paint shall contain less than 0.06 percent lead when tested in accordance with Federal Specification TT-P-1952D, Section 4.3.11 and be chromium free when tested in accordance with Federal Specification TT-P-1952D Section 4.3.1.2.

14. Dried paint color shall match Federal Standard 595B. Colors: White 37925, Black 37038, Yellow 33538 and Red 31136.

15. Condition in the Container: Paint, as received, shall show no evidence of biological growth, livering or hard settling and shall be easily mixed when tested as specified in Federal Specification TT-P-1952D, Section 4.3.2.

16. Scrub Resistance: No less than 500 cycles shall be required to remove the weathered paint film when tested as specified in Federal Specification TT-P-1952D Section 4.3.12.

17. Pigment: Paint shall have a pigment content of 60-62 percent by weight when tested in accordance with ASTM D 3723.

18. Solids by Volume: Paint shall have a minimum solids by volume of 60 percent when tested in accordance with ASTM D 2697.

19. Volatile Organic Content (VOC): The VOC shall not exceed 150 g/L when tested in accordance with ASTM D 2369.

B. Glass Beads

Glass beads shall meet the requirements of Federal Specification TT-B-1325C, Type III. Glass beads shall be treated with adhesion promoting and/or flotation coatings as specified by the manufacturer of the paint.

PART 3. EXECUTION

3.01 EQUIPMENT

A. All equipment for the Work will be subject to approval by the Engineer. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the Work.

B. The mechanical marker shall be an atomizing spray-type marking machine suitable for application of traffic paint and glass beads. It shall produce an even and uniform film thickness at the required coverage and shall be designed so as to apply markings of uniform cross sections and clear-cut edges without running or spattering and within the limits for straightness set forth herein. The machine shall have a gauge for measuring the quantity of paint used, graduated in gallons, or other approved measuring method. The equipment shall be truck mounted and capable of painting an 18-inch wide line in one pass.

C. Suitable adjustments shall be provided on the sprayer(s) of a single machine or by furnishing additional equipment for painting the width required.

3.02 SURFACE PREPARATION

A. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance or other foreign material which would reduce the bond between the paint and the pavement. Thoroughly clean the area to be painted by sweeping and blowing as required to remove all dirt and loose materials. Areas which cannot be satisfactorily cleaned by brooming and blowing shall be scrubbed as directed with a water solution of trisodium phosphate (10 percent Na3PO4 by weight) or an approved equal solution. After scrubbing, rinse off the solution and dry the surface prior to painting.

B. Do not apply paint to portland cement concrete pavement until the concrete in the areas to be painted is clean of curing material. Use abrasive blasting or high-pressure water to remove curing material from concrete surfaces.

3.03 REMOVAL OF EXISTING MARKINGS

A. Remove existing pavement markings no longer needed to the extent that 95 percent removal is achieved without the removal of more than 1/8 inch of pavement.

B. Prior to the start of removal operations, demonstrate the proposed method of removal to the satisfaction of the Engineer. Any method that leaves gouges, ridges or grooves in the pavement will not be permitted.

C. Continuously pick up debris from the removal operation and dispose of off Authority property. Obliterating stripes by painting over them will not be permitted.

3.04 LAYOUT OF MARKINGS

Lay out pavement markings as shown on the Contract Drawings or, if not shown, as approved by the Engineer in advance of the paint application. Verify the location, alignment and radii of all existing pavement markings prior to using them as a guide. Space control points at such intervals as will ensure accurate location and reproduction of all markings at the tolerances specified in 3.05 D.

3.05 APPLICATION

A. Apply markings at the locations and to the dimensions and spacing shown on the Contract Drawings. Do not apply paint until the layout and condition of the surface have been approved by the Engineer.

B. Mix paint in accordance with the manufacturer's instructions and apply to the pavement with a marking machine at a rate of approximately 115 square feet per gallon for permanent markings and a rate of 230 square feet per gallon for temporary markings. The addition of thinner will not be permitted.

C. Allow 30 days, for permanent markings, to elapse between placement of a bituminous surface course or seal coat and application of the paint. For periods less than 30 days, provide temporary markings. Paint shall not bleed excessively, curl or discolor when applied to bituminous surfaces. Paint, when applied at the application rate specified in 3.05 B, and 160 deg F at the gun, shall dry to no pick-up in under 1 minute.

D. Control painting to achieve neat straight edges. The edges of the markings shall vary from a straight line by not more than 1/2 inch in 50 feet. Maintain dimensions and spacings within the following tolerances:

DIMENSION AND SPACING	TOLERANCE
36 inches or less	± 1/2 inch
Greater than 36 inches to 6 feet	± 1 inch
Greater than 6 feet to 60 feet	± 2 inches
Greater than 60 feet	± 3 inches

If markings do not conform to these requirements, remove and immediately correct them as approved by the Engineer at no cost to the Authority. Perform corrective work within the Work hours specified by the Engineer.

E. Distribute glass beads to the surface of marked areas immediately after application of the paint. Use a dispenser which is properly designed for attachment to the marking machine and suitable for dispensing glass spheres. Apply spheres at the rate of 12 pounds per gallon of paint for Type III beads.

F. Furnish certified test reports for the materials shipped to the job site. Do not submit these reports, however, as a basis for final acceptance. Notify the Engineer upon arrival of a shipment of paint to the job site. Return all emptied containers to the paint storage area for checking by the Engineer. Remove all containers from the job site, but only after authorization by the Engineer. Preserve an accurate accounting of the paint materials used in the accepted Work.

G. Apply black paint as a 6-inch wide outline to increase visibility on concrete surfaces and light colored surfaces where shown on the Contract Drawings.

H. Do not apply glass beads to temporary markings or black paint.

3.06 PROTECTION

A. After application of the paint, protect all markings from damage until the paint is dry. The Contractor shall be responsible and shall erect or place suitable warning signs, flags or barricades, protective screens or coverings, as required. Protect all surfaces from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage or drippings of paint.

3.07 ADJUSTING

A. Defective Workmanship or Materials

When any material not conforming to the requirements of this Section or the Contract Drawings has been delivered to the construction site but not yet installed, or it has been incorporated in the Work and has been found to be of inferior quality, as determined by the Engineer, such material or Work will be considered defective and shall be removed and replaced as directed by the Engineer, at no additional cost to the Authority.

END OF SECTION

SECTION 02584

Airfield Pavement Marking

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Catalog Cuts

02584B01 Product Data

1. Detailed catalog cuts, manufacturer's specifications and certified test reports of products proposed for use demonstrating conformance to the requirements of this Section. Material Safety Data Sheets (MSDS) shall be part of every shipment and test sample of paint.

2. Catalog cuts and/or manufacturer's specifications for all equipment to be used.

END OF APPENDIX "A"

SECTION 02584

AIRFIELD PAVEMENT MARKINGS

APPENDIX "B"

MANUFACTURERS

Waterborne Coatings

Manufacturer	Products
Sherwin-Williams	Hotline Fast Dry Latex TM2248 White, TM 2259 Lead-Free Yellow, TM2222 Red, and TM2221 Black.
Aexcel Corporation	Jet-Dry Water Based 72W-A042 White, 72Y-A056 Lead-Free Yellow, 72R-A005 Red, and 72A-A018 Type II Black.

END OF APPENDIX "B"

DIVISION 2

SECTION 02711

SUBDRAINAGE SYSTEM

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for perforated high density polyethylene pipe (HDPE) and non-perforated high density polyethylene pipe (HDPE) subdrainage systems.

B. Definition of terms relating to plastic pipe shall be in accordance with ASTM F412.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M 288	Standard Specification for Geotextiles

American Society for Testing and Materials (ASTM)

ASTM C 33	Concrete Aggregates
ASTM F 2306	12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings to Gravity-Flow Storm Sewer and Subsurface Drainage Applications
ASTM D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
ASTM F 2648	2 to 60 Inch [50 to 1500 mm] Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications
ASTM D 3212	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F 412	Standard Terminology Relating to Plastic Piping Systems
ASTM F 477	Elastomeric Seals for Joining Plastic Pipe

1.03 QUALITY ASSURANCE

A. Any entity performing the Work of this Section shall have at least three years of installation experience on projects with piping systems of types and sizes similar to that required under this Contract.

B. Pipe will be visually inspected by the Engineer when delivered to the construction site. Damaged material or material not meeting the requirements of this Section shall be removed from the construction site and replaced at no cost to the Authority.

C. Pipe may be inspected at the place of manufacture by the Engineer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions for unloading, storing and moving pipe.

B. Plastic pipe that is stored at the construction site shall remain covered, in a manner approved by the Engineer, until pipe installation is performed.

C. Care shall be taken when storing pipe and appurtenances so as not to damage Authority or other public or private property and any property so damaged shall be repaired at the Contractor's expense.

1.05 SUBMITTALS

See Appendix "A"

PART 2. PRODUCTS

2.01 MANUFACTURERS

A. Perforated High Density Polyethylene Pipe.

1. Mega Green ST, manufactured by Hancor, Inc., Findlay, OH.
2. Mega Green ST, manufactured by Advanced Drainage Systems, Inc., Hillard, OH.
3. Approved Equal.

B. Non-perforated High Density Polyethylene Pipe

1. Mega Green WT, manufactured by Hancor, Inc., Findlay, OH.
2. Mega Green WT, manufactured by Advanced Drainage Systems, Inc., Hillard, OH.
3. Approved Equal.

2.02 MATERIALS

Use any of the pipe systems specified below unless otherwise shown on the Contract Drawings.

A. Perforated High Density Polyethylene Pipe.

1. Pipes conform to ASTM F 2648
2. Gaskets conform to ASTM F 477
3. Fittings conform to ASTM F 2306

B. Non-perforated High Density Polyethylene Pipe.

1. Pipes conform to ASTM F 2648
2. Gaskets conform to ASTM F 477
3. Fittings conform to ASTM F 2306
4. Watertight conform to ASTM D 3212

C. Geotextile Wrap (sock): Pipe with circular perforations, and pipe with slotted perforations greater than 1/16" least dimension, shall be furnished with manufacturer's recommended geotextile wrap (sock) to prevent entry of aggregate through the perforations.

D. Geotextile (fabric) shall meet the physical requirements of Class 1 for Drainage applications of AASHTO M 288 and shall be in accordance with Section 02274 entitled "GEOTEXTILES."

E. Washed Aggregate shall be crushed stone conforming to ASTM C33 size No. 6, 67, 7 or an approved equal with maximum size of 25 mm (1") and minimum size of 2.36 mm (No. 8).

PART 3. EXECUTION

3.01 EXAMINATION

Where the subdrain is to cross existing utilities, the Contractor shall verify their elevation and horizontal location through excavation of the test pits.

3.02 INSTALLATION

A. Excavation

1. Excavate pipe trench in accordance with Section 02221 entitled "EXCAVATION, BACKFILLING AND FILLING" in the location and to the depth shown on the Contract Drawings.
2. If ground water is encountered, prevent accumulation of water in trench by methods approved by the Engineer.

B. Subdrain Installation

1. Prior to the start of construction, the method for control of alignment and grade shall be submitted for approval. The method shall be a laser system or grade board setup to establish a reference grade and alignment control directly above or within the pipe. Use of other equipment may be substituted if, in the opinion of the Engineer, the alternate system produces equivalent accuracy.

2. Place geotextile (fabric) in trench and then place washed aggregate in maximum 6 inch lifts to the invert elevations shown on the Contract Drawings. Compact each lift of washed aggregate with two passes of a vibrating pad compactor.

3. Immediately prior to placement in the trench, all pipe shall be inspected in the presence of the Engineer to verify that it is internally clean and free of damage. Damaged units shall be removed from the construction site and replaced to the satisfaction of the Engineer and at no additional cost to the Authority.

4. Lay pipe with bell or grooved end up grade.

5. When lowering pipe into the trench and joining the units, take precautions to ensure that the interior of the pipeline remains clean.

6. Make up pipe joints in accordance with the manufacturer's instructions. Do not cover pipe until the Engineer has approved the installation.

7. Place the balance of the washed aggregate in maximum 6-inch lifts to the elevation shown on the Contract Drawings. Compact each lift with two passes of a vibrating pad compactor.

8. Complete geotextile (fabric) encasement of the washed aggregate as shown on the Contract Drawings and in accordance with the Section 02274 entitled "GEOTEXTILES."

9. Close all openings in the pipeline with watertight plugs when pipelaying is stopped at the conclusion of the work period or interrupted for any reason.

C. Pipe Installation

Installation of HDPE and shall be in accordance with the applicable provisions of ASTM D 2321.

3.03 PROTECTION

A. Care shall be taken not to damage or displace installed pipes during construction.

B. Where pipe is damaged or displaced, replace or take remedial measures as directed by the Engineer at no additional cost to the Authority.

END OF SECTION

SECTION 02711

SUBDRAINAGE SYSTEM

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

02711A01 Where connecting HDPE to PCCP subdrains provide shop drawings to the ngineer for approval prior to construction.

Catalog Cuts

02711B01 Submit Catalog Cuts of pipes and geotextile (fabric) for the Engineer's approval.

Certificates

02711E01 Submit certificates from manufacturers of the following items certifying that the following materials comply with the requirements specified in this Section: 1. Perforated Polyvinyl Chloride Pipe (PVCP) 2. Perforated High Density Polyethylene Pipe (HDPE) 3. Geotextile (Fabric)

Manufacturer Test Reports

02711F01 Submit to the Manager, Materials Engineering Division, Port Authority Technical Center, 241 Erie Street, Jersey City, New Jersey 07310-1397, certified test data covering gradation and composition of the washed aggregate proposed for use, together with one 75-pound representative sample of the material1. Submit the sample in a clean, sturdy container or bag which shall not permit loss of any of the material.2. Clearly label the container or bag of the sample with: Contract location, title and number; the name of the material supplied; and location of the source.3. The Engineer will approve or disapprove the proposed material within 21 days after receipt of the sample.4. Do not deliver material to the construction site from any source until the Engineer has approved the material from that source.

Record Documents

02711M01 Submit "As-Built" drawings in accordance with Section of Division 1 entitled "Utility Record Drawings."

END OF APPENDIX "A"

DIVISION 2

SECTION 02720

MANHOLES AND DRAINAGE STRUCTURES

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for precast and cast-in-place concrete manholes and drainage structures.

B. Definition of terms shall be in accordance with ASTM C 822.

1.02 REFERENCES

A. The following is a listing of the publications referenced in this Section:

	American Concrete Institute (ACI)
ACI 318	Building Code Requirements for Structural Concrete and Commentary.
	American Society for Testing and Materials (ASTM)
ASTM A 48	Specification for Gray Iron Castings.
ASTM A 536	Specification for Ductile Iron Castings.
ASTM B26	Specification for Aluminum-Alloy Sand Castings.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 55	Specification for Concrete Building Brick.
ASTM C 117	Test Method for Materials Finer than 75μm (No. 200) Sieve in Mineral Aggregates by Washing.
ASTM C 136	Test Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM C 150	Specification for Portland Cement.
ASTM C 1329	Specification for Mortar Cement.
ASTM C 443	Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
ASTM C 497	Test Methods for Concrete Pipe, Manhole Sections, or Tile.
ASTM C 822	Terminology Relating to Concrete Pipe and Related Products.
ASTM C 891	Practice for Installation of Underground Precast Concrete Utility Structures.
ASTM C 913	Specification for Precast Concrete Water and Wastewater

	Structures.
ASTM C 923	Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
ASTM C 990	Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

1.03 ENVIRONMENTAL REQUIREMENTS

Cold and hot weather requirements shall conform to the applicable requirements of Section 03301 entitled "PORTLAND CEMENT CONCRETE, LONG FORM" except that in a precast plant the ambient temperature may be below 40 degrees F providing that forms and product are preheated and heat cured and protected. Temperature recording devices shall be used.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

A. As approved by the Engineer, the Contractor may substitute cast-in-place concrete manholes and drainage structures which conform in size and strength to the precast concrete structures shown on the Contract Drawings and as specified in this Section. As approved by the Engineer, the Contractor may also substitute precast concrete structures which conform in size and strength to the cast-in-place concrete structures shown on the Contract Drawings and as specified in this Section. Equivalent strength of substituted structures shall be based on structural design of reinforced concrete as outlined in ACI 318.

B. Design of lifting devices for precast structures shall conform to ASTM C 913.

C. Design of joints for precast concrete structures shall conform to ASTM C 913. Unless otherwise shown on the Contract Drawings, joints shall be designed for leakage not to exceed 0.025 gallons per hour per foot of joint at 3 feet of head.

1.05 QUALITY ASSURANCE

A. Workmen shall be experienced and skilled in the fabrication and installation of precast and cast-in-place concrete manholes and drainage structures.

B. Precast concrete manholes and drainage structures, including castings, will be visually inspected by the Engineer when delivered to the construction site. Damaged material or material not meeting the requirements of this Section shall be removed from the construction site and replaced, at no additional cost to the Authority.

C. Precast concrete manholes and drainage structures may be inspected by the Engineer at the place of manufacture.

D. Where manholes and drainage structures are cast-in-place, do not place concrete until the Engineer has inspected the formwork and verified that the dimensions and concrete reinforcing are in accordance with details shown on the Contract Drawings, on approved shop drawings and as specified in this Section.

E. Conform to the applicable requirements for quality assurance of Section 03301 entitled "PORTLAND CEMENT CONCRETE, LONG FORM" except that, if the concrete is precast, the producer shall maintain a fully equipped testing lab and employ a Quality Control Technician to perform Quality Control Tests. Unless otherwise shown on the Contract Drawings, Quality Control Tests for precast concrete shall consist of compression tests on a minimum of two cylinders for each day's production tested in accordance with ASTM C 39 for cylinders or ASTM C 497 for drilled cores. Acceptance shall be based on the requirements of ACI 318.

F. Tolerances of dimensions, squareness, joint surfaces, reinforcement location, and thickness of slabs and walls for precast structures shall conform to ASTM C 913.

G. Castings shall be of uniform quality, free from sand holes, shrinkage cracks and other defects. Surface of the castings shall be free from burnt-on sand and shall be smooth. Bearing surfaces between grates or covers and frames shall be cast or machined with such precision that continuous, full and uniform bearing is provided throughout the perimeter area of contact. The bearing contact with the frame shall be non-rocking when in place and under the influence of traffic or other loads. Pairs of machined castings shall be match marked to facilitate subsequent identification at installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast manholes and drainage structures.

B. Care shall be taken when storing precast concrete manholes and drainage structures to prevent damage to Authority or other public or private property, and any property so damaged shall be repaired at no additional cost to the Authority.

C. Each precast concrete structure shall be clearly marked by indentation or waterproof paint to indicate the date of manufacture, manufacturer and identifying symbols and/or numbers shown on the Contract Drawings to indicate its intended use.

1.07 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MANUFACTURERS

For each of the specified materials, manufacturer shall be one of the following, or approved equal:

A. Manhole and Drainage Structure Frames, Covers and Grates

Frames, cover and grates shall be as shown on the Contract Drawings.

B. Resilient Connectors

1. NPC Inc., Milford, NH 03055.

2. Press-Seal Gasket Corporation, Fort Wayne, IN 46804.

3. A-Lok Products Inc., Tullytown, PA 19007.

2.02 MATERIALS

A. Concrete

1. Concrete including concrete mixes shall be Category VI with a minimum 28-day compressive strength of 5000 psi for precast and 4000 psi for cast-in-place concrete manholes and drainage structures in accordance with the applicable requirements of Section 03301 entitled "PORTLAND CEMENT CONCRETE, LONG FORM".

B. Joints

1. Unless otherwise shown on the Contract Drawings, joints shall not be permitted in manholes and drainage structures.

2. Joints between precast sections, which occur four feet or more below finished grade, shall be sealed with rubber gaskets conforming to ASTM C 443 or a preformed flexible plastic gasket as specified in 2.02 B.3.

3. Where a preformed flexible plastic gasket is shown on the Contract Drawings, joints between precast sections shall be sealed with a preformed flexible plastic gasket conforming to ASTM C 990, except that gasket size, lengths, quantity of primer and packing material shall be in accordance with the manufacturer's recommendation. Preformed flexible plastic gaskets shall be one of the following, or approved equal:

   a. "Ram-Nek", as manufactured by Henry Co., El Segundo, CA.

   b. "CONSEAL CS-102", as manufactured by the Concrete Sealants, Inc, New Carlisle, OH.

   c. "PRO-STIK", as manufactured by Press-Seal Gasket Corporation, Fort Wayne, IN.

C. Steel Reinforcement

1. Steel reinforcement shall conform to Section 03200 entitled "CONCRETE REINFORCEMENT".

2. There shall be a continuity of reinforcement at all corners of the structure.

D. Silt Buckets

1. Cast aluminum silt bucket shall be furnished and installed for all sanitary sewer manhole structures shown on the Contract Drawings and shall be fabricated of aluminum Alloy 319, conforming to ASTM B 26.

E. Frames, Grates and Covers

1. Frames shall be of the type shown on the Contract Drawings and shall be fabricated of Class 35B cast iron, conforming to ASTM A 48.

2. Covers and grates shall be of the types and materials shown on the Contract Drawings. Where cast iron is shown, manhole covers and drainage grates shall be fabricated of Class 35B cast iron, conforming to ASTM A 48. Where ductile iron is shown, manhole covers and drainage grates shall be fabricated of Grade 65-45-12, or Grade 80-55-06 ductile iron and castings, conforming to ASTM A 536 and shall bear the letters "D.I." in a clearly visible manner on the upper surface.

3. Frames, covers or grates of other materials shall be as shown on the Contract Drawings.

4. Each casting shall be identified by the name of the producing foundry, origin and date of manufacture, ASTM designation number and class of cast or ductile iron.

F. Masonry Collar for Frame

1. Concrete Building Brick: ASTM C 55.

2. Mortar Cement:

ASTM C 1329, Type M.

G. Crushed Stone Bedding

Crushed limestone, gneiss, trap rock or recycled Portland cement concrete aggregate conforming to ASTM C 33, size number 67. Recycled concrete aggregate shall contain not less than 90 percent crushed Portland cement concrete and shall be in accordance with the requirements of the Section 02231 entitled "AGGREGATE BASE COURSE".

H. Connection Between Structure and Pipe

1. Unless otherwise shown on the Contract Drawings, the opening between the wall of the structure and the wall of the pipe shall be sealed with mortar cement conforming to ASTM C 1329, Type M or a resilient connector.

2. Resilient connector shall conform to ASTM C923. If resilient connector is not integrally cast into the wall of the structure, provide cast or cored opening of the size specified by manufacturer of the resilient connector.

2.03 FABRICATION

Manufacture of precast concrete structures shall conform to ASTM C 913.

PART 3. EXECUTION

3.01 PREPARATION

A. Ensure proper orientation of the structure to accommodate pipes.

B. Immediately prior to placement in the excavation, precast concrete structures shall be inspected in the presence of the Engineer to verify that they are internally clean and free of damage. Damaged units shall be removed from the construction site and replaced, at no additional cost to the Authority. Subject to the approval of the Engineer, damaged precast concrete structures may be repaired in a manner that ensures that the structure will conform to the requirements of this Section and its intended use. Acceptance of repaired units is at the sole discretion of the Engineer.

3.02 INSTALLATION

A. Excavation and Backfill

1. Excavate for manhole or drainage structure in accordance with Section 02221 entitled "EXCAVATION, BACKFILLING AND FILLING" in the location and to depth shown on the Contract Drawings. Provide clearance around the sidewalls of the structure as required for construction.

2. If ground water is encountered, prevent accumulation of water in excavations by methods approved by the Engineer. Manhole or drainage structure shall be placed in a dry trench.

3. Where the possibility exists of a watertight structure becoming buoyant in a flooded excavation, take necessary steps to avoid flotation of the structure.

B. Support and Backfilling

1. Manhole or drainage structure shall be supported at proper grade and alignment on crushed stone bedding or other support system, as shown on the Contract Drawings.

2. Backfill excavation for manhole or drainage structure in accordance with Section 02221 entitled "EXCAVATION, BACKFILLING AND FILLING".

C. Installation of Precast Concrete Sructure

1. To ensure safety, precast concrete structures shall be lifted only at the lifting points so designated by the manufacturer.

2. When lowering manhole or drainage structure into the excavation and joining pipe to the structure, take precautions to ensure that the interior of the pipes and structure remains clean.

3. Set precast concrete structure so that it is fully bearing on crushed stone bedding, compacted in accordance with Section 02221 entitled "EXCAVATION, BACKFILLING AND FILLING" or set on other support system as shown on the Contract Drawings.

4. For multiple section structures, lower and set the base section before placing additional sections. Ensure joint integrity by removing all foreign materials from joint surfaces and verify that sealing materials are placed properly. Avoid misalignment by using guide devices affixed to the lower section or as otherwise approved by the Engineer. Joint seal material may be installed at the manufacturer's plant prior to delivering to construction site.

5. Verify that manholes and drainage structures installed satisfy required alignment and grade.

6. Remove knockout or core the structure for pipe so as not to create an opening in excess of that required. Fill resultant annular space with mortar cement or with a resilient connector installed in accordance with manufacturer's instructions.

7. Cut pipe to finish flush with interior of structure.

8. Shape inverts through manhole as shown on the Contract Drawings.

D. Installation of Cast-In-Place Concrete Structure

1. Prepare crushed stone bedding or other support system shown on the Contract Drawings, to receive the base slab as specified for precast structures in 3.02 C.3.

2. Erect forms in accordance with Section 03100 entitled "CONCRETE FORMWORK" and ensure that forms are braced against all movement.

3. Furnish and install reinforcing steel in accordance with the details shown on the Contract Drawings and in accordance with Section 03200 entitled "CONCRETE REINFORCEMENT".

4. After formwork and reinforcing steel are inspected and approved by the Engineer, place and cure concrete in accordance with Section 03301 entitled "PORTLAND CEMENT CONCRETE, LONG FORM".

5. Complete installation in accordance with 3.02 C above.

E. Installation of Frame and Cover or Grate

1. Set frame using mortar cement and masonry as shown on the Contract Drawings. Radially laid concrete brick shall have 1/4-inch thick vertical joints at inside perimeter. Lay all concrete brick in a full bed of mortar cement and completely fill all joints. Where more than one course of concrete brick is required, stagger vertical joints.

2. Set frame and cover two inches above finished grade for manhole structure located in unpaved area. Otherwise, set frame and cover flush with finished grade.

3. Set frame and grate flush with finished grade for all catch basins or drainage inlets, unless otherwise shown on the Contract Drawings.

4. Manhole, inlet and catch basin frames, grates, and covers shall be fitted together and match-marked to avoid rocking of covers and grates. All castings shall be set firm and snug and shall not rattle.

3.03 VERTICAL ADJUSTMENT OF EXISTING STRUCTURES

A. Where shown on the Contract Drawings, adjust the elevation of existing manhole or drainage structure to finished grade.

B. Existing frame and grate or cover shall be carefully removed, cleaned of all mortar fragments to the satisfaction of the Engineer and set to the finished grade in accordance with 3.02 E.

C. When removal of an existing reinforced concrete wall is required, the concrete shall be removed so as not to damage the existing reinforcing bars. The bars shall be cleaned of all concrete to the satisfaction of the Engineer and bent into the new concrete top slab or spliced to vertical reinforcement, as shown on the Contract Drawings.

D. Bond new concrete to existing concrete in accordance with requirements specified in Section 03301 entitled "PORTLAND CEMENT CONCRETE, LONG FORM".

3.04 FIELD TESTS

Field tests will be used by the Engineer to evaluate and approve cast-in-place concrete in accordance with Section 03301 entitled "PORTLAND CEMENT CONCRETE, LONG FORM".

3.05 PROTECTION

Protection and curing of concrete shall be in accordance with Section 03301 entitled "PORTLAND CEMENT CONCRETE, LONG FORM".

END OF SECTION

SECTION 02720

MANHOLES AND DRAINAGE STRUCTURES

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Construction and Installation Procedures

02720G01 Submit plans, methods, equipment and procedures as applicable for:

1.Prevention of accumulation of groundwater as specified in 3.02.

2.Methods other than guide devices to avoid misalignment of joints during installation of precast concrete structures as specified in 3.02.

3.Methods to prevent flotation of watertight structures as specified in 3.02.

4.Installation of resilient connectors as specified in 3.02 C.6.

Calculations

02720H01 Submit design calculations prepared by a Professional Engineer, licensed in the State where the Work is being performed:
1. For design of substitute manhole or drainage structure. Calculations shall demonste that the substituted design is equivalent to the design shown on the Contract Drawings.

END OF APPENDIX "A"

DIVISION 2

SECTION 02722

STORM DRAINAGE SYSTEM

(INFILTRATION/EXFILTRATION TESTING NOT REQUIRED)

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for exterior storm drainage systems not requiring infiltration/ exfilitration testing.

B. Definition of terms relating to Reinforced Concrete Pipe and Plastic Pipe shall be in accordance with ASTM C 822 and ASTM D 883 respectively.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Society for Testing and Materials (ASTM)

ASTM A 746	Ductile Iron Gravity Sewer Pipe
ASTM C 76	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 117	Test Method for Material Finer Than .075mm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 150	Portland Cement
ASTM C 443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 507	Reinforced Concrete Elliptical Culvert Storm Drain and Sewer Pipe
ASTM C 655	Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
ASTM C 822	Terminology Relating to Concrete Pipe and Related Products
ASTM D 883	Standard Terminology relating to Plastics
ASTM D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity-Flow Applications
ASTM D 3212	Standard Specification for Joints for Drain and sewer Plastic Pipes Using flexible Elastometric Seals
ASTM F 2306	12 to 60 in. Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity Flow Storm Sewer and Subsurface Drainage

application

American Water Works Association (AWWA)

AWWA C 104	Cement- Mortar Lining for Ductile-Iron Pipe Fittings for Water
AWWA C 105	Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids
AWWA C 110	Ductile-Iron Fittings, 3 Inch Through 48 Inch, for Water and Other Liquids
AWWA C 111	Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

1.03 QUALITY ASSURANCE

A. Any entity performing the Work of this Section shall have at least three years of installation experience on projects with piping systems of types and sizes similar to that required under this Contract.

B. Pipe will be visually inspected by the Engineer when delivered to the construction site. Damaged material or material not meeting the requirements of this Section shall be removed from the construction site and replaced at no additional cost to the Authority.

C. Pipe may be inspected at the place of manufacture by the Engineer.

1.04 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's instructions for unloading, storing and moving pipe.

B. Care shall be taken when storing pipe and appurtenances so as not to damage Authority or other public or private property, and any property so damaged shall be repaired at the Contractor's expense.

1.05 SUBMITTALS

For Submittals, see Appendix "A".

PART 2. PRODUCTS

2.01 MATERIALS

Use any of the pipe sytems specified below unless otherwise shown on the Contract Drawings.

A. Reinforced Concrete Pipe

1. ASTM C 76, Class V, Wall B or Wall C for Circular Reinforced Concrete Pipe, ASTM C 507, Class HE-IV for Horizontal Elliptical Pipe and Class VE-VI for Vertical Elliptical Pipe, unless otherwise shown on the Contract Drawings. Use ASTM C 150, Type II Portland cement. Pipe joints shall be tongue and groove or bell and spigot, and shall be sealed with a continuous gasket. Lifting holes in pipe will not be permitted.

2. Pipe joints shall be sealed with rubber gaskets. Design of joints and physical requirements for rubber gaskets shall conform to ASTM C 443. Rubber gaskets shall be the following types of rubber gaskets, manufactured by Hamilton Kent Manufacturing Co., Toronto, Ontario or approved equal:

a. "Tylox Type C" for straight tongue and groove pipe

b. "Tylox Superseal " for offset pipe

c. "Tylox Type 0" for recessed pipe

B. Ductile Iron Pipe

1. ASTM A 746, minimum wall thickness Class 50 unless otherwise shown on the Contract Drawings, with push-on joints, and cement mortar lining, which shall be twice the standard thickness in AWWA C 104.

2. Joints shall be sealed with continuous ring rubber gaskets conforming to AWWA C 111.

3. Polyethylene Encasement for Ductile Iron Sewer Pipe: AWWA C 105, Class C polyethylene, 8-mil thickness.

C. Corrugated Polyethylene Pipe

1. ASTM F 2306, high density Polyethylene pipe, joints shall be bell and spigot and sealed with a continuous gasket.

2. Pipe joints shall be sealed with continuous ring rubber gaskets and conforming to ASTM F 477 and meet the requirements of ASTM D 3212.

C. Crushed Stone for Pipe Bedding

Crushed limestone, gneiss, trap rock or recycled Portland cement concrete aggregate conforming to ASTM C 33, size number 67. Recycled concrete aggregate shall contain not less than 90 percent crushed Portland cement concrete and shall be in accordance with the requirements of the Section 02231 entitled "AGGREGATE BASE COURSE".

PART 3. EXECUTION

3.01 EXAMINATION

Where the storm drain is to cross existing utilities, the Contractor shall verify their elevation and horizontal location through excavation of the test pits shown on the Contract Drawings.

3.02 INSTALLATION

A. Excavation

1. Excavate pipe trench in accordance with Section 02221 entitled "EXCAVATION, BACKFILLING AND FILLING" in the location and to the depth shown on the Contract Drawings.

2. In the course of excavation, should the trench or subtrench width exceed the outside diameter of pipe plus two feet for nominal diameters up to 18 inches or outside diameter plus three feet for nominal diameters in excess of 18 inches, the Engineer may require remedial measures to reduce the load on the pipe such as the use of concrete cradle or concrete arch bedding, or reinforced concrete encasement. Or the Engineer may require the Contractor to substitute a stronger pipe capable of withstanding the increased load such as ASTM C 655 or ASTM A 746. A subtrench is defined as a trench excavated for pipe placement within a wider trench.

3. If ground water is encountered, prevent accumulation of water in trench by methods approved by the Engineer. Pipe shall be laid in a dry trench.

B. Pipe Support and Backfilling

1. Where concrete cradles are shown on the Contract Drawings, support the pipe at proper alignment and grade, place concrete (as specified in the Section entitled "CONCRETE") to dimensions shown and vibrate same. Concrete, when cured, shall support the full length of pipe.

2. Where crushed stone bedding is shown on the Contract Drawings, place and compact crushed stone bedding material in the bottom of the trench to provide a firm but slightly yielding surface and to an elevation such that pipe laid on same will be at the proper grade and alignment. Make suitable excavations for the pipe bells, where applicable so that the bottom reaction and support are confined to the pipe barrel. After installation of pipe on the compacted layer, place and compact additional bedding material in small lifts to the dimensions shown.

3. a. Reinforced Concrete Pipe and Ductile Iron Pipe

Continue backfilling of the trench from the pipe support limits reached in 3.02 B.1 and 2 above in accordance with the Section entitled "EXCAVATION, BACKFILLING AND FILLING".

b. Corrugated Polyethylene Pipe

Place pipe embedment and backfilled in accordance with ASTM D 2321.

C. Polyethylene Encasement for Ductile Iron Pipe

1. Install polyethylene encasement on all ductile iron pipes using one of the installation methods described in AWWA C 105.

2. Pipe surface shall be totally cleaned prior to installation of the polyethylene encasement. During installation, care shall be exercised to prevent soil or bedding material from becoming trapped between the pipe and the polyethylene encasement.

3. The polyethylene film shall be fitted to the contour of the pipe to effect a snug, but not tight, encasement with the minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, or fittings, and to prevent damage to the polyethylene due to backfilling operations.

4. Overlaps and ends shall be secured with adhesive tape, string or plastic tie straps to hold the polyethylene encasement in place until backfilling operations are complete.

D. Pipe Installation

1. Immediately prior to placement in the trench, all pipe shall be inspected in the presence of the Engineer to verify that it is internally clean and free of damage. Damaged units shall be removed from the construction site and replaced to the satisfaction of the Engineer, at no additional cost to the Authority.

2. When lowering pipe into the trench and joining the units, take precautions to ensure that the interior of the pipeline remains clean.

3. Lay pipe true to line and grade, with uniform bearing under the full length of its barrel, without break from structure to structure, and with bell or grooved end facing upgrade. Adjustments to line and grade shall be made by scraping away or adding bedding material under the pipe.

4. Prior to start of construction, the method for control of alignment and grade shall be submitted for approval. The method shall be a laser system or gradeboard setup to establish a reference grade and alignment control directly above or within the pipe. Use of other equipment may be substituted if, in the opinion of the Engineer, the alternate system produces equivalent accuracy.

5. Make up pipe joints in accordance with the manufacturer's instructions and taking extreme care that joints are clean and free of foreign materials. Support pipe free of the bedding during the joining process to avoid disturbing the subgrade.

6. In large diameter sewers with compression-type pipe joints, or where considerable force will be required to insert the spigot fully into the bell, come-alongs and winches or other equipment may be rigged to provide the necessary force. Inserts shall be used to prevent the sewer pipe from being thrust completely home prior to checking gasket location. After the gasket is checked, the inserts shall be removed and the joint completed.

7. Close all openings in the pipeline with watertight plugs when pipelaying is stopped at the conclusion of the work period or if work is interrupted for any reason.

8. Install polyethylene encasement prior to backfilling ductile iron pipe.

3.03 PROTECTION

A. Care shall be taken not to damage or displace installed pipes and joints during construction of pipe supports, backfilling and other operations.

B. Where pipe is damaged or displaced, take remedial measures as directed by the Engineer including but not limited to relaying pipe or replacing the pipe and/or testing of joints. All such remedial measures shall be performed at no additional cost to the Authority.

END OF SECTION

SECTION 02722

STORM DRAINAGE SYSTEM (INFILTRATION/EXFILTRATION TESTING NOT REQUIRED)

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

02722A01 Submit catalog cuts of gaskets for pipejoints including manufacturer's installation instructions.

Record Documents

02722M01 Submit "As Built" drawings in accordance with the Section entitled "UTILITY RECORD DRAWINGS" of Division 1 of the Specifications.

END OF APPENDIX "A"

DIVISION 2

SECTION 02920

SOIL TESTING

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for subgrade preparation and the testing of on-site fill material prior to seeding and/or planting operations.

1.02 DESIGN AND PERFORMANCE REQUIREMENTS

A. As a guide to determine local weather predictions use the National and Local Forecast, Hurricane, Radar and Report website at http://www.weather.com as published by the Weather Channel.

B. Soil Testing Procedures shall be as per "Recommended Soil Testing Procedures For The Northeastern United States, Current Edition, Northeastern Regional Publication No. 493 as provided by the Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Obtain soil samples only during the following weather conditions:

1. There shall be no frost in the ground and the soil temperature shall be above 32 degrees F.
2. There shall be no form of precipitation falling or forecast to fall within the next two hours. Following a period of precipitation, resume operations only after the soil has drained.

1.04 QUALITY ASSURANCE

A. Qualifications

1. Verify that the laboratory performing the soil testing of this Section is a certified testing laboratory such as the Rutgers Soil Testing Laboratory, Rutgers Cooperative Research & Extension, New Jersey Agricultural Experiment Station, Milltown, NJ 08850 or an approved equal in either the States of New Jersey or New York, that it has experience in soil testing for soil properties important for plant and turf management and that is capable of performing a "Technical Topsoil Evaluation" as specified in 2.01 and in accordance with Appendix B of this Section.

B. Test Requirements

1. Prior to seeding and/or planting, submit a representative sample of on-site soil material for analysis to a certified independent laboratory to ensure conformance to requirements specified in 2.01.

2. Provide the number of soil samples to the testing laboratory in accordance with 1.04 B3. No substitutions for testing parameters will be permitted.
3. Take samples only in the presence of the Engineer and at sites ready for planting operations to commence.
4. Provide a minimum of three (3) test samples representative of the range of existing soil found within areas to receive seed.
5. Allow a minimum of 2 weeks for processing soil analysis at the testing laboratory.
6. Identify the type of "crop" to be grown as "Lawn" with each test sample requisition sent to the testing laboratory in order to obtain recommendations for nutrient and pH adjustments.

C. Do not commence seeding and/or planting until the Engineer has approved in writing the certified results of the soil analysis and recommendations from the approved soil testing laboratory for the representative samples and approved a report from the Contractor verifying that the Contractor has reviewed the soil analysis and will comply with the recommendations.

1.05 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Soil Testing conforming to the following:

1. Soil to be tested shall be of uniform quality, free from hard clods, stiff clay, hard pan, sods, partially disintegrated stone, lime, cement, ashes, slag, concrete, tar residues, tarred paper, boards, chips, sticks, glass or any other undesirable material.
2. Provide a soil nutrient analysis providing the percentage Nitrogen (N), Phosphorus (P) and Potassium (K) in pounds per Acre.
3. Provide soil micronutrient analysis providing the percentage of Zinc, Copper, Manganese, Boron and Iron, in parts per million.
4. Provide a soil analysis for organic matter as determined by loss on ignition of moisture-free samples.
5. Provide soil pH range.
6. Provide soluble salts in micromhos per centimeter.
7. Soil shall be graded as follows:

PASSING	RETAINED ON	PERCENTAGE
1" screen		100%
1" screen	2 mm (No. 10) Sieve	%*

*The portion retained shall be no larger than 3/8" in size and composed of homogeneous clods and/or stones.

8. Provide a mechanical analysis of the portion of soil passing the 2 mm sieve, based on the mechanical analysis of the soil as determined by the Bouyoucous Hydrometer method, and shall consist of the following, based on dry (air-dried only) weight of sample:
   a. Sand min% - max%, inclusive;
   b. Silt min% - max%, inclusive;
   c. Clay min% - max%, inclusive.
9. Provide recommendations for pH adjustment, fertilization and micronutrients.

PART 3. EXECUTION

3.01 PREPARATION

A. Soil Sample(s) Taken From Areas of Changed Grades

Verify that areas of changed grades shown on the Contract Drawing have a smooth, uniform surface and finish grade elevations (excepting the addition of soil amendments) have been established.

1. Obtain grab samples for the minimum of test samples representative of the range of existing soil found within the each, separate area of existing soils to receive seed.
2. Grab sample shall be made up of a two-pound sample, each.
3. Remove stones over two inches in any dimension, roots, rubbish and other extraneous materials from the sample.
4. Implement all soil recommendations received from the soil testing laboratory.
5. Do not commence with any planting or soil related activities prior to receipt of written acceptance of the soil sample analysis and recommendations, by the Engineer as per 1.04 and 2.01.

B. Soil Sample(s) Taken From Unaltered Areas

Verify that subgrade areas shown on the Contract Drawings are unaltered or undisturbed by excavation, grading or stripping operations as follows:

1. Follow steps listed in 3.01 A., 1-4 above.

C. Soil Sample Results

1. Submit all soil sample analyses listed in 2.01 above.

END OF SECTION

SECTION 02920

Soil Testing

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Certificates

02920E01 Submit to the Engineer certification required by 1.04 A & B.

Qualifications

02920K01 Submit qualifications of the entity performing the laboratory testing of this Section to the Engineer in accordance with 1.04 A. Include the name, address and telephone number of the testing laboratory performing the Work of this Section.

Information

02920S01 Submit laboratory analyses of soil and the results of the "Technical Topsoil Evaluation" to the Engineer, in accordance with 1.04, 2.01 and Appendix B.

END OF APPENDIX "A"

SECTION 02920

SOIL TESTING

APPENDIX "B"

The following is a sample testing form to be used by the Contractor:

Material: Soil

Specification: Section 02920 – "Technical Topsoil Evaluation"

Crop: Lawn

Source of Sample:

Contract or P.O.#:

Quality Characteristics:	Spec.		
Visual Examination:	No hard clods, etc.		
Nutrients: Inorganic Nitrogen-Nitrate (ppm)			
Nutrients: Inorganic Nitrogen-Ammonium (ppm)			
Total Kjeldahl Nitrogen (%)			
Nutrients: P (pounds/acre)			
Nutrients: K (pounds/acre)			
Micro Nutrients: Zinc (ppm)			
Micro Nutrients: Copper (ppm)			
Micro Nutrients: Manganese (ppm)			
Micro Nutrients: Boron (ppm)			
Micro Nutrients: Iron (ppm)			
Organic Matter: (Loss of Ignition)	Min. % Max. %		
Soluble Salts: - Micromhos/Cm - PPM	Max. Max.		
pH:			
Mechanical Analysis: Passing - 1"	100%		
Passing - 1" Retain 2 mm (#10)	Max. % The portion retained shall be no larger than 3/8" in size and shall be composed of homogeneous clods and/or stones		
Passing 2mm (#10)	Min. %		

Retain Pan			
Bouyoucous Hydrometer Test of Material:			
Passing 2 mm (#10) Percent - Sand	min%-max%		
Percent – Silt	min%-max%		
Percent – Clay	min%-max%		

END OF APPENDIX "B"

DIVISION 2

SECTION 02930

SEEDING (NEW YORK)

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for endophyte seed and dust retardant at airports.

1.02 DEFINITIONS

A. The term "Blue Tag Certified" refers to the original certification tag, blue in color, which certifies that the seed was produced in Oregon, of the latest crop, bearing the lot number that matches the lot number on the Oregon State University Seed Laboratory Report of Seed Analysis.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Use product-testing methods adopted and published by the Association of Official Analytical Chemists, 1111 19th Street Suite 210, Arlington, VA 22209.

B. As a guide to determine local weather predictions, use the National and Local Forecast, Hurricane, Radar and Report website at http://www.weather.com as published by the Weather Channel.

C. Seed and installation practices shall comply with Federal Aviation Administration (FAA) Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants On Or Near Airports, August 28, 2007.

D. Pest control for turfgrass shall be in accordance with the "2009 Pest Management Guidelines for Commercial Turfgrass", published by Cornell University, Ithaca, NY. This publication is available from The Resource Center, Cornell University, Ithaca, NY 14853. Telephone (607) 255-9946.

E. Grass seed shall have attached thereto or in a conspicuous place on the exterior of the container a plainly printed label in the English language, in legible type specifying:

1. All endophyte seed lots shall be Blue Tag Certified, produced in Oregon, of the latest crop. The state of origin shall be Oregon, no exceptions.

2. Submit a copy of the Oregon State University Seed Laboratory Report of Seed Analysis bearing the lot number matching all the bags of seed delivered to the Work site.
3. Submit the name of Seed Company located in Oregon, along with the Blue Tag Certified seed variety, date of harvest and proof of storage in cold and dry conditions of the seed delivered to the Work site.
4. Submit the name and address of the person who labeled said seed, or who sells or offers the seed for sale to the Contractor if the seed being delivered to the Work site is not directly supplied to the Contractor from the originating seed company from Oregon.
5. Submit certification and the date seed was shipped, from 4 above, identifying that the seed delivered to the Work site shall have been shipped directly from Oregon and never stored anywhere else except the production facility in Oregon.
6. Submit the commonly accepted name of the kind or kind and variety, or both, of each agricultural seed component in excess of 5.0% of the whole and the percentage by weight of pure seed of each.
7. Percentage by weight of all weed seeds. Maximum weed seed content shall not exceed 1% by weight.
8. Lot number or other lot identification.
9. The percentage of germination, exclusive of hard seed; hard seed, if present, and the calendar month and year that the germination test was completed. If a single test date is used, it shall be that of the oldest tested component.
10. All delivered endophyte seed shall be fresh seed, having a proof of harvest date, and delivered to the Work site for immediate application. Seed delivered to the Work site for immediate application exceeding two months from the date it left storage in Oregon shall not be accepted. (See 1-5 above)
11. Any bag of seed without a blue tag and corresponding Oregon State University Seed Laboratory Report of Seed Analysis bearing the lot number matching all the bags of seed delivered to the Work site will be rejected by the Engineer and the Contractor shall immediately remove it from the Work site and replace with seed that complies with this Specification.
12. The percentage of endophyte level shall meet or exceed the level specified herein. Any test results as per 1.05 B. 4 of the bags of seed with a seed label indicating that the percentage level of endophyte is less than specified will be rejected by the Engineer and the Contractor shall immediately remove it from the Work site and replace it with seed that complies with this Specification.

F. Fertilizer application for turfgrass shall be as per all federal, state and local regulations.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Perform operations only during the following weather conditions:

1. There shall be no frost in the ground and the soil temperature at each planting area shall be above 32 degrees F.

2. There shall be no form of precipitation falling or forecast to fall within the next two hours. Following a period of precipitation, resume operations only after the soil has drained.

3. Apply chemicals only when wind velocity is below 5 mph, drift hazard is negligible, the air temperature is above 40 degrees F and below 70 degrees F.

4. Do not perform any product application if precipitation has fallen within two hours prior to the planned application time or is forecast during the next 12-hour period.

B. Seeding Calendar Limitations

Seed as per Appendix "B" of this Section.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Verify that the entity and its workers performing the Work of this Section are experienced in seeding and have been engaged in work of a complexity similar to that required under this Section for a period of at least three years.

2. Verify that the entity performing pesticide applications has a valid license as a commercial applicator from the state in which the Work is being performed.

3. Verify that the entity performing the Work has a Brillion Turfmaker II Seeder to install the seed for this Work. Hydroseeding will not be permitted to be used.

4. Verify that the entity performing the Work has a Hydromulcher with a "mechanical agitator paddle" as manufactured by one of the following: Aqua Mulcher, Bowie, Finn, Kincaide or Turfmaker. A hydromulcher that uses "jet agitation" will not be permitted to be used. See Section 02936 – Hydaulically-Applied Erosion Control – High Performance Flexible Growth Medium.

B. General Requirements for Operations and Products

1. After delivery to the construction site, allow the Engineer, at his discretion, to take for analysis representative samples of any item listed in PART 2 - PRODUCTS.

2. Seed

a. Submit all the information specified in 1.03 E 1 -12 to the Engineer for review and approval prior to delivery to the Work site.

b. Do not furnish or plant the following turfgrasses under any circumstance:

Winter Wheat

Tall Fescue Grass with less than 90% Endophyte levels.

Tall Fescue Grass without Endophyte

Kentucky Blue Grass

Buffalo Grass

Bent Grass

Bermuda Grass

Fine Fescue Grass

Annual Rye Grass

Perennial Rye Grass with less than 90% Endophyte levels

Perennial Rye Grass without Endophyte

Native Grasses

3. Fertilizer

a. The application of fertilizer containing a maximum of 0.67% phosphorus is not restricted in New York. Fertilizer containing more than 0.67% phosphorus can only be used if a new lawn is being established or if a soil testing indicates that it is necessary.

b. Do not apply fertilizer applications between December 1 and April 1 or any time when the ground is frozen.

c. Do not apply fertilizer during or just before a heavy rainfall or onto an impervious surface.

d. Apply only a fertilizer with a Water Insoluble Nitrogen (WIN) and other clearly marked sources of Slow Release Nitrogen equal to or greater than specified herein under PART 2 – PRODUCTS.

e. Apply fertilizer only at rate specified herein under PART 3 – EXECUTION or as recommended in the analysis issued by the New Jersey Agricultural Experiment Station at Rutgers, the State University, whichever provision recommends the least amounts of N, P & K.

f. Do not apply fertilizer within 20 feet of any surface water except: where there is a vegetative buffer of at least 10 feet; or where the fertilizer is applied by a device with a spreader guard, deflector shield or drop spreader at least three feet from surface water.

g. Prior to application of any fertilizer containing phosphorous, submit the results from the "Technical Topsoil Evaluation" from the Rutgers Soil Testing Laboratory as specified in Section 02920 – Soil Testing of the soil to be fertilized to determine the need for phosphorous. Apply only the amount of phosphorous recommended in the analysis issued by the New Jersey Agricultural Experiment Station at Rutgers, the State University.

h. Submit to the Engineer for his review and approval the fertilizer label including the chemical trade name, the full chemical analysis (N, P, K, WIN & other slow release % for N) and application rate.

4. Pesticide

a. Select specific pesticide(s) to act on identified pest and use the manufacturer's recommended formula, application rate and safety instructions at all times.

b. Prepare and maintain all records that are or may be required by Federal, State or Local laws. Submit copies of these records to the Engineer within 5 days when so requested.

c. Not less than forty-eight hours prior to a proposed spray operation, submit to the Engineer for his review and approval a tabulated list indicating the target to be treated, the chemical trade name and quantity of mix being prepared.

5. Testing for Endophytes

a. Submit the test result for "Seed Immunoblot Assay Testing". No later than two months prior to delivery of endophyte seed to the Work site, submit a sample of seed for testing in accordance with Appendix "B" and submit the results to the Engineer prior to delivery. Submit a minimum of one (1) pint of seed per every twenty (20) bags of seed delivered to the Work site.

b. Submit the test results for "Seed Grow-out Testing". No later than two months prior to delivery of endophyte seed to the Work site, submit a sample of seed for testing in accordance with Appendix "B" and submit the results to the Engineer prior to delivery. Submit a minimum of one hundred (100) seeds per every twenty (20) bags of seed delivered to the Work site.

c. Submit the test results for "Tiller Testing". No later than two months after on-site germination, submit tiller samples for testing in accordance with Appendix "B" and submit the results to the Engineer. Submit a minimum of fifty (50) tillers per every one (1) Acre of seeded area.

6. Soil Testing

a. Submit to the Engineer the "Technical Topsoil Evaluation" from the Rutgers Soil Testing Laboratory as specified in Section 02920 – Soil Testing. "Technical Topsoil Evaluation" lab request shall specify the crop to be grown as lawn.

b. Perform nutrient controls and pH adjustments as recommended in the "Technical Topsoil Evaluation" for establishing lawn. Nutrient and pH control adjustments shall be performed at no additional cost to the Authority.

c. The Contractor shall utilize the recommendations and information provided from the "Technical Topsoil Evaluation" to perform the appropriate nutrient and pH control adjustments.

C. Reseeding

1. Replace unsatisfactory seeded areas for a period of six months from the date of rendition of the Certificate of Final Completion. Reseed all areas, at no additional cost to the Authority, that:

a.) are dead

b.) have weed and/or pest infestations

c.) have not provided 85% vegetative coverage as per Appendix "B"

d.) <90% endophyte viability proved by tiller testing performed on seed grow-outs and/or germinated seed at the construction site.

2. Perform replacement of unsatisfactory seeded areas with products and by operations that comply with all requirements of this Specification, and on such date(s) as ordered by the Engineer.

D. Application of Dust Retardant

1. Apply dust retardant on all unsatisfactory seeded areas and/or areas where soil is exposed, but cannot be seeded because the calendar seeding date limits have expired, all in accordance with 3.02 C.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver all products in the manufacturer's unopened containers bearing the trade name, manufacturer's name, weight and analysis.

B. Store products away from moisture and extreme temperatures and in such a manner that their effectiveness will not be impaired.

1.07 SUBMITTALS

See Appendix "A" for submittals requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Nutrient Controls

1. Fertilizer

Granular - 20-0-8, slow release fertilizer conforming to the following or approved equal:

a. Commercial fertilizer 20-0-8, dust-free, homogenous, granular fertilizer as follows:

Guaranteed analysis shall be

20% Nitrogen,

8.2% Ammoniacal Nitrogen

6.0% W.I.N. (water-insoluble nitrogen)*

1.2% Urea Nitrogen

4.6% Water Soluble Nitrogen*

(*10.6% slowly available Nitrogen from Methylene Ureas)

8% Potash (K_2O)

1.0 % Iron (Fe) (0.1% water soluble Iron)

2. Soil pH adjustment

a. Aqua-pHix

A blend of chelated, buffered acid, spray applied to alkaline soil to reduce high pH soils as manufactured by Profile Products, LLC, Buffalo Grove, IL 60089.

Aqua-pHix is available from the following suppliers:

(1) Pinelands Nursery, Columbus, NJ 08022

(2) All Pro Horticulture, Copiague, NY

(3) ACF Environmental, Brookfield, CT 06804

(4) Merritt Seed Company, Syracuse NY

(5) Pennington Seed, Laurel, MD 20723

b. Elemental Sulfur

Guaranteed analysis shall be

0% Nitrogen

0% Phosphorus

0% Potassium

90% Sulfur

B. Turf Seed

1. Turf seed shall be the latest crop, clean, pure and free of noxious weed seed, of the variety and mix in accordance with Appendix "B" and to 1.03 E. 1- 12 and 1.05 B. 5.

2. Turf seed shall have a demonstrated cultivar performance, which includes Lateral Spread Technology (LS), high levels of rhizome expression, high density, insect resistance, greater than 90% viable endophyte and superior stress tolerance.

C. Dust Retardant

1. "Coherex" as manufactured by Golden Bear Division of the Witco Corporation, Chandler, AZ 85244

2. "Soil-Sement" as manufactured by Midwest Industrial Supply, Inc., Canton, OH 44711

3. "Soil Seal Concentrate" as manufactured by Soil Seal Corporation, Los Angeles, CA 90017

4. Or approved equal.

D. High Performance Flexible Growth Medium

1. See Section 02936 – Hydraulically-Applied Erosion Control: High Performance Flexible Growth Medium

PART 3. EXECUTION

3.01 PREPARATION

A. Areas of Changed Grades

Verify that areas of changed grades, which are to be seeded as shown on the Contract Drawings, are in conformance with the grading plans and have a smooth, uniform surface. Rototill to a minimum six (6) inch depth. Remove stones over two inches in any dimension, roots, rubbish and other extraneous materials. Limit preparation to areas, which will be seeded promptly after preparation.

B. Sustainable Measures

Remove all debris resulting from the soil preparation operations promptly. Thoroughly clean the Work area to the satisfaction of the Engineer. Remove and transport off Authority property all debris materials resulting from the soil preparation operation in accordance with Division 1 clause entitled "Recycling of Construction Debris Materials".

B. Formulation, Application and Equipment

1. Use the manufacturers recommended formula, application rate and safety instructions at all times.
2. Mix and agitate products and use equipment according to the manufacturer's directions. Mix and agitate only in an area designated by the Engineer.
3. Dispose of spilled materials and surplus products away from Authority property.

C. Erosion Control and Sedimentation Measures

Apply erosion and sediment control measures at all times as required by this Contract and the governing regulatory agencies.

3.02 INSTALLATION

A. Seeding Operations

1. Apply 2-inches of Compost as per Section 02960 – Adding Compost.
2. Apply a liquid form of "Soil pH adjustment" such as Aqua pHix per the results of Section 02920 – Soil Testing of the existing soil and as per the manufacturer's instructions, to all areas to be seeded if PH adjustments are required in accordance with Section 02920 – Soil Testing.

3. Apply 20-0-8 fertilizer, uniformly by machine at the rate of 1 pound of Nitrogen per 1000 square feet or per the results of Section 02920 – Soil Testing of the existing soil and as per the manufacturer's instructions worked lightly into the top six inches of soil, to all areas to be seeded if nutrient adjustments are required in accordance with Section 02920 – Soil Testing.

4. Sow grass seed at the rate provided in Appendix B "Permanent Seeding" of this Section and cover in such manner that a uniform stand would result.

5. Seed the area uniformly in two passes using a Brillion Turfmaker II Seeder and in uniform rows that cross each other at an angle of 30 degrees. Apply seed at designated seeding rates for both passes as per Appendix B "Permanent Seeding".

6. For areas too small for the use of a Brillion Turfmaker II Seeder, apply seed at the designated seeding rates per 1000 square feet with a broadcast spreader.

7. Hydroseeding will not be permitted.

B. Mulching Seeded Areas

1. See Section 02936 – Hydraulically Applied Erosion Control: High Performance Flexible Growth Medium

C. Application of Dust Retardant

1. Apply dust retardant on all completed areas that have not been seeded and/or where seed germination is less that 50% after 3 weeks from date seed was sown and when the calendar seeding date limits (See Appendix "B") have expired and seeding can no longer be performed or as approved by the Engineer.

2. Apply dust retardant with an approved pressurized sprayer with a rating of 40-60 PSI.

3. Do not apply dust retardant if precipitation is forecast within 24-hours after application.

4. Apply dust retardant as many times as necessary to control stormwater and wind erosion, all at no additional cost to the Authority.

D. Care of Seeded Areas

As per Appendix "B" of this Section, provide "Full" Care conforming to the following:

1. Full Care

Upon completion of seeding operations, maintain seeded area(s) in accordance with Appendix "B" for Permanent Seeding of this Section.

END OF SECTION

SECTION 02930

SEEDING

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Product Data

02930D01 Submit in accordance with the requirements of "Inspections and Rejections" of Division 1 - GENERAL PROVISIONS, a complete "Product List", listing all products to be used under this Section.

02930D03 Submit for approval to the Engineer the seed requirements in accordance with 1.03 E, 1-11.

Manufacturer Test Reports

02930F01 1. Submit to the Engineer the Oregon State University Seed Laboratory Report of Seed Analysis bearing the Lot number matching all the bags of seed delivered to the Work Site.
2. Submit to the Engineer the test results for Endophyte level analysis as specified in 1.05 B 4.
3. Submit to the Engineer the test results for "Landscape Level 3 Topsoil Evaluation as specified in Section 02920 and 1.05 B. 5 of this Section.
4. Submit to the Engineer the test results for the nutrient controls as recommended in the "Landscape Level 3 Topsoil Evaluation" as specified in Section 02920 " Crop – Lawn".

02930F02 1. Submit to the Engineer the Oregon State University Seed Laboratory Report of Seed Analysis bearing the Lot number matching all the bags of seed delivered to the Work Site.

2.Submit to the Engineer the test results for Endophyte level analysis as specified in 1.05 B 4.

3.Submit to the Engineer the test results for "Landscape Level 3 Topsoil Evaluation as specified in Section 02920 and 1.05 B. 5 of this Section.

4.Submit to the Engineer the test results for the nutrient controls as recommended in the "Landscape Level 3 Topsoil Evaluation" as specified in Section 02920 " Crop – Lawn".

Qualifications

02930K01 Submit qualifications of the entity and its workers performing the Work of this Section to

the Engineer in accordance with 1.05 A. Include names of clients, telephone numbers, and contract amounts for work performed in the last three years and experience records of workers performing the Work of this Section.

Information

02930S01 Submit evidence of a valid pesticide applicator's license.

02930S02 Submit a list of equipment owned by the entity as listed under 1.05

02930S03 4. Submit a list of contracts or similar scope including contracts using similar construction methods, products and equipment. Provide Contract Name, date of completion, number of acres seeded, Contact Name and Phone Number.

02930S04 Submit for approval by the Engineer, that the entity performing the seeding has a Brillion Turfmaker II Seeder and a hydromulcher in accordance with 1.05 A. 3-4 and verify that it will used for this Contract. Submit for approval by the Engineer, that the entity performing the lawn mowing has a Mulching Mower, in accordance with 1.05 B. 6 and verify that it will be used for this Contract.

END OF APPENDIX "A"

SECTION 02930

SEEDING

APPENDIX "B"

A. SEED MIX

Permanent Seeding

1. Seed Mixture shall have originated in Oregon and be as distributed by F M Brown Seed, Sinking Spring, PA 19608 (800) 345-3344, Lesco, Inc., Mountainside, NJ 07092 (908) 317-0509, Jonathan Green, Farmingdale, NJ, (732) 938-7007, All Pro Horticulture, Inc. ,721 Main Street, Farmingdale, NY 11735, (631) 789-6680 or approved equal and as follows:

Kind of Seed	% Mix:	% Min. Purity:	% Min. Germ:	% Min. Endophyte Infection:
Firecracker LS or Spider LS Tall Fescue	100	99	95	>90

2. Seeding rate shall be 10 pounds per 1000 square feet.
3. Seeding shall be performed only during the following periods:

   Fall planting only - August 16 - October 15 (latest crop, fresh seed, subject to proper storage and testing results)

4. Provide full care upon completion of seeding until issuance of Certificate of Final Completion. Full care shall include irrigation when bi-weekly rainfall does not exceed one (1) inch of rainfall per week at the construction site, at no additional cost to the Authority.
5. Successful seeding shall be defined by the following:
   a. 85% survival of the specified turfgrass at the end of the Full care period as determined solely by the Engineer.
   b. Endophyte test results for tillers that meet the minimum % endophyte viability levels as specified on the "blue tag certified" label and matching Oregon State University Seed Laboratory Report Seed Analysis when submitted to the Engineer.

TESTING LABS/CONTACTS

1.) Oregon State University Seed Laboratory
3291 SW Campus Way
Corvallis, OR 97331-3801
Contact: Dr. Adriel Garay, Lab Manager
e-mail: adriel.garay@oregonstate.edu
Website: www.seedlab.oscs.oregonstate.edu
Tele: (541)-737-4464
Fax: (541)-737-2126
Endophyte Tests offered:

- Seed Testing: Immunoblot assay*
  Lab requires one-pint seed sample
- Seed Grow-out/Plant Tissue Endophyte Analysis*
- Plant Tissue: Grass Tillers Endophyte Analysis*

2.) Plant Diagnostic Lab
New Jersey Agricultural Experiment Station
Rutgers University
P.O. Box 550
Milltown, NJ 08850-0550
Contact: Richard Buckley
Tele: (732)-932-9140
Website: www.njaes.rutgers.edu/services
Endophyte Tests offered:

- Seed Testing: Endophyte Screening*
  Lab requires one pint of seed for testing.
- Plant Tissue: Grass Tiller Endophyte Analysis Test *
  Lab requires minimum of 50 tillers for tissue testing.

* Verify Fees/Sampling Procedures with Lab

END OF APPENDIX "B"

DIVISION 2

SECTION 02936

HYDRAULICALLY-APPLIED EROSION CONTROL:

HIGH PERFORMANCE FLEXIBLE GROWTH MEDIUM

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for the application of flexible growth medium (FGM) at airports.

1.02 DEFINITIONS

A. The term "High Performance-Flexible Growth Medium (HP-FGM)" specifies a hydraulically-applied 100% biodegradable, 100% recycled, thermally processed (within a pressure vessel) wood fibers, crimped, interlocking biodegradable fibers, and performance enhancing additives. The HP-FGM is phytosanitized, free from plastic netting, requires no curing period and upon application forms an intimate bond with the soil surface to create a continuous, porous, absorbent and flexible erosion resistant blanket that allows for rapid germination plant growth.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. As a guide to determine local weather predictions, use the National and Local Forecast, Hurricane, Radar and Report website at http://www.weather.com as published by the Weather Channel.

B.

Property:	Test Method:	Req. Value (English)
Physical		
Mass Per Unit Area	ASTM D6566'	12 oz/yd2 minimum
Thickness	ASTM D6525'	0.22 inch minimum
Wet Bond Strength	ASTM D6818'	9 lb/ft
Ground Cover	ASTM D6567'	99% minimum
Water Holding Capacity	ASTM D7367	1700% minimum
Material Color	Observed	Green
Performance		

Cover Factor(6 in/hr)	ECTC Test Method No.2	0.01 max.
% Effectiveness	ECTC Test Method No.2	99% min.
Shear Stress	ECTC Test Method No.2	1 lb/ft2
Cure time	Observed	0 – 2 hours
Vegetation Establ.	ASTM D7322'	800% min.
Environmental		
Functional Longevity	ASTM D5338	Up to 18 months
Biodegradability	ASTM D5338	100% minimum

1. ASTM test methods developed for Rolled Erosion Control Products and have been modified to accommodate Hydraulically-Applied Erosion Control Products.
2. Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.
3. % Effectiveness = One minus Cover Factor multiplies by 100%.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Perform operations only during the following weather conditions:

1. There shall be no frost in the ground and the soil temperature at each planting area shall be above 32 degrees F.
2. There shall be no form of precipitation falling or forecast to fall within the next two hours. Following a period of precipitation, resume operations only after the soil has drained.
3. Apply chemicals only when wind velocity is below 5 mph, drift hazard is negligible, the air temperature is above 40 degrees F and below 70 degrees F.
4. Do not perform any product application if precipitation has fallen within two hours prior to the planned application time or is forecast during the next 12-hour period.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Verify that the entity and its workers performing the Work of this Section are experienced in applying HP-FGM and have been engaged in work of a complexity similar to that required under this Section for a period of at least three years.
2. Verify that the entity performing the Work has a Hydromulcher with a "mechanical agitator paddle" as manufactured by one of the following: Aqua Mulcher, Bowie, Finn, Kincaide or Turfmaker. A hydromulcher that uses "jet agitation" will not be permitted to be used.

B. General Requirements for Operations and Products

1. After delivery to the construction site, allow the Engineer, at his discretion, to take for analysis representative samples of any item listed in PART 2 - PRODUCTS.

2. Submit certification from the manufacturer of HP-FGM that the installation meets or exceeds the required product preparation and application rates.

3. Submit the total number of bags of HP-FGM, applied at the minimum rate of 3000lbs per Acres furnished and installed at the construction site in accordance with the amount of square feet of area prepared by the Contractor for seed.

4. Submit one copy of the U. S. Department of Labor Material Safety Data Shets (MSDS) and product labels for HP-FGM.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver all products in the manufacturer's unopened containers bearing the trade name, manufacturer's name, weight and analysis.

B. Store products away from moisture and extreme temperatures and in such a manner that their effectiveness will not be impaired.

1.07 SUBMITTALS

See Appendix "A" for submittals requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Flexible Growth Medium

1. "High Performance-Flexible Growth Medium (HP-FGM) as manufactured by Profile Products, LLC. Buffalo Grove, IL 60089.

Or approved equal conforming to the following:

Clean, uniform, nontoxic, and free of seeds, fungi, and other plant pathogens;

Thermally-processed in such a manner as to contain no growth or germination inhibiting factors.

Interlocking crimped polyester fibers combined with wood fiber and crosslinked tackifier having the following physical properties:

Moisture Content	12% +-3
Wood Fiber	80% ± 3%
Locking Fibers	5.0% +-1
Crosslinked Tackifier	10% +-1

Water Holding Capacity	1700% Min
Organic Material	95% Min
pH	4.8 +-2

2. High Performance Flexible Growth Medium is available from the following suppliers:

   a. Pinelands Nursery, 232 Island Avenue, Columbus, NJ 08022

   b. All Pro Horticulture, 55 Motor Avenue, Farmingdale, NY 11735

   c. ACF Environmental, 48 Old Grays Brook Rd., Brookfield, CT 06804

   d. AH Harris & Sons, 17 Commercial Drive, Albany, NY 12205

   e. Pennington Seed, 9327 US RTE 1, Laurel, MD 20723

PART 3. EXECUTION

3.01 PREPARATION

A. Areas of Changed Grades

Verify that areas of changed grades, which are to be seeded as shown on the Contract Drawings, are in conformance with the grading plans and have a smooth, uniform surface. Apply HP-FGM to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope. Do not proceed with installation until satisfactory conditions are established. Limit preparation to areas, which will be seeded promptly after preparation.

B. Sustainable Measures

Remove all debris resulting from the soil preparation operations promptly. Thoroughly clean the Work area to the satisfaction of the Engineer. Remove and transport off Authority property all debris materials resulting from the soil preparation operation in accordance with Division 1 clause entitled "Recycling of Construction Debris Materials".

B. Formulation, Application and Equipment

1. Use the manufacturers recommended formula, application rate and safety instructions at all times.

2. Mix and agitate products and use equipment according to the manufacturer's directions. Mix and agitate only in an area designated by the Engineer.

3. Dispose of spilled materials and surplus products away from Authority property.

C. Erosion Control and Sedimentation Measures

Apply erosion and sediment control measures at all times as required by this Contract and the governing regulatory agencies.

3.02 INSTALLATION

A. Seeding Operations

1. See Section 02930 – Seeding.

B. Hydraulically-Applied Erosion Control of HP-FGM of Seeded Areas

1. Strictly comply with manufacturer's installation instructions and recommendations. Use approved mechanically agitated, hydraulic mulching machines with a fan-type nozzle (50-degree tip).

   a. Fill tank to middle of agitator or tank about 1/3 full of water. Turn on pump to wet or purge lines. Begin agitating. Keep adding water slowly while adding the HP-FGM at a steady rate.

   b. Mix at a rate of 50 lbs of HP-FGM per 125 gallons of water. Verify with the equipment manufacturer the optimum mixing rates for the HP-FGM.

   c. All HP-FGM should be added once the tank is approximately ¾ full.

   d. Thoroughly agitate and mix slurry for at least 10 minutes after adding the last of the HP-FGM to fully activate all the bonding additives and to attain proper viscosity.

   e. Turn off recirculation valve to minimize potential for air entrainment within the slurry.

2. Apply HP-FGM uniformly in successive layers, from two or more directions, to accomplish 100% coverage of the soil surface at following rates:

   a.) Minimum application shall be 4,500 lbs/Acre.

3. Do not over-spray the hydromulch onto runways, taxiways, roadway, sidewalks, signs, fences, gravel swales or any structure or surface feature. Any over-spray found anywhere except where seed is required, shall be thoroughly cleaned and repaired, all at no additional cost to the Authority.

SECTION 02936

Hydraulically-Applied Erosion Control: High Performance Flexible Growth Medium

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Product Data

02936D01 Submit in accordance with the requirements of "Inspections and Rejections" of Division 1 - GENERAL PROVISIONS, a complete "Product List", listing all products to be used under this Section.

02936D02 Submit the total number of bags of FGM, applied at the minimum rate 4500lbs per Acre furnished and installed at the construction site in accordance with the amount of square feet of area prepared by the Contractor for seed.

02936D03 Submit to the Engineer one copy of U.S. Department of Labor Material Safety Data Sheets (MSDS) and product labels for all hazardous chemicals utilized during the Work of this Section.

Certificates

02936E01 Submit certification from the manufacturer of Flexible Growth Medium that the installation meets or exceeds the required product preparation and application rates.

Qualifications

02936K01 Submit qualifications of the entity and its workers performing the Work of this Section to the Engineer in accordance with 1.05 A. Include names of clients, telephone numbers, and contract amounts for work performed in the last three years and experience records of workers performing the Work of this Section.

02936K02 Submit a list of equipment owned and to be used in this Contract in accordance with 1.05 A of this Section.

02936K03 Submit a list of contracts or similar scope including contracts using similar construction methods, products and equipment. Provide Client Name, date of completion, number of acres seeded, Construction Cost, Contact Name and Phone Number.

END OF APPENDIX "A"

DIVISION 2

SECTION 02960

ADDING COMPOST

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for amending soil with compost prior to seeding and/or landscaping.

1.02 DESIGN AND PERFORMANCE REQUIREMENTS

A. Use product testing methods adopted and published by the Association of Official Analytical Chemists, 1111 19th Street Suite 210, Arlington, VA 22209.

B. As a guide to determine local weather predictions, use the National and Local Forecast, Hurricane, Radar and Report website at http://www.weather.com as published by the Weather Channel.

C. Use testing methods for 'Assessing Compost Quality' as provided by the Rutgers Soil Testing Laboratory, Rutgers New Jersey Agicultural Experiment Station, New Brunswick, NJ 08901.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Perform operations only during the following weather conditions:

1. There shall be no frost in the ground and the topsoil temperature shall be above 32 degrees F.

2. There shall be no form of precipitation falling or forecast to fall within the next two hours. Following a period of precipitation, resume operations only after the soil has drained.

1.04 QUALITY ASSURANCE

A. Verify that the entity and its workers performing the Work of this Section are experienced in landscaping and have been engaged in work of a complexity similar to that required under this Section for a period of at least three years. Include names of clients, telephone numbers, and contract amounts for work performed in the last three years and experience records of workers performing the Work of this Section.

B. Test Requirements

1. Submit a representative sample of compost material for analysis to a certified independent laboratory to ensure conformance to requirements specified in 2.01 prior to delivery and at the commencement of each 100 cubic yards of compost delivered to the construction site. No substitutions for testing parameters will be permitted.

2. Take on-site samples only in the presence of the Engineer and at sites ready for operations to commence.

3. Test Soluble salts in Compost utilizing the Saturated Paste Extract method.

B. General Requirements for Operations and Products

1. Products listed in PART 2 - PRODUCTS shall be approved in writing by the Engineer prior to delivery to the construction site.

2. Prior to delivery of compost to the construction site, submit to the Engineer the following:

   a. The location of the source of compost and the name and address of the supplier.

   b. A certified analysis of the compost that it meets the requirements of this Section. Any analysis of which the date of testing by the certified independent laboratory is in excess of one month prior to the actual date of delivery to the construction site will not be accepted.

   c. A ¼ pound sample to the Chief of Materials Engineering.

   d. In the event that the sample/analysis does not conform to the specified requirements, submit additional samples/analyses until the results do conform to this Section, all at no additional cost to the Authority.

3. After delivery to the construction site, the Engineer may, at his discretion, take for analysis representative samples of any item listed in PART 2 - PRODUCTS.

4. At the commencement of each 100 cubic yards of compost delivered to the construction site, the Engineer may, at his discretion, take a sample of compost for analysis to determine if the product is in conformance to this Section.

5. In the event that the analysis of the compost sample is not consistent with the requirements specified in 2.01, remove the delivered compost from the construction site and replace it with material that does conform, all at no additional cost to the Authority.

1.05 DELIVERY, STORAGE AND HANDLING

A. Do not deliver bulk compost to the construction site until the Engineer has approved in writing that the product meets requirements of this Section.

B. Deliver all products in the manufacturer's unopened containers bearing the trade name, manufacturer's name, weight and analysis.

C. Store products away from moisture and extreme temperatures and in such a manner that their effectiveness will not be impaired.

1.06 SUBMITTALS

A. See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Compost

1. Compost shall be derived from leaves and or biosolids, free of viable weed seeds and contain material of a generally humus nature. The product shall not contain any materials toxic to plant growth or produce objectionable odors. Compost shall meet EPA Exceptional Quality Standards and all State Environmental Agency requirements. Variations in the following specified physical properties are not acceptable. Compost shall conform to the following:

Parameters:	Allowable Range:	Test Method:
Moisture Content		Wet Basis
% water	35% - 60%	
% solids	65% - 40%	
pH	5.7 – 7.7	Saturated Media Extract (SME)
Soluble Salt Level		
SME	<5.0 mmhos/cm (ds/m)	Saturated Media Extract
1:5 dilution	<1.5 mmhos/cm (ds/m)	1:5 dilution
Inorganic Nitrogen		
ppm nitrate-N	50 -200 ppm	SME
ppm ammonium-N	6 – 18 ppm	SME
Organic Matter Content	30% - 60%	
Organic Carbon Content	20% - 25%	
Total Kjeldahl	1.0% - 2.5%	
Carbon-to-Nitrogen Ratio	15 – 30:1	
Maturity Index	6 – 8	Solvita Test

*See Appendix "B" for allowable compost application rates based upon soluble salts levels.

PART 3. EXECUTION

3.01 PREPARATION

A. Areas of Changed Grades

1. Areas of changed grades shown on the Contract Drawings that have a smooth, uniform surface, where compost is to be spread:

   a. Rototill existing soil to a depth of not less than six inches to produce a homogeneous mixture of fine texture, free of clods, stones, roots and other extraneous materials. Remove and dispose of such materials away from Authority property.

   b. Rake and drag soil surface to remove high areas and fill depressions.

   c. Limit preparation to areas that will receive compost immediately following preparation.

B. Unaltered Areas

Prepare areas shown on the Contract Drawings as unaltered or undisturbed by excavation, grading or stripping operations as follows:

1. Remove existing vegetation and turf. Dispose of vegetative matter away from Authority property.

2. Rototill to a depth of not less than six inches to produce a homogeneous mixture of fine texture, free of clods, stones, roots and other extraneous materials. Remove and dispose of such materials away from Authority property.

3. Rake and drag to remove high areas and fill depressions.

4. Limit preparation to areas that will receive compost immediately after preparation.

C. Sustainable Measures

Remove all debris resulting from the soil preparation operations promptly. Thoroughly clean the Work area to the satisfaction of the Engineer. Remove and transport off Authority property all debris materials resulting from the soil preparation operation in accordance with Division 1 clause entitled "Recycling of Construction Debris Material".

3.02 INSTALLATION

A. Formulation, Application, and Equipment - General

1. Use the manufacturer's recommended formula, application rate and safety instructions at all times.

2. Mix and agitate products and use equipment according to the manufacturer's directions. Mix and agitate only in an area designated by the Engineer.

3. Dispose of spilled materials and surplus products away from Authority property.

B. Apply a minimum of 2" of compost evenly over area and uniformly incorporate (rototill) into the soil to a minimum depth of six inches.

C. Commence seeding and/or landscaping applications immediately after incorporating compost.

END OF SECTION

SECTION 02960

ADDING COMPOST

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Samples

02960C01 Submit the location of the source of the compost and a two-pound representative sample of compost (ONLY ONE SAMPLE PER SUBMITTAL) to the Chief of Materials Engineering.

Manufacturer Test Reports

02960F01 Submit laboratory analyses of the compost (ONLY ONE ANALYSIS FROM ONE SOURCE PER SUBMITTAL)to the Chief of MaterialsEngineering, Materials Engineering Unit, Port Authority Technical Center, 241 Erie Street, Jersey City, NJ 07310-1397, in accordance with 1.04 B and 2.01 B.

02960F02 Submit laboratory analyses of the compost to the Chief of MaterialsEngineering, Materials Engineering Unit, Port Authority Technical Center, 241 Erie Street, Jersey City, NJ 07310-1397, in accordance with 1.04 B and 2.01 B.

END OF APPENDIX "A"

SECTION 02960

ADDING COMPOST

APPENDIX "B"

COMPOST – SOLUBLE SALTS LEVELS

Use the following table to determine the maximum allowable ECe(dS/m of saturation extract) of compost at the desired application rate:

Desired Use Rate		Salinity (ECe) of On-Site Soil		
Cubic Yards Amendment per 1000 Sq. Ft. for incorporation to 6" depth	Volume Percentage of Amendment	3 dS/m	2 dS/m	1 dS/m
		Maximum ECe of Compost		
1	5	14	28	42
2	11	7	14	21
3	16	5	9. 5	14
4	22	3. 5	7	10. 5
5	27	3	5. 5	8. 5
6	32	2. 5	4. 5	7

Example: If Specification calls for 6 cubic yards compost per 1000/sq. ft. to be incorporated into the top 6" depth, and site soil has an ECe of 2.0. In order to avoid exceeding an ECe of 4 in the final blend, compost ECe should be less than 4.5 dS/m.

END OF APPENDIX "B"

DIVISION 3

SECTION 03100

CONCRETE FORMWORK

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for cast-in-place concrete formwork.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American Concrete Institute (ACI)
ACI 347	Guide to Formwork for Concrete
ACI 117	Standard Specifications for Tolerances for Concrete Construction and Materials
ACI 318	Building Code Requirements for Reinforced Concrete
	American Society for Testing and Materials (ASTM)
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)
	National Forest Products Association (NFPA)
	National Design Specifications for Wood Construction
	West Coast Lumber Inspection Bureau
	American Plywood Association (APA)
	Douglas Fir Plywood Association (DFPA)

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Design calculations shall be prepared by a Professional Engineer licensed in the State where the Work is to be performed. Design calculations shall be made available to the Engineer to facilitate inspection.

B. For wood products furnished for the Work of this Section, the Contractor shall comply with the applicable provisions of "National Design Specifications for Wood Construction" of the National Forest Products Association (NFPA).

C. For all other products furnished for the Work of this section, the contractor shall comply with the reference standards of the local building code.

D. Shop Drawings

1. All formwork and shoring shop drawings shall be signed and sealed by a Professional Engineer licensed in the State where the Work is to be performed. Shop drawings shall be made available to the Engineer to facilitate inspection.

2. Shop drawings shall indicate:

a. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports;

b. Means of leakage prevention for concrete exposed to view in the finished construction;

c. Sequence and timing of erection and stripping, assumed compressive strength at time of stripping, height of lift and height of drop during placement;

d. Vertical, horizontal and special loads in accordance with "Loads" of ACI 347 (Section 2.2) and camber diagrams, if applicable;

e. Notes to formwork erector showing size and location of conduits and pipes embedded in concrete according to ACI 318 (Section 6.3).

1.04 SUBMITTALS

For Submittals - see Appendix "A".

PART 2. PRODUCTS

2.01 MATERIALS

A. Earth Forms

Use only for footings where shown on the Contract Drawings.

B. Lumber Forms

Use for edge forms and unexposed finish concrete. Boards shall be 6 inches or 8 inches in width, shiplapped or tongue and groove, "Standard" Grade Douglas Fir, conforming to the "Standard Grading and Dressing Rules No. 17", of the West Coast Lumber Inspection Bureau. Boards shall be four sides surfaced.

C. Plywood Forms

Use for exposed finish concrete. Forms shall conform to U.S. Product Standard PA 1-66. Each panel shall carry the grade trademark of the American Plywood Association along with the Douglas Fir Plywood Association (DFPA) Quality stamp and shall be full size (4-foot x 8-foot) panels.

1. Plywood for surfaces to receive membrane waterproofing shall be a minimum of 5/8 inch thick and shall be "B-B Plyform Class 1 Exterior" grade.

2. Plywood where "Smooth Finish" is required, as shown on the Contract Drawings, shall be "HD Overlay Plyform Class 1 Exterior" grade, a minimum of 3/4 inch thick.

D. Prefabricated Forms

Prefabricated forms shall be as listed below and where shown on the Contract Drawings:

1. Pan Type Void Forms

   Removable steel or reinforced plastic of sizes and profiles required to produce completed Work shown.

2. Tubular Column Type

   Metal, fiberglass-reinforced plastic, or spirally wound laminated fiber materials; inside surface treated with release agent; of sizes required to produce completed Work shown.

E. Steel Forms

Sheet steel, suitably reinforced and designed for the particular use shown on the Contract Drawings.

F. Form Liners

Smooth, durable, grainless and non-staining hardboard, unless otherwise shown on the Contract Drawings.

G. Framing, Studding, and Bracing

Stud or No. 3 Structural Light Framing grade.

H. Form Ties and Spreaders

Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. No wire ties, wood spreaders or through bolts will be permitted.

I. Form Anchors and Hangers

Anchors and hangers used for exposed concrete shall not leave exposed metal at surface. Hangers supporting forms from structural steel shall be symmetrically arranged on supporting members to minimize twisting or rotation of member. Penetration of structural steel members will not be permitted.

J. Form Coating Agent

Provide one of the following unless otherwise shown on the Contract Drawings:

1. "Arcal-80"; Arcal Chemical Corporation
2. "Synthex"; Industrial Synthetics Company
3. "Nox-Crete Form Coating"; Nox-Crete Company

K. Vapor Retarder

Where shown on the Contract Drawings, 8 mil thick poly-ethylene sheet

L. Bituminous Joint Filler: ASTM D 1751

PART 3. EXECUTION

3.01 PREPARATION

A. Earth Forms

Trench earth forms neatly and accurately and at least 2 inches wider than footing widths shown on the Contract Drawings, unless otherwise indicated. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing. Form sides of footings where earth sloughs. Earth forms shall be tamped firm and cleaned of all debris and loose material before depositing concrete.

B. Formwork – General

Sloped surfaces steeper than 1.5 horizontal to 1 vertical should be provided with a top form to hold the shape of the concrete during placement, unless it can be demonstrated to the engineer that top forms can be omitted. Construct forms to the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials or the placing and vibrating of the concrete shall not throw them out of line or position. Forms shall be strong enough to maintain their shape under all imposed loads. Camber where necessary to assure level finished soffits unless otherwise shown on the Contract Drawings. Carefully verify the horizontal and vertical positions of forms and correct all inaccuracies to the satisfaction of the Engineer before placing concrete in any form. Complete all wedging and bracing before placing concrete.

C. Forms for "Smooth Finish" Concrete

Use steel, plywood or lined board forms. Plywood and form liners shall be clean, smooth, uniform in size and free from damaged edges and holes. Form lining shall have close-fitting square joints between separate sheets and shall not be sprung into place. Sheets of form liners and plywood shall be full size wherever possible and joints shall be taped to prevent protrusions in concrete. Use special care in forming and stripping wood forms to protect corners and edges. All horizontal joints shall be level and continuous. Wood forms shall be kept wet at all times until stripping.

D. Forms for Surfaces to Receive Membrane Waterproofing

Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.

E. Framing, Studding and Bracing

Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood. Framing, bracing, centering and supporting members shall be of ample size and strength to carry safely, without deflection, all dead and live loads to which forms may be subjected, and shall be spaced sufficiently close to prevent any bulging or sagging of forms. Soffits of all beam forms shall be constructed of material a minimum of two inches thick. Concrete out of line, level or plumb will be cause for rejection by the Engineer of the whole Work affected. Distribute bracing loads over base area on which bracing is erected. When placed on ground, protect against undermining, settlement or accidental impact.

3.02 INSTALLATION

A. Tolerances

Formwork shall be constructed so that concrete surfaces shall be within construction tolerances specified in "Standard Specifications for Tolerance for Concrete Construction and Materials" of ACI 117. Tolerances not met will be corrected to the satisfaction of the Engineer at no cost to the Authority.

B. Chamfered Corners

As shown on the Contract Drawings, provide moldings in forms for all chamfering required. Moldings shall be 45-degree right triangles in profile, of size required, milled from wood free from visible defects.

C. Forms Ties

Form ties shall be of sufficient strength and used in sufficient quantities to prevent spreading of the forms. Place ties at least one inch away from the finished surface of the concrete. Leave inner rods in concrete when forms are stripped. Space all form ties to be equidistant, and symmetrical and lined up both vertically and horizontally unless otherwise shown on the Contract Drawings.

D. Cleanouts and Access Panels

Provide removable cleanout sections or access panels at the bottoms of all forms to permit inspection and effective cleaning of loose dirt, debris, and waste material. Clean all forms and surfaces against which concrete is to be placed of all chips, sawdust, and other debris and thoroughly blow out with compressed air just before concrete is placed.

E. Arrangement

Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

F. Construction Joints

Provide a surfaced pouring strip where construction joints intersect exposed surfaces to provide a straight line at joints. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage. Construction joints shall show no overlapping of concrete and shall, as closely as possible, present the same appearance as butted plywood joints. Joints in a continuous line shall be straight, true, and sharp.

G. Embedded Items

Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops and other features. No wood or uncoated aluminum shall be embedded in concrete. Obtain any required information pertaining to embedded items to be furnished for the Work specified in other Sections. Securely anchor all embedded items in correct location and alignment prior to placing concrete. Conduits and pipes, including those made of coated aluminum, must meet the requirements of ACI 318 (Section 6.3). Approved coatings for aluminum shall be as follows unless otherwise shown on the Contract Drawings:

1. Conlux

   Primer - Bond Plex 46 or 66 (water borne urethane)
   Topcoat - Epolon Multi-Mil 39 (epoxy polyamide)

2. Sherwin Williams

   Topcoat - Heavy Duty Epoxy B67/B60B3 (epoxy polyamide)
   Note: self-priming

3. Benjamin Moore

   Primer - Epoxy Rust Inhibitive Primer (epoxy polyamide)
   Topcoat - Epoxy Enamel (epoxy polyamide)

H. Openings for Items Passing Through Concrete

Frame openings in concrete where shown on the Contract Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of Work specified under other Sections. Coordinate all Work of this nature in order that there shall be no unnecessary cutting and patching of concrete. Perform any cutting and repairing of concrete required as a result of failure to provide for such openings at no cost to the Authority.

I. Screeds

Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs. Slope slabs to drain where required or as shown on the Contract Drawings. Before depositing concrete, remove all debris from the space to be occupied by the concrete and thoroughly wet all forms. Remove freestanding water.

J. Screed Supports

For concrete over waterproof membranes and vapor barrier membranes, use screed supports of a cradle, pad or base type which shall not puncture the membrane. Staking through the membrane will not be permitted.

K. Shores and Falsework

Provide shores and falsework of adequate strength to protect persons and adjacent structures. Falsework and supports shall be adequate in size and strength to resist the loads imposed upon them without deformation, deflection, or settlement. All members must be straight and true without twists or bends. Use wedges in pairs or jacks where required to bring forms, shoring, or falsework for beams, girders, slabs, and other parts of the structure to the necessary elevations and uniform bearing before placing concrete. Do not use single wedges. Vertical and lateral loads shall be carried to ground by the formwork system or by bracing. Where shores rest on ground, provide adequate mud sills or other bases. Construct forms to permit their removal without disturbing the original shoring. Ensure that there is no movement of shores, braces or other supports during placement of concrete.

L. Reuse and Coating of Forms

Thoroughly clean forms and reapply form coating before each reuse. For exposed Work, do not reuse any form which cannot be reconditioned to "like new" condition. Discard forms considered unsatisfactory by the Engineer. Apply form coating to all forms in accordance with the manufacturer's specifications, except where "Scored Finish" is required as shown on the Contract Drawings. Do not coat forms for concrete that is to receive a "Scored Finish". Apply form coatings before placing reinforcing steel.

M. Inspection

Notify the Engineer after placement of reinforcing steel in the forms, but prior to placing any concrete, so that his inspection may be made.

3.03 REMOVAL OF FORMS AND SHORES

A. The forms and supporting shoring shall not be removed until the members have acquired sufficient strength to support their weight and the loads superimposed thereon safely and until the time and sequence of removal have been approved by the Engineer. Formwork shall be removed without damage to the concrete, in a sequence that does not allow the members to be subject to impact or loading eccentricities. Any repair required as a result of damage to the concrete shall be made to the satisfaction of the Engineer at no cost to the Authority.

B. Except when otherwise approved by the Engineer, or when minimum attained concrete strengths are specified on the Contract Drawings, forms shall be left in place for not less than the total number of days as specified in ACI 347.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

03100A01 From work and shoring shop drawings for areas accessible to the public and/or concrete exposed to view in the finished construction shall be submitted to the Engineer (as indicated in Section 1.03 D) at least 21 days prior to ordering any material or constructing any formwork.

03100A02 Provide a layout of all embedded items, including electrical and telephoneconduit and lumbing and drainage pipes, at least 15 days prior to concrete placement.

Catalog Cuts

03100B01 Material certifications, brand names and test results (where required) for all formwork materials. Submit at least 35 days prior to concrete placement.

Samples

03100C01 From ties and spreaders with manufacturer's specifications, submit at least 21 days prior to ordering any material.

03100C02 Tapes for form joints with manufacturer's literature;

03100C03 Water stops and premolded expansion joint filler;

03100C05 From coating agent with manufacturer's literature

END OF APPENDIX "A"

DIVISION 3

SECTION 03200

CONCRETE REINFORCEMENT

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for furnishing and installing concrete reinforcement.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M32	Steel Wire, Plain, for Concrete Reinforcement
AASHTO M55	Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
AASHTO M221	Welded Deformed Steel Wire Fabric for Concrete Reinforcement
AASHTO M31	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
AASHTO M284	Epoxy-Coated Reinforcing Steel Bars

American Concrete Institute (ACI)

ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318	Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM A 82	Steel Wire, Plain, for Concrete Reinforcement
ASTM A 184	Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
ASTM A 497	Welded Deformed Steel Wire Fabric for Concrete Reinforcement
ASTM A 615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 767	Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
ASTM A 775	Epoxy-Coated Reinforcing Steel Bars

American Welding Society (AWS)

AWS D 1.4	Structural Welding Code - Reinforcing Steel

Concrete Reinforcing Steel Institute (CRSI)

Manual of Standard Practice Placing Reinforcing Bars

1.03 BRIDGE WORK

For Work of this Section involving bridges, the Contractor shall comply with the applicable provisions of "Standard Specifications for Highway Bridges" of the American Association of State Highway and Transportation Officials (AASHTO). Materials shall be in accordance with AASHTO designations where shown after the ASTM designation in parenthesis. Where not shown, comply with ASTM Designation.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver concrete reinforcement in bundles marked with metal tags indicating size, length and mark number.

B. Store and handle materials to prevent corrosion, damage to coating or contamination that could impair bond.

1.05 SUBMITTALS

For submittals see Appendix "A".

PART 2. PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars: ASTM A 615 (AASHTO M31), deformed, Grade 60, unless otherwise shown on the Contract Drawings.

Coated bars where shown on the Contract Drawings shall comply with the following:

1. Galvanized Reinforcing Bars

ASTM A 767, Class-I hot-dip galvanized, after fabrication and bending.

Repair sheared and cut ends and damaged coating with a zinc-rich formulation conforming to ASTM A 767 in accordance with the material manufacturers' recommendations.

2. Epoxy-coated Reinforcing Bars: ASTM A 775 (AASHTO M284)

Repair sheared and cut ends and damaged coating with an epoxy patching material conforming to ASTM A 775 (AASHTO M284) in accordance with the patching material manufacturers recommendations.

B. Welded Wire Fabric

Types shall be as shown on the Contract Drawings and shall comply with the following:

1. Plain, ASTM A 185 (AASHTO M55), flat sheets for size W5 and larger and coiled rolls for sizes below W5.

2. Deformed, ASTM A 497 (AASHTO M221), flat sheets for sizes D5 and larger and coiled rolls for sizes below D5.

C. Fabricated Steel Bar Mats

Fabricated steel bar mats shall be in accordance with ASTM A 184, when shown on the Contract Drawings, and as follows:

1. Bar grade, size and spacing as shown on the Contract Drawings.
2. Welded connections, unless otherwise shown on the Contract Drawings.

D. Steel Wire

Steel wire shall comply with ASTM A 82 (AASHTO M32), plain finish, unless otherwise shown on the Contract Drawings.

2.02 ACCESSORIES

A. Tie Wire

Provide minimum 16-gage, annealed type. Provide nylon, plastic or epoxy-coated wire for use with epoxy-coated and galvanized reinforcing bars, if any.

B. Supports for Reinforcement

Provide bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use galvanized steel wire bar type supports complying with CRSI standards and as follows:

1. For supporting epoxy-coated reinforcing bars, use plastic coated supports, or supports fabricated from or coated with a dielectric material.
2. For slabs-on-grade, use supports with horizontal plate runners.
3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, use supports with plastic capped legs (CRSI, Class 1).
4. Where architectural concrete is shown on the Contract Drawings, use plastic side form spacers.

2.03 FABRICATION

A. Fabricate concrete reinforcement as shown on the Contract Drawings and on approved shop drawings, in accordance with ACI 315 "Tolerances".

B. Bend all concrete reinforcement cold. Heating of bars or wire fabric is prohibited.

C. Where welding of concrete reinforcement is shown on the Contract Drawings, weld in accordance with AWS Dl.4.

PART 3. EXECUTION

3.01 INSTALLATION

A. Place concrete reinforcement as shown on the Contract Drawings and on approved shop drawings. Where not shown on the Contract Drawings, comply with CRSI "Placing Reinforcing Bars".

B. Clean concrete reinforcement of loose rust, mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support and secure concrete reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support concrete reinforcement by chairs, runners, bolsters, spacers, and hangers in accordance with CRSI Manual of Standard Practice". Do not interfere with placement of embedded items.

D. When a vapor barrier is shown on the Contract Drawings, do not cut or puncture during concrete reinforcement placement.

E. Place concrete reinforcement to obtain covers shown on the Contract Drawings for concrete protection, or in accordance with ACI 318 "Concrete Protection for Reinforcement", if not shown on the Contract Drawings. Arrange, space and securely tie bars and bar supports to hold concrete reinforcement in position during concrete placement operations. Set ties so ends are directed into concrete, not toward exposed concrete surfaces.

F. Install welded wire fabric in lengths as long as practical. Lap adjoining pieces at least one full mesh and lace splices with wire, but in no case shall lap be less than requirements of ACI 318 "Splices of Welded Deformed Wire Fabric in Tension" or "Splices of Welded Plain Wire Fabric in Tension". Offset end laps in adjacent widths to prevent continuous laps in either direction.

G. After concrete placement, do not field bend partially embedded concrete reinforcement except as shown on the Contract Drawings.

H. Repair damaged bars and welds, if any, in accordance with 2.O1A.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

03200A01 Detailed indicating placement, cover, splice locations, lap lengths, mechanical splice hardware, grade, bar size, length, mark number, bending schedule, bending diagram, weld designations, type of coating, material used to repair coating, and types of chairs, spacers, hangers and tie wire for all concrete reinforcement.

Catalog Cuts

03200B01 Catalog cuts for chair, spacers, hangers

03200B02 Spec, Data Sheets for mechanical Splices

03200B03 Spec, Data sheets for repair coatings

Samples

03200C01 Mechanical Splice Hardware

03200C02 Material used to repair coating.

Certificates

03200E01 Certification from the applicator of epoxy that the epoxy-coated reinforcing bars meet the requirements of ASTM A 775 (AASHTO M284).

03200E02 Test results and certification from the galvanizer that the weight, application and testing of zinc coating conforms with specifications and ASTM A 767.

Manufacturer Test Reports

03200F01 Certified mill test reports for all concrete reinforcement.

END OF APPENDIX "A"

DIVISION 3

SECTION 03301

PORTLAND CEMENT CONCRETE, LONG FORM

PART 1. GENERAL

1.01 SUMMARY

This Section and its appendices specify requirements for Portland Cement Concrete mix proportions, materials used in concrete mixes, placing, finishing (with the exception of concrete for pavements), curing, control joints, end result property requirements of the in-place concrete, and the evaluation of these properties through Quality Acceptance testing performed by the Authority for determining Adjustments to Contract Compensation. The Specifications herein establish minimum standards for concrete construction. This does not relieve the Contractor from following more stringent standards to achieve the quality acceptance limits for applicable performance parameters and their respective Percent Within Limit (PWL) measurements.

1.02 REFERENCES

The following is a listing of the publications, standards and codes referenced in this Section, of which the latest edition shall govern:

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO HB	Standard Specifications for Highway Bridges.
AASHTO M182	Burlap Cloth Made From Jute or Kenaf.
AASHTO T 26	Standard Method of Test for Quality of Water to Be Used in Concrete.
AASHTO T 277	Electrical Indication of Concrete's Ability to Resist Chloride.
AASHTO T 318	Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.

American Concrete Institute (ACI)

ACI 207	Mass Concrete.
ACI 211	Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
ACI 213	Guide for Structural Lightweight-Aggregate Concrete.
ACI 222R	Protection of Metals in Concrete Against Corrosion.
ACI 301	Specifications for Structural Concrete for Buildings.
ACI 302.1	Guide for Concrete Floor and Slab Construction.
ACI 303.1	Specification for Cast in Place Architectural Concrete.
ACI 304R	Guide for Measuring, Mixing, Transporting, and Placing Concrete. Chapter 8: Concrete Placed Under Water.
ACI 305R	Hot Weather Concreting.
ACI 306R	Cold Weather Concreting.

ACI 308	Standard Practice for Curing Concrete.
ACI 309R	Guide for Consolidation of Concrete.
ACI 318	Building Code Requirements for Structural Concrete.
ACI 548.4	Standard Specification for Latex-Modified Concrete (LMC) Overlays.

ASTM International (ASTM)

ASTM C 31	Practice for Making and Curing Concrete Test Specimens in the Field.
ASTM C 33	Specification for Concrete Aggregates.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 42	Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
ASTM C 78	Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
ASTM C 88	Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
ASTM C 94	Specification for Ready-Mixed Concrete.
ASTM C 114	Test Methods for Chemical Analysis of Hydraulic Cement.
ASTM C 131	Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM C 136	Test Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM C 138	Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
ASTM C 143	Test Method for Slump of Hydraulic-Cement Concrete.
ASTM C 150	Specification for Portland Cement.
ASTM C 156	Test Method for Water Retention by Liquid Membrane-Forming Curing Compounds for Concrete.
ASTM C 157	Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
ASTM C 171	Specification for Sheet Materials for Curing Concrete.
ASTM C 172	Practice for Sampling Freshly Mixed Concrete.
ASTM C 173	Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
ASTM C 174	Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores.
ASTM C 191	Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle.
ASTM C 227	Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
ASTM C 231	Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 289	Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).

ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM C 311	Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete.
ASTM C 330	Specification for Lightweight Aggregates for Structural Concrete.
ASTM C 494	Specification for Chemical Admixtures for Concrete.
ASTM C 535	Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM C 566	Test Method for Total Evaporable Moisture Content of Aggregate by Drying.
ASTM C 567	Test Method for Determining Density of Structural Lightweight Concrete.
ASTM C 618	Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
ASTM C 979	Specification for Pigments for Integrally Colored Concrete.
ASTM C 989	Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
ASTM C 1064	Test Method for Temperature of Freshly Mixed Hydraulic Cement Concrete.
ASTM C 1116	Specification for Fiber-Reinforced Concrete.
ASTM C 1152	Test Method for Acid-Soluble Chloride in Mortar and Concrete.
ASTM C 1218	Test Method for Water-Soluble Chloride in Mortar and Concrete.
ASTM C 1240	Specification for Silica Fume Used in Cementitious Mixtures.
ASTM C 1260	Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
ASTM C 1399	Test Method for Obtaining Average Residual-Strength of Fiber-Reinforced Concrete.
ASTM C 1583	Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials By Direct Tension (Pull-Off Method).
ASTM C 1611	Slump Flow of Self-Consolidating Concrete.
ASTM D 1751	Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
ASTM D 1752	Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
ASTM D 3665	Practice for Random Sampling of Construction Materials.
ASTM D 4580	Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding.
ASTM D 4791	Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
ASTM D 4833	Test Method for Index Puncture Resistance of Geomembranes, and Related Products.
ASTM D 5199	Test Method for Measuring the Nominal Thickness of Geosynthetics.

ASTM E 965	Test Method for Measuring Pavement Macrotexture Depth Using a Volumetric Technique.
ASTM E 1347	Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry.

Federal Aviation Administration (FAA) Advisory Circular (AC)

FAA AC 150/ 5370, Item P-501-6	Standards for Specifying Construction of Airports - Portland Cement Concrete Pavement - Contractor Quality Control Program.

Federal Specifications

SS-S-1401	Sealants, Joint, Non-Jet-Fuel-Resistant, Hot-Applied, for Portland Cement and Asphalt Concrete Pavements.

New Jersey Department of Transportation (NJDOT)

Standard Specifications for Road and Bridge Construction 2007.

US Army Corps of Engineers (USACE)

Handbook of Concrete and Cement.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements

1. Cold weather concrete construction shall conform to ACI 306R.
2. Submit a Cold Weather Concrete Construction Plan, and have it approved prior to concrete placements when the ambient temperature falls below 50 deg F. This Plan shall conform to ACI 306R and shall include but not be limited to the demonstration of how the in situ concrete temperature will be maintained at 50 deg F and monitored, or at temperatures specified in ACI 306R, Table 3.1, whichever is more stringent. In addition, demonstrate that the specified concrete properties can be achieved within the time requirements specified while maintaining a minimum curing temperature of 50 deg F.
3. Do not mix or place concrete when the ambient temperature is below 35 deg F, or when conditions indicate that the temperature will fall below 35 deg F within 72 hours, unless the areas to receive fresh concrete are insulated or enclosed, and maintain the concrete temperature at 50 deg F or in accordance with Table 3.1 in ACI 306.
4. Reinforcement, forms and soils with which concrete will be in contact shall not be frozen and must be maintained completely frost-free. If required, apply heat to raise their temperature to a minimum of 35 deg F. The use of chemicals to eliminate frost will not be permitted.

B. Hot Weather Requirements

1. Hot weather concrete construction shall conform to ACI 305R.

2. Submit a Hot Weather Concrete Construction Plan and have it approved prior to concrete placements when the ambient temperature exceeds 80 deg F. This Plan shall conform to ACI 305R and shall include but not be limited to the demonstration of how the concrete temperature during batching and mixing will be kept below 90 deg F, how the concrete will be protected from rapid evaporation of surface moisture, the proper use of water reducing retarders with re-dosing charts and procedures and curing procedures.

3. Do not place concrete for pavements, overlays, bridge decks or ramps when the ambient temperature exceeds 85 deg F; schedule Work so that concrete can be placed during the coolest part of the day. Do not place concrete for structural decks, slabs or pavements when the rate of concrete surface evaporation exceeds 0.15 lbs/ft^2/hr, as defined in ACI 305R, Figure 2.1.5. If ambient conditions exceed this limit, demonstrate through the use of windscreens, fogging or other suitable means that the concrete evaporation rate is less than 0.15 lbs/ft^2/hr.

4. If the concrete temperature reaches 92 deg F as measured at the construction site in accordance with ASTM C 1064, it may be rejected.

1.04 QUALITY CONTROL

A. General

1. Maintain a level of Quality Control sufficient to consistently achieve the end result performance properties specified herein. In addition:

   a. Submit the approved mix proportions including an automated, time-date stamp on each delivery ticket indicating the batch weights of all batching constituents.

   b. Ensure that all plant mixing equipment and trucks are calibrated and approved by either the New Jersey or New York State Department of Transportation. Documentation of such conformance shall be available to the Engineer at all times.

   c. Ensure that all personnel performing concrete testing are certified ACI Grade I Concrete Laboratory Testing Technicians or Concrete Field Testing Technicians, as appropriate.

   d. When placing aeronautical pavement concrete, the quality control plan shall conform to the provisions of the Federal Aviation Administration Advisory Circular 150/5730-10D- Rigid Pavement Items P-501 Contractor Quality Control Program.

B. Quality Control Plan: Submit a Quality Control Plan a minimum of 10 days prior to the pre-concrete construction meeting described in 1.06. Do not start production before the Quality Control Plan has been approved by the Engineer. The Quality Control Plan shall include the following:

1. Quality Control Organization

   a. A chart showing all Quality Control personnel and a description of how these personnel integrate with and report to other management or field construction personnel. Include names, company name and each person's function, telephone number and fax number.

b. The quality control organization chart shall include a Program Administrator who shall ensure that all QA procedures are followed and enforced and who shall have a minimum of 5 years experience on projects of size and scope comparable to the Work of the Contract. The Program Administrator shall be a full-time employee of the Contractor or a consultant engaged by the Contractor. Additional qualifications shall include at least one of the following:

(1) Professional Engineer, Engineer-In-Training, Bachelor of Science in Civil Engineering, Civil Engineering Technology or five years experience with airport and/or highway concrete construction.

(2) Completed New Jersey ACI Chapter's "Concrete Construction Technology" course with 5 years of airport and/or highway concrete construction experience.

(3) Qualified as ACI Concrete Transportation Construction Inspector or possessing Concrete Construction Special Inspector certification with 5 years of airport and/or highway concrete construction experience.

2. Intended project progress schedule for each mix and application, including quantities and a submittal schedule.

3. Quality Control Testing Plan, including a list of testing standards and the frequency at which each test is to be performed.

a. Include gradation and moisture content testing for fine and coarse aggregates in accordance with ASTM C 136 and ASTM C 566, respectively. Perform both tests (1) prior to production, (2) every 3 hours during production or every 100 cubic yards of concrete produced (whichever is longer in time) and (3) when aggregates are used from a new stockpile that has not been tested for gradation or moisture content.

4. Documentation of Quality Control activities, including the location where recorded test results and other information such as mill test certificates for all cementitious material will be stored, which shall be made available to the Engineer at any time upon request.

5. Procedures for corrective action when QA and/or QC test results do not conform to the requirements of the Contract.

1.05 TRIAL BATCHING AND TEST POUR VERIFICATIONS

A. Trial Batching

1. The Engineer may prepare and test trial batches as specified herein and in accordance with ACI 318, Section 5.3. At the Engineer's request, submit representative samples of all materials in sufficient quantities to the Port Authority Materials Engineering Unit. In the event of a conflict between tests performed by the Engineer and tests performed by or for the Contractor, all tests performed by the Engineer shall control.

2. The Engineer may perform the following tests to verify trial batches submitted by the Contractor: compressive strength, flexural strength, permeability by the Coulomb test, air content, unit weight, water content of freshly mixed concrete using the microwave oven drying test, shrinkage, chloride ion concentration, corrosion inhibitor concentration, bond strength, slump, time of set, gradation of fine and coarse aggregates, and the fineness modulus of the fine aggregate.

B. Test Pours

1. Unless otherwise noted on the Contract Drawings, perform a test pour a minimum of 14 calendar days prior to production pouring in order to demonstrate and verify proper workability, finishability, setting characteristics, consolidation and curing procedures and to confirm that specified physical properties are attained for the approved mix proportions. For tremie concrete applications, construct a mock-up to verify acceptable consolidation and that the specified compressive strength is achieved by testing three in-place cores taken from the test placement at locations designated by the Engineer. In addition, for architectural cast in place concrete, construct a full-scale mock-up in accordance with 2.03 C.3. If in the sole opinion of the Engineer the test pour is acceptable, follow the procedures established during the test pour during production.

2. Test Pour Size: For flatwork, the minimum test pour size shall be a length of 100 feet for the entire thickness of the pavement and width of the screed planned to be used. For all other concrete construction, the test pour size shall be full-size for the cross sectional area, including the location of all steel reinforcement. However, at the option of the Engineer, the length of the member may be reduced from its design size, provided it is adequate to demonstrate workability, finishability, setting characteristics, consolidation, finish and curing procedures, as determined solely by the Engineer. Perform all test pours using the same personnel, equipment, procedures and materials that will be used for full production.

3. The test section will be considered acceptable if, in the sole opinion of the Engineer, it meets the specifications for surface preparation, batching, mixing, placement, consolidation, curing, finish and applicable performance properties of the concrete. In addition, for architectural concrete, color and texture will be considered acceptable according to the sole opinion of the Engineer.

4. In the event that the Engineer deems the test section unsatisfactory, remove the test section and repeat the test at no cost to the Authority.

5. The test pour location will be determined by the Engineer at the pre-concrete construction meeting, and will be located close to, if not within, the area of Work, unless otherwise noted on the Contract Drawings.

1.06 PRE-CONCRETE CONSTRUCTION MEETING

A. A pre concrete placement meeting will be conducted at the construction site by the Engineer a minimum of 20 days prior to the first pour to review the Contractor's submitted mix proportions, hot and cold weather concreting plans (as applicable), curing procedures plan and test pour and to discuss the methods and procedures to achieve the specified concrete quality. Notify the Engineer and send a pre-concrete meeting agenda to all attendees a minimum of 15 days prior to the scheduled date of the meeting indicating review subjects. At no additional cost to the Authority make arrangements for the Contractor's superintendent and a qualified representative from each segment of the concrete operations to be present, including, but not limited to the following:

1. Concrete supplier.

2. Laboratory representative responsible for the concrete proportion mix and Quality Control.

3. Contractor's Program Administrator for Quality Control.

4. Concrete subcontractor.

5. Admixtures and curing membrane suppliers.

6. Concrete pumping subcontractor.

7. Mobile mixer subcontractor.

8. Precast concrete fabricator and installer.

9. Joint sawing subcontractor.

10. The Engineer.

B. Record, type, and print meeting minutes and distribute them to all attendees of the meeting within 5 days of the date of the meeting.

C. Do not schedule the pre-concrete construction meeting until all of the following have been submitted and approved, as applicable to the Work of the Contract:

1. Mix Proportions.

2. Admixture dosage charts showing the effects of concrete temperatures from 50 deg F to 90 deg F.

3. Sample panels (12" x 12" x 2" for architectural concrete).

4. Hot and Cold Weather Concrete Construction Plans.

5. Independent testing laboratory AASHTO Accreditation Certification.

6. ACI Grade I certifications for concrete testing personnel.

7. Placement methods and procedures, including surface preparation.

8. Pumping Procedure Plan.

9. Curing Procedure Plan.

10. Joint Location Plan and Timing of Cuts.

11. Quality Control Plan.

12. Procedure for Curing Field Concrete Specimens.

1.07 SUBMITTALS

A. See Appendix "A" for submittal requirements.

B. Do not deliver any concrete to the construction site until all approvals have been obtained.

PART 2. PRODUCTS

2.01 MANUFACTURERS AND SOURCES OF SUPPLY

A. Use no cement, fly ash, slag, silica fume, metakaolin or fine or coarse aggregates that have not been approved by either the New Jersey or New York State Department of Transportation.

2.02 MATERIALS

A. Cement: Conforming to ASTM C 150, Type I and II, and Type III where early strength gain is required, or others specified on the Contract Drawings.

B. Very High Early Strength Cement: Defined as cement used to produce concrete with the compressive strength shown on the Contract Drawings within 12 hours or less and conforming to the following:

1. The compressive strength shall be greater than or equal to the specified strength at the curing time specified on the Contract Drawings, when tested in accordance with ASTM C 39. During cold weather concrete construction, demonstrate that the specified compressive strength can be obtained at a curing temperature of 50 deg F.

2. Absolute drying shrinkage less than or equal to 0.04% at 28 days for the mix proportions containing the Very High Early Strength Cement in accordance with ASTM C 157 modified (Air Drying Method), where the initial reading shall be taken at 3 hours after the addition of the mixing water to the dry materials in the mix.

3. Setting time, determined in accordance with ASTM C 191, shall be sufficient to provide adequate workability, meet the specified strength requirement, and allow enough time in the field to finish and begin curing the concrete for its intended use.

4. The Very High Early Strength Cement shall meet the properties in 2.02 B.1, 2.02 B.2 and 2.02 B.3, for each Lot of cement not to exceed every 50,000 pounds. Submit certification from an independent testing laboratory employed by the Contractor and approved by the Engineer that the cement meets these properties.

C. Silica Fume: Shall conform to ASTM C 1240 and the following:

1. Silicon Dioxide Content: 90% minimum.

2. Loss On Ignition: 6% maximum.

3. Surface Area: (nitrogen absorption): 15,000 m2kg.

4. Crystallinity: Non-crystalline within limits of detection by XRD.

5. Oversize Foreign Materials (in fume): 5% maximum on 45-micron sieve (wet).

D. Metakaolin: Conforming to ASTM C 618, Class N. Use one of the following products, or approved equal:

1. "MetaMax", as manufactured by Engelhard, Iselin, New Jersey.

2. "PowerPozz", as manufactured by Advanced Cement Technologies, LLC, Blaine, Washington.

E. Fly Ash: Conforming to ASTM C 311 and ASTM C 618, Class F except the maximum loss on ignition shall be less than 4%.

F. Slag: Conforming to ASTM C 989, Grade 100 or 120.

G. Fine Aggregate: Conforming to ASTM C 33, ASTM C 227, ASTM C 289 and ASTM C 131 with a maximum percentage of wear of 30%.

H. Coarse Aggregate (Normal Weight Concrete): Conforming to ASTM C 33, ASTM C 227, ASTM C 289, ASTM C 535 with a maximum percentage of wear of 40%, and ASTM C 88 with a magnesium sulfate loss of not more than 12% for a five-cycle test period. Use trap rock or gneiss for all pavement wearing surfaces. The aggregate in any size group shall not contain more than 8% by weight of flat or elongated pieces, as tested in accordance with ASTM D 4791. A flat or elongated piece is one having a ratio between the maximum and minimum dimensions of a circumscribing rectangular prism exceeding 5 to 1. In accordance with ACI 318, Section 3.3.2, the nominal maximum size of coarse aggregate shall be not larger than: (1) one-fifth the narrowest dimension between sides of forms, (2) one-third the depth of slabs, or (3) three-quarters the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, or prestressing tendons or ducts. The nominal maximum size of coarse aggregate used shall be the largest size aggregate that conforms to ACI 318, Section 3.3.2, unless otherwise noted herein or shown on the Contract Drawings.

1. For full depth pavement concretes unless otherwise shown on the Contract Drawings the combined aggregate volume shall be a minimum of 70 percent. The combined gradation of the fine and coarse aggregate shall conform to the following, when tested in accordance with ASTM C 136:

	For Pavement 10 Inches or Greater in Thickness		For Pavement Less Than 10 Inches in Thickness	
Sieve Size % Passing	Min.	Max.	Min.	Max.
2-1/2"	100			
2"	90	98	100	
1-1/2"	76	88	89	98
1"	67	79	74	86
3/4"	65	77	64	76
3/8"	48	60	48	60
No. 4	30	42	30	42
No. 8	27	37	27	37
No. 16	20	30	20	30
No. 30	16	22	16	22
No. 50	4	10	4	10
No. 100	0	4	0	4

2. Pile Jackets: As a minimum, the mix proportion shall contain an ASTM C 33 Size No. 8 coarse aggregate. The ratio of coarse aggregate to fine aggregate by volume shall be not less than one to one.

3. Pipe Piles: Reduce the amount of coarse aggregate to minimize segregation. The volume of coarse aggregate shall not exceed 9.0 cubic feet per cubic yard of concrete. The maximum size coarse aggregate shall be ASTM C 33 Size No. 8.

4. Minimum Volume of Coarse Aggregate: All mixes shall contain a minimum of 39% coarse aggregate by volume, with the exception of 1) applications specified in Part 2.02 H.1-4, H.2), Performance Category VI applications, 3) bridge decks and 4) mixes containing ASTM C 33 Size No. 8 aggregate. Bridge deck concrete mixes shall contain a minimum of 41% coarse aggregate and total minimum aggregate volume of 67%. Mixes containing ASTM C 33 Size No. 8 stone not covered in 2.02 H.2-4 shall contain a minimum of 36% coarse aggregate by volume. These minimum requirements apply to all methods of placement, including pump mixes.

5. When requested by the Engineer, supply independent laboratory test results in accordance with ASTM C 1260 indicating the potential alkali reactivity of the aggregates and cementitious materials proposed for use. Expansion at 16 days shall be less than 0.10%.

I. Coarse Aggregate (Lightweight Concrete)

1. Expanded clay or shale produced by the rotary kiln process conforming to ASTM C 330 shall be graded in accordance with the requirements for 3/4" to No. 4 sieve sizes shown in Table I of that specification.

2. The oven dry unit weight of plant-tested, lightweight aggregate shall vary not more than +/- 3.0 pounds from the unit weight (pounds per cubic foot) determined from the sample quantity submitted in accordance with 1.05 A.1.

J. Water: Conforming to AASHTO T 26. Clean and potable for both mixing and curing concrete.

K. Formulated Latex Modifier: Latex modifier shall be modifier "A/NA", as manufactured by Dow Chemical, Midland, Michigan. Add latex emulsion at a rate of 3.5 gallons per 94 lbs. of cementitious material in the concrete mix.

L. Air Entraining Agent: Conforming to ASTM C 260.

M. Admixtures: All admixtures shall conform to ASTM C 494. They shall contain not more than 0.05% chloride ions, and shall be used in accordance with the manufacturer's recommendations. Submit dosage charts, including the effects of concrete temperatures from 50 deg F to 90 deg F, to the Engineer. All admixtures shall be manufactured by one of the following:

1. Euclid Chemical Company.

2. W.R. Grace & Company.

3. Master Builders Technologies.

4. Sika Corporation.

N. Polycarboxylate High Range Water Reducer: For use when self-compacting concrete is desired and approved by the Engineer. Conforming to ASTM C 494, Type F or Type G. Dosage rate shall be as recommended by the manufacturer to produce a spread of the concrete mixture measuring between 21 and 27 inches in diameter without segregation when released from a slump cone in accordance with ASTM C 1611. Use one of the following products, no substitutions:

1. "Plastol 5000" or "Plastol 341", as manufactured by The Euclid Chemical Company.

2. "ADVA Flow 530" or "ADVA Flow 540", as manufactured by W.R. Grace & Company.

3. "Glenium 3030 NS" or "Glenium 3200 HES", as manufactured by Master Builders Technologies.

O. Corrosion Inhibitors

1. Corrosion inhibitor shall be one of the following:

a. For cast in place or precast:

(1) "DCI-S", as manufactured by W.R. Grace & Company.

(2) "Eucon CIA", as manufactured by Euclid Chemical Company.

(3) An approved equal.

b. For precast applications only:

(1) "Sika CNI", as manufactured by Sika Corporation.

(2) "Rheocrete CNI", as manufactured by Master Builders Technologies.

(3) "DCI", as manufactured by W.R. Grace & Company.

2. The concentration of calcium nitrite shall be 30% +/- 2% by weight of solids per gallon.

3. The Engineer will sample the corrosion inhibitor for testing to verify the calcium nitrite solids content. The amount of calcium nitrite in fresh concrete may also be tested at any time, to verify if the proper quantity of the corrosion inhibitor is being batched in the mix.

4. Corrosion inhibitor admixtures shall not accelerate the setting time of the concrete mixture. Use a retarder and/or other admixtures to ensure that acceleration of setting time does not occur, while maintaining the applicable performance criteria, as stipulated in 2.04. Submit procedures for the placement of concrete mixes containing a corrosion inhibitor when a retarder is required for the range of concrete temperatures from 50 deg F to 90 deg F.

P. Viscosity Modifying and/or Self-Consolidating Admixtures: May be required for tremie concrete applications at the rate recommended by the manufacturer. Test concrete in accordance with CRD-C6189A US Army Corps of Engineers "Handbook of Concrete and Cement". Maximum percentage of washout weight loss shall not exceed 5% after three standard test drops in water.

Q. Pigments: Conforming to ASTM C 979.

R. Curing Materials

1. Curing compound shall be one of the following:

a. "DOT Resin Cure (Type II)", as manufactured by Conspec Marketing & Manufacturing Company, Inc.

b. "Euco Kurez Vox (White)", as manufactured by Euclid Chemical Company.

c. "1200 White", as manufactured by W.R. Meadows.

d. "AHT Type II Class B Cure", as manufactured by American Highway Technology, a Dayton Superior Company.

e. "Certi-Vex Envio Cure White-1000", as manufactured by Vexcon Chemicals Inc.

f. "Day-Chem White Pigmented Cure (J-10-W)", as manufactured by Dayton Superior.

g. Or an approved equal meeting the requirements specified in 2.02 R.2.

2. Liquid Membrane Forming Curing Compound conforming to the following:

a. For horizontal exterior applications, curing membranes are restricted to ASTM C 309 Type 2, Class B materials. ASTM C 309 Type 1-D, Class B membranes are acceptable for other exterior applications. ASTM C 309 Type 1, Class B membranes are acceptable for interior applications only.

b. Curing membranes shall be wax free when used on concrete where overlays, coatings, paints, sealers or any topping is to be applied, or where vehicular, pedestrian or aircraft traffic will pass over.

c. Membranes shall be volatile organic compound (VOC) compliant for the states of both New York and New Jersey. Submit certification of compliance to the Engineer upon request.

d. The membrane shall restrict the loss of water to not more than 0.40 kilograms per square meter in 72 hours at a coverage rate of 300 square feet per gallon per coat for Type I curing compounds, and 200 square feet per gallon per coat for Type 2 curing compounds when tested in accordance with ASTM C 156.

3. Burlap: Conforming to AASHTO M 182, Class 3, weighing approximately 9 oz./sq. yd. dry.

4. Sheet Material: Conforming to ASTM C 171.

a. Shall be White Burlap Polyethylene Sheet.

5. Cotton Mats: conforming to ASTM D 5199 with a minimum thickness of 40 mils, ASTM C 156 with a maximum water loss of 0.0065 oz./in.^{2}, ASTM D 4833 with a minimum puncture strength of 70 pounds and ASTM E 1347 with a minimum reflectance of 75%. The following cotton mats may be used in lieu of burlap for wet curing operations:

a. "Transguard 4000", as manufactured by Reef Industries, Inc., Houston, Texas, or

b. An approved equal conforming to the requirements specified in 2.02 R.5.

S. Evaporation Retardant: This material shall be used to retain moisture in the concrete during finishing operations. Use one of the following:

1. "Euco-Bar", as manufactured by Euclid Chemical Company.

2. "E-Con", as manufactured by L&M Construction Chemicals, Inc.

3. "Confilm", as manufactured by Master Builders Technologies.

4. "SikaFilm", as manufactured by Sika Corporation.

5. "Aquafilm", as manufactured by Conspec Marketing & Manufacturing Company, Inc.

T. Fiber Reinforcement:

1. Polypropylene Micro Fibers

a. Use one of the following products, subject to compliance with the Contract requirements:

(1) "Fiberstrand", as manufactured by Euclid Chemical Company.

(2) "Fibermesh", as manufactured by Fibermesh, Inc.

(3) "Forta", as manufactured by Forta Corporation.

(4) "Grace Fibers" or "Grace Microfibers", as manufactured by W.R. Grace & Company.

(5) "Durafiber", as manufactured by Industrial Systems, Ltd.

(6) Or an approved equal.

b. Additional requirements:

(1) Collated fibrillated materials: Dosage rate shall be a minimum of 1.5 lb./cu. yd.

(2) Multifilament fibers: Dosage rate shall be a minimum of 1 lb./cu. yd. The minimum length shall be 0.75 inches.

(3) Conformance with ASTM C 1116, designation Type III, 4.1.3.

(4) Conformance with a minimum plastic shrinkage crack reduction of 70 percent when tested in accordance with ICBO ES, Appendix B (7-92).

(5) Use of fibers shall not change the water requirements of the mix.

(6) Conform to the manufacturer's recommendations for the quantity of fiber, which shall be not less than the minimum requirements of 2.02 T.1.b.1 and 2.02 T.1.b.2.

(7) Arrange for the fiber manufacturer to provide the services of a qualified representative at the pre-concrete construction meeting and for the first two days of fibrous concrete placement production.

2. Structural Polypropylene/Polyethylene Macro Fibers

a. Use one of the following products, subject to compliance with the Contract requirements:

(1) "Tuf-Strand SF", as manufactured by Euclid Chemical Company.

(2) "Strux 90/40", as manufactured by W.R. Grace & Company.

(3) Or approved equal.

b. Additional requirements:

(1) Dosage rate shall be a minimum of 4.0 lb./cu. yd. Higher dosages may be noted on Contract Drawings.

(2) The minimum length shall be 1.50 inches.

(3) Fiber shall have an Aspect Ratio of 50 to 90.

(4) Conformance with ASTM C 1116, designation Type III, 4.1.3.

(5) The structural macro fiber concrete shall have an average residual strength of 200 psi when tested in accordance with ASTM C 1399.

(6) Use of fibers shall not change the water requirements of the mix.

(7) Conform to the manufacturer's recommendations for the quantity of fiber, which shall be not less than the minimum requirements of 2.02 T.2.b.1.

(8) Arrange for the fiber manufacturer to provide the services of a qualified representative at the pre-concrete construction meeting and for the first two days of fibrous concrete placement production.

U. Expansion Joints (Except for Bridge Decks) and Contraction Joints (Except for Pavements)

1. Vinyl plastic water stops shall be of types and sizes shown on the Contract Drawings and conforming to Corps of Engineers "Specifications for Polyvinylchloride Waterstop" (Designation: CRD-C 572-60, latest revision).

2. Premoulded expansion joint filler, when shown on the Contract Drawings:

a. Cork type shall be ASTM D 1752, Type II.

b. Bituminous type shall be ASTM D 1751.

3. Joint Sealant when shown on Contract Drawings: Federal Specification SS-S-1401, latest revision.

2.03 MIX PROPORTIONS

A. Develop mixes in accordance with the latest editions of ACI 211, ACI 301 and ACI 318 to achieve the proportion performance criteria in accordance with the Contract Documents, with a degree of excess as determined by Chapter 5 of ACI 318, and meet all of the applicable performance criteria as specified in the Contract Documents. In addition, all concrete placed underwater shall conform to ACI 304R, Chapter 8, and lightweight aggregate concrete shall conform to ACI 213. Submit an underwater concrete placement procedure that is in conformance with ACI 304R, Chapter 8. Prior to concrete construction and after approval of all materials to be used in the concrete, submit a mix proportion showing that all performance criteria have been met. Mix proportions submitted shall be based upon laboratory trial mix test results and/or mixes successfully used within the two years preceding the date of the submittal of the mix for the Work of this Section. The independent testing laboratory used to develop the mix proportions and to perform testing shall have AASHTO Accreditation for all test methods required to be performed and to develop the required mix. Submit proof of certification to the Engineer prior to the start of development of the mix proportions and testing. The mix proportions shall include copies of test reports, including test dates, and a complete list of materials, including type, brand and source. The trial mix design performed in the testing laboratory shall use the same materials, cement, pozzolons, aggregates and admixtures that will be used at the proposed batch plant. Show fineness modulus, gradations and absorptions of aggregates. If any of the approved mix constituents change in source, properties or proportion, submit a new mix. The mix proportions shall also conform to the following:

1. Substitute either fly ash or slag at the minimum rate of 20% by weight of cement. The maximum rates of substitution shall be 30% for fly ash and 40% for slag, unless otherwise approved by the Engineer. Fly ash and slag substitution in the same mix may be permitted upon approval by the Engineer.

2. For concrete placed underwater, the minimum cementitious material content shall be 700 pounds per cubic yard of concrete.

3. Compute water to cement ratio using the weight of cementitious material that is equal to the total weight of cement plus fly ash, slag and silica fume. Any admixtures which increase the water to cement ratio by 0.01 or greater shall be accounted for in the mix proportion to meet the specified water to cement ratio.

4. For Categories II, III and IV concrete applications, the mix water to cement ratio shall not exceed 0.40 and the absolute drying shrinkage at 28 days shall not exceed 0.04% in accordance with ASTM C 157 (Air Drying Method), modified to start measuring at 10 hours. In addition for Categories III and IV, the maximum Coulomb count at 28 days shall be 1,000 for mixes without calcium nitrite and 1,500 when the mix contains calcium nitrite. For mixes that do not have silica fume, latex or metakaolin but contain either fly ash or slag, the Coulomb count requirements shall remain the same; however, the test shall be performed at 90 days instead of 28 days. For concrete pavements and Categories I and V applications where the concrete will be exposed to freeze-thaw cycles and/or sulfates, the mix proportion water to cement ratio shall not exceed 0.40 and the absolute drying shrinkage at 28 days shall not exceed 0.04% in accordance with ASTM C 157 (Air Drying Method). For other concrete applications, the mix water to cement ratio shall not exceed 0.50, unless otherwise shown on the Contract Drawings.

5. High Range Water Reducer shall not be added to the concrete mix at the plant. It shall be delivered to the construction site in a tank fixed to the truck that discharges directly into the mixing drum, or it may be added to the drum from a calibrated dispensing unit. A calibrated dispensing unit shall be defined as a manufactured dispenser with clear volume indications marked on the outside of the unit. It shall be available at all times during the concrete placement for re-dosing purposes. Submit a re-dosing chart showing the dosages necessary to increase the slump, in inches per cubic yard of concrete remaining in the drum, over the range of concrete temperatures from 50 deg F to 90 deg F. If re-dosing occurs, the re-dosing chart shall be used, but under no circumstances shall the total dosage exceed the maximum dosage recommended by the manufacturer. The truck shall mix the load for a minimum of an additional 5 minutes prior to releasing the load.

6. The percentage of air in the mix shall fall within the range of the Lower Quality Limit (LQL) and the Upper Quality Limit (UQL) as outlined in the table shown in 2.04 A.6 entitled "Air Content Target Range for Freshly Mixed Concrete". Air content shall be determined by testing in accordance with ASTM C 231 for normal and heavyweight concrete mixes and ASTM C 173 for porous, lightweight aggregate.

7. Make adjustments to the weight of coarse, lightweight aggregate in accordance with the following:

   a. Design lightweight concrete mix proportions not to exceed 123 pounds per cubic foot, unless otherwise specified.

b. Adjust the proportion of lightweight aggregate to compensate for the difference between the wet unit weight determined in 3.05 B.5 and the dry unit weight of the material submitted in accordance with 1.05 A.1 and the approved mix proportions.

c. For lightweight aggregate mixes, advise the batch plant 72 hours prior to pouring in order to saturate the aggregate. Presoak lightweight coarse aggregate a minimum of 72 hours prior to mixing of concrete. The lightweight aggregate shall reach an absorbed moisture content not less than the manufacturer's written recommendations or the concrete will be rejected.

B. Where Latex Modified Concrete is specified in the Contract Documents, conform to ACI 548.4. The mix maximum water to cement ratio shall not exceed 0.37. The minimum volume of coarse aggregate shall be not less than 7.6 cubic feet (absolute volume) per cubic yard.

C. Architectural Concrete

Concrete that will be permanently exposed to view and which therefore requires special care in selection of concrete ingredients including color, forming, placing, consolidating and finishing to obtain the desired architectural appearance is designated as "Architectural Concrete".

1. A minimum of 35 days prior to construction of a mock-up, submit mix proportions and two sample panels (a minimum of 12" x 12" x 2") for each mix to the Engineer for approval. The materials used for the sample panels shall be from the same sources of material supply for all constituents in the approved mix. When requested by the Engineer, submit samples of all constituents for trial batching to the Port Authority Materials Engineering Unit to verify that the physical property requirements are met. Obtain approval for both sample panels for color and texture, as well as for the mix proportions for physical properties prior to constructing a mock-up.

2. Pigments, in conformance with ASTM C 979, shall be used when matching the color of existing concrete or when a specific color of concrete is required by the Engineer.

3. Construct mock-up only after the Engineer has approved both the mix proportions for physical properties and the sample panels for color and texture. For cast in place concrete, a mock-up in accordance with ACI 303.1 Section 1.6 Quality Assurance will be required for approval by the Engineer. For walls, a mock-up shall include all details that will be encountered in a typical day's pour. The mock-up may be constructed at the construction site as part of the permanent Work at the sole risk of the Contractor. If the Engineer rejects the mock-up, it shall be removed and recast at the sole expense of the Contractor. For precast architectural concrete, the mock-up shall consist of a full member selected in advance by the Engineer. Keep the approved mock-up at the precast concrete production facility for the Engineer to compare with the production units for acceptance or rejection. Acceptance or rejection shall be determined solely by the Engineer.

4. Construct mock-ups only with all of the actual constituents of the approved mix proportions. Do not proceed with production until the mix proportions, sample panels, full-scale mock-up and shop drawings have been approved by the Engineer. Once production begins, do not change suppliers or sources of supply for any of the constituents in the approved mix for the duration of the Contract.

5. In addition to the mix proportions and sample panels, submit the following for approval: forms, form liners and form oil or release agents.

6. Architectural Concrete shall conform to the Quality Assurance performance criteria specified in 4.01 B, Table 2 for the appropriate placement application and the associated Quality Acceptance Limits specified in 2.04.

7. Noticeable differences in color and/or texture of the finished product, as determined solely by the Engineer, shall be corrected by means and materials approved by the Engineer.

D. Pipe Piles: The target range for slump shall be 4 to 6 inches.

2.04 QUALITY ACCEPTANCE LIMITS

A. Develop mixes to meet the following performance criteria Quality Acceptance Limits in accordance with the relevant application properties specified in 4.01.B., Table 2, unless otherwise noted on the Contract Drawings:

1. Compressive Strength (ASTM C 39): The Lower Quality Limit, LQL, shall be the specified mix compressive strength at 28 days, unless otherwise noted on the Contract Drawings.

2. Flexural Strength (ASTM C 78): The Lower Quality Limit, LQL, shall be 700 psi at 28 days, unless otherwise noted on the Contract Drawings.

3. Permeability (AASHTO T 277): The Upper Quality Limit, UQL, shall be 1700 Coulombs for mixes not containing a corrosion inhibitor and 2200 Coulombs for mixes that do contain a corrosion inhibitor. Performance testing shall be performed at 28 days, except for mixes containing only fly ash and/or slag substitution for cement but no silica fume or metakaolin, which shall be evaluated at 90 days.

4. Bond Strength (ASTM C 1583): The Lower Quality Limit, LQL, shall be 150 psi at 28 days.

5. Water Content (AASHTO T 318): The Upper Quality Limit, UQL, for water content shall be the specified water to cementitious ratio specified in 2.03 A.4 plus 0.05.

6. Air Content (ASTM C 138, ASTM C 173 or ASTM C 231): Both the Lower Quality Limit, LQL, and the Upper Quality Limit, UQL, shall be as specified in the table below:

AIR CONTENT TARGET RANGE FOR FRESHLY MIXED CONCRETE

MAXIMUM SIZE AGGREGATE (SIZE #)	AIR CONTENT LQL	AIR CONTENT UQL
2" or above (# 467 and above)	3.5%	7.5%
1-1/2" (# 57)	4.0%	8.0%
1" (# 67)	4.5%	8.5%
1/2" (# 8)	5.5%	9.5%
3/8"	6.0%	10.0%
Latex modified concrete	2.5%	6.5%

Note: For a specified compressive strength greater than 5000 psi, the LQL and UQL for air content, as indicated above, shall both be reduced by 1.0%. For all concrete applications not exposed to freeze-thaw cycling or chlorides, no air entrainment is required.

7. Chloride Ion Concentration by Weight of Cementitious Material (ASTM C 1152, ASTM C 1218, ASTM C 114, ACI 222R): The acid soluble chloride ions by weight of cementitious material in the concrete mix shall be less than or equal to 0.10% for reinforced concrete and 0.08% for prestressed concrete, as per ACI 222R. The water soluble chloride ions by weight of cementitious material in the concrete mix shall be less than or equal to 0.08% for reinforced concrete and 0.06% for prestressed concrete, as per ACI 222R.

8. Pavement Thickness: The Lower Quality Limit, LQL, for pavement thickness shall be 97.0% of the thickness shown on the Contract Drawings.

9. Delaminations: The total surface area tested for any given Lot of concrete shall indicate less than 5.00% delaminated area when tested using the chain drag in accordance with ASTM D 4580.

B. For concrete bridge decks where riding surface tolerances are required, as shown on the Contract Drawings, the following requirements shall be met:

1. Surface smoothness deviations shall not exceed 1/4 inch in 16 feet.

2. Vertical deviation from the grade shown on the Contract Drawings shall not exceed plus or minus 0.04 foot at any point.

C. For mass concrete as defined in ACI 207 or as specified on Contract Drawings the temperature at the core of the in situ concrete shall not exceed 160 deg F nor shall the maximum difference in temperature between the core and the surface of the structure exceed 35 deg F at any time. The drop in temperature in the first 24 hours after the end of protection shall not exceed the limits of ACI 306R Table 3.1.

D. Unless otherwise specified on the Contract Drawings, the above specified Quality Acceptance Limits will be used to calculate Adjustments to Contract Compensation in accordance with Part 4 of this Section.

PART 3. EXECUTION

3.01 SURFACE PREPARATION

A. Bonded Overlays and Patching Applications

1. Bond strength tests will be performed by the Engineer in accordance with ASTM C 1583, using 4-inch by 4-inch steel plates, to determine the adequacy of the surface preparation. A minimum average bond strength of 200 psi shall be attained, with no single test value less than 180 psi. If time does not permit the above test to be performed, as determined solely by the Engineer, the Engineer will measure the macrotexture depth in accordance with ASTM E 965. A minimum of four tests will be performed and the average macrotexture depth shall be a minimum of 0.06 inches. Prior to the placement of any overlay or patching material, obtain the Engineer's approval of the surface preparation.

B. Latex Modified Concrete and Silica Fume Concrete

1. The Engineer will sound the concrete surface to identify areas of unsound or deteriorated concrete. Areas so identified shall be removed to the limits and depths as ordered by the Engineer. Perform abrasive blasting of all exposed reinforcing steel that is to remain in place.

C. Construction Joints (excluding joints in pavements)

1. Number, locations and details shall be as shown on the approved shop drawings.
2. Planes of joints shall be normal to direction of pressure and shall include suitable keys and dowels.
3. Locate joints at points of minimum shear, unless otherwise shown on approved shop drawings or directed by the Engineer.
4. Avoid lips and other irregularities between adjoining sections of concrete. Secure forms tightly against previously placed concrete.

D. Expansion and Contraction Joints (excluding joints in pavements)

1. After curing concrete, clean grooves or saw cuts to receive joint sealant by scrubbing with a mechanical wire brush to loosen dirt and other foreign matter and blowing out loose matter with compressed air.
2. Install joint sealant to finish flush with concrete surface, except where otherwise shown on the Contract Drawings.

E. Preparation for Placing Concrete (excluding pavements)

1. Straighten bent dowels, whether placed under this Contract or by others, using tools approved by the Engineer. Do not apply heat to dowels.
2. Clean all dowels and all steel, that will be embedded in concrete, of all loose rust, scale, paint, grease and other objectionable materials.
3. Examine coated reinforcement for integrity of coating. Repair all damaged areas in accordance with the requirements of Specification Section 03200 entitled "Concrete Reinforcement". Make the repair crew available at the time of examination.
4. Check all formwork locking devices to ensure that they are in place and properly secured.
5. Do not place concrete for piles, footings, pile caps or slabs supported on pile caps or piles until the pile survey has been completed and additional reinforcing steel, if necessary, has been added as directed by the Engineer.
6. For preparation of surfaces to receive concrete, conform to the Contract Drawings for all procedures, equipment limitations and requirements to be performed prior to placing concrete.
7. Do not place concrete for slabs-on-grade, grade beams or footings until the subgrade has been inspected and approved by the Engineer, and until any base course or fill has been properly compacted in accordance with the Contract requirements.

8. Provide vent holes (1/4 inch diameter, minimum) edge angles or embedded plates at joints where vibrating alone will not ensure elimination of voids. Locate such holes at high points and with uniform spacing along joints for escape of air during concreting operations. Evidence of voids adjacent to embedments will be cause for rejection of work. Submit all vent holes and procedures for placement of concrete at joints with the shop drawings for review and approval.

9. Make provisions for the concrete to pass through the reinforcing steel without segregating during placement.

F. For preparations for placing concrete pavements, see Section 02513 entitled "PLACEMENT OF PORTLAND CEMENT CONCRETE PAVING (FAA)".

3.02 BATCHING AND MIXING CONCRETE

A. Measurement of Proportions

1. All concrete batching shall be in conformance with ASTM C 94 and ACI 304R.

2. For Very High Early Strength Concrete requiring 2000 psi or greater in 6 hours or less time, the method of batching will be restricted to a calibrated mobile mixer, or to a transit mixer that is loaded at the construction site with bulk bags of the Very High Early Strength Cement. Bulk bags shall contain sufficient Very High Early Strength Cement by weight to batch for a minimum of 3 cubic yards of concrete.

B. Mixing Concrete

1. Arrange for transit mix trucks to be inspected and approved annually by either the New Jersey or New York State Departments of Transportation.

   a. Mixers shall be equipped with a metal plate attached by the manufacturer, indicating the volume of mixed concrete the equipment is intended to produce. The quantities of materials transported and the volume of mixed concrete produced shall not exceed the mixer's rated capacity. In locations where the rate of depositing is slow, the Engineer may restrict the volume of concrete that may be mixed in a mixer to a volume less than the manufacturer's rated capacity of the mixer.

   b. Immediately repair or withdraw from use any mixer which is determined to be mechanically unsatisfactory.

2. If truck mixers are used, keep available a sufficient number to ensure continuous delivery of the concrete at the rate required for the proper handling, placing, finishing and curing of the concrete. If a plant at the construction site is used, it shall be of sufficient capacity to meet such requirements.

   a. Mixers shall be of the revolving-drum type, with drums suitably mounted and fitted with adequate blades capable of discharging the mixture without segregation. All truck mixers shall be equipped with an accurate, operable counter to measure the number of drum revolutions and an accurate, working water site gage or manometer to measure the volume of water introduced into the drum. Truck mixers without an accurately operating counter or water site gage shall be immediately withdrawn from use.

3. The Engineer may permit one re-tempering of the concrete subject to the following:

   a. When the measured water content in the batch is less than the water in the approved mix proportion.

   b. The redosage of high range water reducer shall conform to the Engineer-approved redosage chart and shall not exceed the manufacturer's recommended limitation, nor shall it retard the initial set of the concrete by more than 30 minutes.

   c. When air content is below the lower quality limit specified in 2.04 A.6.

4. The Engineer may reject concrete in the following instances:

   a. Concrete has not been placed within 90 minutes from the time the cement had first contact with water.

   b. Concrete temperature reaches 92 deg F.

   c. The mix appears to be segregated.

5. The Engineer will reject concrete subject to the following:

   a. Concrete that has partially hardened or has attained its initial set prior to placement.

   b. The water to cement ratio as determined by AASHTO T 318 exceeds that given in 2.03 A.4 by 25%.

6. Construction Site Mixing: Measure mix components in accordance with tolerances given in ASTM C 94. Weigh all non-liquid components and measure all liquid components immediately prior to batching. Use a calibrated flask with clear indication markings for ounces, pints, etc. when measuring liquid components. Measures without calibrated clear indication markings will not be permitted. Mix concrete materials in an approved drum-type batch machine mixer.

   a. For a mixer capacity of 1 cubic yard or less, continue mixing a minimum of 3 minutes, but not more than 5 minutes after ingredients are in the mixer and before any portion of the batch is released.

   b. For a mixer capacity of greater than 1 cubic yard, increase the mixing time by 1 minute for each additional 1 cubic yard.

   c. Provide a batch ticket to the Engineer for each batch discharged and used in the Work, indicating the Contract number and title, date, time, mix type, mixing time, quantity of each constituent, volume of concrete and amount of water added. Record a location of the deposit in the structure that can be easily identified.

C. Mobile Mixers: When application requires the use of a mobile mixer, it shall meet the following criteria:

1. Proportioning and Mixing Equipment

   a. Mixer shall be a self-contained, self-propelled, continuous mixing type capable of carrying sufficient unmixed dry cement, aggregates, water and admixtures to produce not less than 6 cubic yards of concrete. Maintain a calibrated back-up unit at the construction site ready for use.

b. Mixer shall be capable of positive measurement of cement being introduced into the mix. A recording meter, visible at all times and equipped with a ticket printout, shall indicate this quantity.

c. Mixer shall provide positive control of the flow of water and admixtures. Water flow shall be indicated by flow meter and shall be readily adjustable to accommodate minor variations in aggregate moisture.

d. Mixer shall be capable of being calibrated to automatically proportion and blend all components of indicated composition on continuous or intermittent basis as required by the finishing operation, and shall discharge mixed material through a chute directly in front of the finishing machine. Notify the Engineer a minimum of 48 hours prior to calibration of the mobile mixers. Before approving the calibration of the mobile mixer, the Engineer will witness the calibration of the mobile mixer. However, the Contractor is responsible for testing the mix produced. Allow the Engineer to test the concrete mix at any time.

e. Calibrate mixer to accurately proportion the specified mix. Certification of calibration by an Engineer approved testing agency will be accepted as evidence of this accuracy, provided such certification attests the yield to be true within the following tolerances (by weight):

Coarse Aggregate	+/- 2%
Fine Aggregate	+/- 2%
Cement	+/- 1%
Water	+/- 1%
Admixtures	+/- 3%
Latex	+/- 1%

f. Mix in accordance with the specified requirements for the equipment used. The concrete, as discharged from the mixer, shall be such that finishing operations can proceed at a steady pace with final finishing completed before the formation of the plastic surface film.

g. Repair mixers not functioning in a manner the Engineer considers acceptable. If repair is not practical, remove the mobile mixer from the construction site and replace it with one which functions properly.

h. Prior to production, test the moisture content of the fine aggregate and coarse aggregate. Adjust the water gage setting only in the presence of the Engineer, to produce the approved mix water to cement ratio. Test the moisture content of the fine aggregate and coarse aggregate every 3 hours during production, or when the mobile mixer is loaded with aggregates from a stockpile different from the one for which moisture content tests were performed, whichever occurs first. Make adjustments in the presence of the Engineer. For Latex Modified Concrete, the maximum permissible moisture content of fine aggregate and coarse aggregate shall be 6.0% and 3.0%, respectively, as determined in accordance with ASTM C 566. If these limits are exceeded, stop concreting operations until drier aggregates are obtained. Allow the Engineer to view and copy all records for moisture content testing at any time.

3.03 PLACEMENT FIELD REQUIREMENTS

A. During all concrete placements at the construction site, the Contractor shall have an individual in a supervisory capacity present with a valid certification from one of the following programs:

1. ACI Concrete Transportation Construction Inspector or Concrete Construction Special Inspector.
2. New Jersey ACI Chapter's "Concrete Construction Technology" course.

B. Prior to any construction site delivery of concrete, furnish, deliver and maintain insulated curing boxes of sufficient size and strength to contain all the specimens (cylinders and beams) made by the Engineer in any two (2) consecutive Work periods. Such boxes shall be equipped to regulate the temperature in the range of 60 deg F to 80 deg F or 68 deg F to 78 deg F when the design compressive strength is 6000 psi or greater, and to provide the moisture to maintain the curing conditions specified in ASTM C 31. During hot weather when the temperature is greater than 80 deg F, maintain the temperature of the concrete specimens in the required range by immersing them in a water bath. Cover the water bath to prevent direct sunlight from raising the water temperature. Completely remove and replace the water in the bath every day. Locate the boxes where directed by the Engineer. Protect boxes from vibration and other disturbances during specimen curing.

C. Keep this Specification and the following ACI publications available at all times at the construction site:

1. ACI 301.
2. ACI 302.1R.
3. ACI 305R.
4. ACI 306R.
5. ACI 308.
6. ACI 309R.
7. ACI 318.

D. Ensure that the concrete supplier keeps this Specification and the following ACI publications available at all times at the batching location:

1. ACI 211.
2. ACI 213.
3. ACI 304R.

E. Bonding New Concrete to Existing Concrete

Where new concrete will be placed against existing concrete surfaces:

1. Surface to receive concrete shall be soaked and kept wet with water for one (1) hour prior to placement of material. Puddles of standing water shall be removed immediately prior to placement.

2. A thin layer of material from the leading edge of the concrete being placed shall be broomed into the wetted surface. Care shall be exercised to ensure that all vertical as well as horizontal surfaces receive a thorough, even coating and that the rate of progress is controlled so that the broomed material does not dry before being covered with additional material as required for final grade.

F. Placing Concrete (excluding pavements)

1. Place concrete only in the presence of the Engineer and by methods approved by him.
2. For concrete cast against earth or an approved compacted subgrade, and for concrete overlays, place concrete against surfaces in a saturated surface dry condition.
3. Prior to placing concrete, remove all standing water or puddles.
4. Do not place concrete on or next to frozen surfaces.
5. Transfer concrete from mixer to place of deposit as rapidly as practical to prevent formation of cold joints.
6. Use equipment and methods for placing which permit rapid placement of concrete of the required consistency and which preclude segregation.
7. The method and equipment used to transfer concrete from mixer to forms will be subject to prior approval by the Engineer. Do not use any pipes, chutes or other equipment made of aluminum.
8. Subject to the foregoing requirements, convey concrete by approved conveyors, pipes, chutes or spouts to a point not more than five feet horizontally or vertically from its final position, unless otherwise approved by the Engineer.
9. Concrete for fill in steel reinforced pipe piles, steel shells or caissons shall be deposited using a metal (not aluminum) hopper and an elephant trunk. The hopper and elephant trunk shall be set above the top of piles, steel shells or caissons to permit the escape of air as the concrete is placed. Elephant trunks shall be removed in sections while filling piles, steel shells or caissons from bottom of reinforcing cage to top of piles, steel shells or caissons. Elephant trunks shall extend a minimum distance of 10 feet below top of pile, steel shell or caisson or to bottom of reinforcing cage, whichever is greater. The top 15 feet of the concrete poured from the top shall be vibrated or rodded. No cold joints will be permitted during concreting operations, unless otherwise noted on the Contract Drawings.
10. Except where otherwise approved by the Engineer, consolidate concrete by internal mechanical vibration subject to the following:
    a. Type, number and method of application of vibrators will be subject to prior approval by the Engineer.
    b. Apply vibrators at points not more than 30 inches apart for time intervals of approximately 10 seconds.
    c. Do not use vibrators to move concrete horizontally.
    d. In locations where spading is approved in lieu of mechanical vibration, spade coarse aggregate away from the forms and into the plastic mass; rod concrete around embedded materials and into corners and spaces to be filled and use only approved equipment.

11. Prevent formation of laitance and accumulation of excessive water on surface of concrete as it is deposited. Remove any accumulated bleed water by approved means before placing other concrete.

12. Place concrete so as to require as little rehandling as possible. Place and spread concrete using an approved mechanical spreading device that prevents segregation of the materials. Place continuously between contraction joints. Perform necessary hand spreading with shovels, not rakes.

13. Deposit concrete as near to joints as possible without disturbing them but do not discharge onto a joint assembly unless placement is centered above the joint assembly.

14. Thoroughly consolidate concrete against and along the faces of all forms and previously placed concrete and along the full length and on both sides of all joint assemblies by means of vibrators inserted in the concrete. Do not permit vibrators to come in contact with a joint assembly, base course or a side form. In no case shall the vibrators be used to move the concrete.

15. Screed and float concrete for riding surfaces as it is placed and use an approved evaporation retardant or fog spray.

G. Concrete Placing and Finishing Equipment for Bridge Decks and other Riding Surfaces (except for FAA pavements)

1. For slab or overlays 8 inches or more thick use internal vibrators. Internal vibrators shall be gang-mounted and supplemented with manual vibrators subject to the following:

   a. Use manual, hand-held vibrators adjacent to joint assemblies and similar locations where gang-mounted vibrators are not practical.

   b. Check all vibrators prior to the start of Work and periodically during construction progress to verify that they are working properly.

2. For slab or overlays less than 8 inches thick, vibrating surface pans or screeds will be allowed.

3. Manual tools such as bull floats, trowels, brooms and other similar hand tools are acceptable.

H. For placement and finishing of concrete pavements, see Section 02513 entitled "PLACEMENT OF PORTLAND CEMENT CONCRETE PAVING (FAA)".

I. Consolidation and Finishing

1. Bridge Decks and other Riding Surfaces

   a. Machine finishing shall conform to NJDOT Standard Specifications for Road and Bridge Construction 2007 Subsection 1005.02, .03 and .04.

   b. Finishing at and adjacent to joints shall conform to NJDOT Standard Specifications for Road and Bridge Construction 2007 Subsection 405.03.02 Item C.

c. Hand finishing methods will not be permitted, except under the following conditions: (1) in the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade; (2) in areas of narrow widths or of irregular dimensions where operation of the mechanical equipment is impractical. Concrete, as soon as placed, shall be struck off and screeded using an approved portable screed. Use a second screed shall for striking off the bottom layer of concrete when reinforcement is used.

The screed for the surface shall be at least 2 feet longer than the maximum width of the slab to be struck off. It shall be of approved design, sufficiently rigid to retain its shape, and shall be constructed either of metal (not aluminum) or of other suitable material covered with metal. Consolidation shall be achieved by the use of suitable vibrators.

d. After the concrete has been struck off and consolidated, it shall be further smoothed and trued by means of a longitudinal float using one of the following methods:

(1) Long-handled floats shall be not less than 12 feet in length and 6 inches in width, stiffened to prevent flexibility and warping. The float shall be operated from foot bridges spanning but not touching the concrete or from the edge of the pavement. Floating shall pass gradually from one side of the bridge deck to the other. Forward movement along the centerline of the pavement shall be in successive advances of not more than one-half the length of the float. Any excess water or laitance in excess of 1/8-inch thick shall be removed and wasted.

(2) The Contractor may use a machine composed of a cutting and smoothing float(s), suspended from and guided by a rigid frame and constantly in contact with, the side forms or underlying surface. If necessary, long-handled floats having blades not less than 5 feet in length and 6 inches in width may be used to smooth and fill in open-textured areas in the pavement. When the crown of the bridge deck will not permit the use of the mechanical float, the surface shall be floated transversely by means of a long-handled float. Care shall be taken not to work the crown out of the pavement during the operation. After floating, any excess water and laitance in excess of 1/8-inch thick shall be removed and wasted. Successive drags shall be lapped one-half the length of the blade.

e. While the concrete is still in a workable condition, test it for trueness with a Contractor-furnished 16-foot straightedge swung from handles 3 feet (1 m) longer than one-half the width of the slab. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other, as necessary. Advance in successive stages of not more than one-half the length of the straightedge. Any excess water and laitance in excess of 1/8-inch thick shall be removed from the surface of the bridge deck and wasted. Any depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated and refinished. High areas shall be cut down and refinished. Special attention shall be given to ensure that the surface across joints meets the smoothness requirements set forth in 2.04 B. Straightedge testing and surface corrections shall continue until the entire surface is free from observable departures from the straightedge and until the slab conforms to the required grade and cross section. The use of long-handled wood floats shall be confined to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment. Test the surface across the joints with a 16-foot straightedge as the joints are finished and correct any irregularities in excess of 1/4 inch before the concrete has hardened.

2. Specified concrete finishes, as shown on the Contract Drawings, shall be in accordance with the following requirements:

a. "Smooth Finish": A surface of concrete obtained by the use of special forms as specified in Division 3 Section entitled "Concrete Formwork". Remove all fins and other irregularities in the exposed surfaces of concrete by rubbing the irregularities with a carborundum brick and clean fresh water. Any mortar patches shall be rubbed with a carborundum brick as above specified.

b. "Scored Finish": A surface of concrete obtained by roughening in an approved manner or by etching with sharp-pointed steel tools to key or otherwise improve the mechanical bond of the surface. Such scoring shall roughen at least ten percent of the area so scored.

c. "Float Finish": A surface of concrete obtained by the use of a wood float. Apply float finish to horizontal surfaces immediately after screeding and before initial setting has begun.

d. "Trowel Finish": A surface of concrete obtained by the use of a steel trowel, after screeding and floating the surface of the concrete to produce a dense, smooth, even surface suitable for painting or the application of floor covering. The troweling shall not take place until the surfaces have set sufficiently to sustain knee boards without damage. Troweling shall eliminate all irregularities and leave the concrete surface with a smooth, hard finish, free from marks and blemishes to the satisfaction of the Engineer.

e. "Traction Finish": A monolithic layer of abrasive concrete having a minimum thickness of 3/4 inch and which shall be "Emericrete SH", as manufactured by the Sika Corporation, or approved equal. Prepare the base and install the monolithic finish in accordance with the recommendations of the manufacturer of the abrasive concrete. The surface shall be given a wood float finish. The sides and edges of pavement slabs shall be rounded with an approved edging tool to the minimum radius obtainable in the sole opinion of the Engineer.

f. "Burlap Finish": A surface of concrete obtained by the use of a burlap drag, after screeding and floating the surface of the concrete. Drag the burlap in one direction in a straight line before initial setting has begun and in such a manner that the full width of the slab being finished is dragged in one operation. Prepare the surface prior to dragging by working from a bridge that does not come in contact with the fresh concrete at any point. The use of any burlap that causes irregularities or grooves greater than 1/16 inch in depth in the concrete surface will not be permitted. Rinse or wash burlap as often as is necessary to prevent the presence of hardened particles and consequent scarring of the concrete.

g. Stair treads and platforms of steel stairs shall be filled with mortar mixed in the proportions of one part Portland cement to three parts of fine aggregate, mixed with water to a satisfactory consistency. Coat the surface of the mortar with three pounds of aluminum oxide crystals per square yard of surface, uniformly applied, and trowel the surface to a smooth hard finish. Aluminum oxide crystals shall be grade AL203 crystals ranging from No. 12 to No. 30 in size and shall contain not more than six percent of iron or other impurities.

h. "Broom Finish" shall be subject to the following:

(1) Finish the concrete when the water sheen has practically disappeared. Use push broom or floor brush type, not less than 18 inches wide and made of good quality bass or bassine fibers not more than 4-1/2 inches long and with handles longer than half the width of the slab.

(2) Use an adequate number of brooms to keep up with other operations. Achieve proper finish prior to initial set of the concrete.

(3) Wash and thoroughly dry brooms at frequent intervals and remove worn or damaged brooms from the construction site.

(4) Draw broom across previously finished surface from the centerline to each edge of the slab with a slight overlap of strokes.

(5) Corrugations made in surface shall be uniform, approximately 1/16 inch in depth, and not more than 1/8 inch in depth.

(6) Complete brooming before concrete reaches a condition that would result in the surface becoming torn or unduly roughened and before initial set of concrete.

(7) Immediately following brooming, carefully finish the edges of slab along sides and at joints with an approved edging tool to form a smooth rounded surface of required radius and subject to the following:

(a.) Where corners or edges of slabs have crumbled and at any areas which have leaked sufficient mortar to make proper finishing difficult, remove loose fragments and soupy mortar, fill solidly with a mixture of correct proportions and consistency and finish.

(b.) Edges shall be smooth, true to line and free of unnecessary tool marks.

i. "Saw Cut Grooved Surface" for deck slabs and overlays shall conform to the requirements of the NJDOT Standard Specifications, Division 500 Subsection 507.03.02, Item L.

j. Concrete Curbs and Sidewalks

(1) Give sidewalks a "Float Finish", tool edges and joints for a width of 2 inches and round corners to a radius of 1/4 inch with an approved edging tool.

(2) Install expansion joints at not more than 20-foot intervals in sidewalks with matching joints in curbs. Use 1/4-inch bituminous joint filler.

(3) Score sidewalks in squares as approved by the Engineer.

J. Pump Concrete

1. Grout used to prime the pump line shall not be included in the placement. Dispose of the grout at the end of the pump line off Authority property. Do not begin placement until concrete is visible at the end of the pump line.

2. Allow no water to enter the pump hopper at any time during placement operations.

3. Submit written procedures for pumping to the Engineer for approval. The procedures shall contain, but shall not be limited to, pumping scheme, pump description, line diameter, line length and the number of turns and line offsets.

K. Silica Fume Concrete and Fibrous Concrete

1. Arrange for qualified technical representatives from the silica fume and the fiber suppliers, who are experienced in the batching and placement of silica fume and fibrous concrete, to be present for the pre-concrete construction meeting, all test pours and the first two production pours.

L. Fog spray forms, steel reinforcement and subgrade with potable water immediately prior to the placement of fresh concrete. Maintain uniform moisture of the subgrade without standing water, soft spots or dry areas.

3.04 CURING

A. Carefully cure all concrete. Submit a curing procedure plan for approval by the Engineer prior to placing any fresh concrete. Perform curing in accordance with ACI 308 and the following specifications. Commence curing procedures immediately after fresh concrete has been placed.

1. Provide suitable means, such as insulating blankets or heated enclosures, for maintaining a concrete temperature of at least 50 deg F after placement. At the end of this period, remove protection in such a manner that the drop in temperature of any portion of concrete is gradual and does not exceed the following within the first 24 hours after removal of protection, in accordance with ACI 306R, Table 3.1: 50 deg F for applications with a minimum dimension less than 12 inches; 40 deg F for applications with a minimum dimension between 12 and 36 inches; 30 deg F for applications with a minimum dimension between 36 and 72 inches; and 20 deg F for applications with a minimum dimension greater than 72 inches.

2. Allow all concrete to attain 4,000 psi compressive strength before exposure to freeze-thaw cycles.

3. Choice of curing material and method shall be as approved by the Engineer.

B. Wet Curing

1. All pavement concrete and structural slabs: Immediately after screeding of the concrete, apply an evaporation retardant, or commence the operation of a fog spraying system to keep moisture in the atmosphere surrounding the concrete until all concrete finishing has been completed. Do not direct fogging at the fresh concrete and do not permit ponding of water on the fresh concrete surface.

2. Perform wet curing for the following concrete applications: overlays, deck slabs, ramps, any concrete mixes containing silica fume, Very High Early Strength Cement and formulated latex modifier.

3. Immediately after finishing concrete, cover the surfaces with wet burlap or cotton mats which have been presoaked for a minimum of 24 hours in potable water, so that no marring of the surface occurs. Keep the burlap or cotton mats continuously moist, 24 hours per day, through the use of a fog spraying system or soaker hoses arranged at the high points of the concrete pour. Burlap, which shall consist of two or more layers, or cotton mats shall overlap a minimum of one foot, and shall be at least one foot longer than necessary to cover the entire width and edges of the pavement lane. The burlap or cotton mats shall be weighted down to prevent displacement.

   a. Inspect sheet material before reuse. Repair all holes and tears with cemented patches, subject to approval by the Engineer.

4. Wet curing procedures may be stopped only (1) when the ambient temperature is expected to fall below 35 deg F within 24 hours, (2) when placing concrete for slabs directly adjacent to the fog spraying system or soaker hoses or (3) when concrete is to receive traffic.

   a. When the ambient temperature at the surface of placement is 35 deg F and falling, wet curing will not be permitted; instead, apply a liquid membrane forming curing compound in accordance with 2.02 R and 3.04 C.1.a.

   b. When wet curing is temporarily interrupted for an adjacent placement, remove all standing water in areas to receive fresh concrete prior to placement. Occasionally spray a fine mist of water over the wet curing areas. Do not puddle water on the surface of the fresh concrete. When the fresh concrete is finished and covered with burlap or cotton mats, reassemble the continuous fog spraying system or soaker hoses and continue wet curing immediately.

   c. Areas in which the concrete will be exposed to traffic shall be wet cured for as long as possible. Wet curing may stop only when there is just enough time to apply a liquid membrane forming curing compound over the entire area prior to reopening it to traffic. In this case, apply the liquid membrane forming curing compound when the surface has no standing water or puddles on the surface, but is in a damp condition.

5. Wet cure for 7 days, or until 75% of the design compressive strength is obtained, whichever is longer, when determined by strength tests performed on sample cylinders cast in the field and cured in the same manner as the concrete.

6. Immediately after wet curing procedures are completed, apply a liquid membrane forming curing compound in accordance with 2.02 R and 3.04 C.1.a.

7. Contain water within the area of work.

8. For latex modified concrete, wet cure for a maximum of 48 hours, unless otherwise directed by the Engineer.

C. Liquid Membrane Forming Curing Compounds and Sheet Materials for Curing

1. Immediately after placing or finishing, commence the curing process of concrete not covered by forms from loss of moisture. Use one of the curing materials listed in 2.02 R, which may be supplemented by initially using an evaporation retardant listed in 2.02 S, as long as wet curing is not required, subject to the following:

   a. Apply white pigmented liquid membrane forming curing compound as soon as surface moisture has evaporated by approved pressure spraying or distributing equipment in two uniform full applications perpendicular to each other as recommended by the manufacturer. Allow the first coat to become tacky before applying the second coat. Each application shall be the full quantity recommended by the manufacturer. The entire surface shall be white after the second application.

      (1) Recoat areas subjected to heavy rainfall within 3 hours after rain.

      (2) Follow manufacturer's recommendations for agitation during application and warming where necessary during cold weather. Do not use liquid membrane forming curing compound where the surface being cured is to receive a finish that will be bonded to the concrete surface or where a floor hardener is to be applied, unless a certification of compatibility and a minimum five-year performance record is submitted in advance to the Engineer for approval.

      (3) The Engineer will check for uniformity through random sampling and testing. Testing may include determination of membrane infrared spectrum, pH, specific gravity and solids content.

2. Removal of Forms

   Removal of forms shall be subject to the following:

   a. Remove forms in accordance with the requirements of Specification Section 03100 entitled "Concrete Formwork" or Section 02513 entitled "Placement of Portland Cement Concrete Paving (FAA)".

   b. After removal of forms, patch areas of concrete which in the opinion of the Engineer show excessive honeycomb by cutting out defective areas, keying and refilling them with a mortar of cement and sand in the same proportions as those in the approved concrete mix design and sufficient water to provide a workable mix.

   c. After forms are removed, cure sides of slabs greater than 12 inches in thickness in accordance with 3.04 C.

d. Immediately after removal of forms, holes and voids in the surfaces of concrete, resulting from bolts and ties, shall be wetted and filled with a mortar containing cement and fine aggregate in the same proportions as in the approved concrete mix design, and utilizing cement which shall produce mortar of the same color as the concrete. Exposed mortar surfaces shall then be finished smooth and even with a wood float, except that those surfaces exposed to view in the finished structure shall be finished with a steel trowel to match adjacent surfaces. All fins and other surface irregularities shall be removed promptly by chipping, grinding or other methods approved by the Engineer to give a uniform finish. Where no specific surface finish for formed concrete surfaces is indicated on the Contract Drawings, no further finishing will be required.

e. Drop in concrete surface temperature over the first 24 hours shall be controlled in accordance with ACI 306.

3.05 QUALITY ASSURANCE TESTING, SAMPLING AND INSPECTIONS

A. The Engineer will perform Quality Assurance testing during mixing and placing of concrete on samples taken from the end of the pump line or at the point of discharge in accordance with ASTM C 172. The Engineer will take samples of concrete from each Lot during a single Work period based on random sampling procedures contained in ASTM D 3665. A Lot of concrete is defined as the production of a single Work period. For each Sublot, the Engineer will cast cylinders in accordance with ASTM C 31 when testing for compressive strength, as well as 4" x 8" cylinders when permeability is being tested and beams when flexural strength is being tested. The cylinders and beams will be tested in accordance with ASTM C 39 and ASTM C 78, respectively, for each Sublot to determine the compressive strength and flexural strength at the time requirements specified.

TABLE 1

LOTS AND SUBLOTS

Daily Placement Quantity (Cubic Yards)	Number of Lots	Number of Sublots
Less than 50	Note 1	Notes 1 and 3
50 – 100	1	3 equally divided
101 – 450	1	4 equally divided
Greater than 450	1	Note 2

Table 1 Notes:

1. If one Work period's placement of a given Class of concrete is less than 50 cubic yards, it will not constitute a Lot. It will be added either to the previous or the next Work period's Lot, whichever is closer in time, or until a minimum of 3 Sublots are completed constituting a Lot.

2. For concrete placements of 450 cubic yards or greater, a Sublot will be deemed to be one fourth of a Lot of concrete, or 150 cubic yards of concrete, whichever is less. For larger pours the Engineer may increase the number of cubic yards that constitute a Sublot.

3. If the total concrete quantity under the Contract for any type of mix is less than 50 cubic yards, it will constitute one Lot and will be divided into a minimum of 3 Sublots, regardless of the placement schedule.

B. Quality Assurance Testing Standards and Frequency of Testing: Some or all of the following procedures will be used by the Engineer to approve the concrete mix proportions and evaluate the in-place concrete for Adjustments to Contract Compensation:

1. Compressive Strength: In accordance with ASTM C 31 and ACI 318 Part 3, Chapter 5, Item 5.6, entitled "Evaluation and Acceptance of Concrete", except that the Engineer will take samples on a random basis and 4" x 8" cylinders will be used when the nominal maximum size of the coarse aggregate allows. Latex Modified Concrete samples will be wet cured by the Engineer for 1 day and dry cured for 27 days. The cylinders will be tested in accordance with ASTM C 39. The Engineer will calculate the average of two test specimens at the compressive strength time requirement. The average of the two test specimen result values for each Sublot will be considered the Sublot compressive strength value.

2. Flexural Strength: From each Sublot sample, cast beams in accordance with ASTM C 31. The Engineer will test the beams in accordance with ASTM C 78 and will calculate the average of two test specimens at the flexural strength time requirement. The average of the two test specimen result values for each Sublot will be considered the Sublot flexural strength value.

3. Slump Test: Performed by the Engineer at the point of delivery during the time of placement in accordance with ASTM C 143 or ASTM C 1611 when self-consolidating concrete is used. For Latex Modified Concrete, the Engineer will perform slump tests 5 minutes after sampling from the mixer. For pile concrete applications, the slump shall be no less than 4 inches and no greater than 6 inches.

4. Air Content Test: Performed during the placement in accordance with ASTM C 138, ASTM C 173 or ASTM C 231. The Engineer will perform one test for each Sublot, which will be considered the Sublot air content test value.

   a. When results for either two consecutive tests or three tests in one lot or one day's production indicate that the air content is outside the Quality Limits specified in 2.04 A.6 by +1.0 or –0.50% do not place the next load until it has first been tested and satisfactory test results have been obtained. If the air content for the next load is outside the Quality Limits specified in 2.04 A.6, it will be rejected. The Engineer will test subsequent loads until the air content is found to be within the specified limits of 2.04 A.6.

5. Unit Weight: The Engineer will determine the plastic unit weight of concrete (taken at the same frequency as specified in 3.05 B.4 according to ASTM C 138). For lightweight concrete, the plastic unit weight, as determined in accordance with ASTM C 567, shall not exceed 125 pounds per cubic foot, unless otherwise specified.

6. Water Content Test: The Engineer will test for water content during the placement using a Microwave Drying Oven, in accordance with AASHTO T 318. He may adjust drying times depending on the mix constituents to achieve a constant dry weight. Once the water content has been determined, it will be divided by the cementitious content in the mix design to determine the water to cement ratio. When the maximum aggregate size exceeds 1-1/2 inches, the Engineer will obtain a sample of approximately 5000 grams. This sample will be split and the Engineer will perform two separate analyses. The weighted average of the two separate analyses will be considered the Sublot water content value. Likewise, the Engineer will compute the sublot water cement ratio as given above.

a. When results for either two consecutive tests or three tests in one lot or one day's production indicate that the water content exceeds the limits given in 2.03 A.4 by 0.10, do not place the next load until it has first been tested and satisfactory test results have been obtained. If the water content for this load is greater than the Upper Limit given in 2.04 A.5, it will be rejected. The Engineer will test subsequent loads until the water content is found to be within the limit given in 2.04 A.5.

7. Coulomb Test: To evaluate the permeability of the concrete the Upper Quality Limit, UQL, shall be 1700 Coulombs for mixes without a corrosion inhibitor and 2200 Coulombs for mixes containing a corrosion inhibitor, as tested by the Engineer in accordance with AASHTO T 277 after a 28-day wet cure. For mixes containing only fly ash or slag (no silica fume or metakaolin) permeability will be evaluated at 90 days, using the same performance requirements stated above (1700 Coulombs for mixes without a corrosion inhibitor and 2200 Coulombs for mixes with a corrosion inhibitor). For Latex Modified Concrete applications, samples will be wet cured for 7 days and dry cured for 21 days. For each Sublot, the Engineer will cast two (2) 4" x 8" cylinder specimens for each Sublot. The Engineer will cut 2-inch thick samples from the center of each cylinder for testing. The average of the two test specimen result values for each Sublot will be considered the Sublot Coulomb test value.

8. Bond Strength: The bond strength between overlay concrete and parent concrete will be evaluated in accordance with ASTM C 1583. For each Sublot, the Engineer will perform three tests. Three 4-inch diameter cores will be cut 1/2 inch into the parent concrete to isolate the overlay concrete. The average of the three test result values for the Sublot will be considered the Sublot bond strength test value. The locations for each test will be randomly determined by the Engineer.

9. Chloride Ion Concentration by Weight of Cement: The Engineer may perform testing for both the acid soluble and water soluble chloride ion concentrations by weight of cementitious material, which will be evaluated as follows. Powder samples from 28-day concrete cylinders, cast from the concrete mix delivered to the construction site, will be tested to assess both the acid soluble and water soluble chloride ion concentrations by weight of cementitious material. Samples will be obtained using a rotary hammer drill from the mid-height of a minimum of two Sublot specimens from each Lot. The sample will be obtained from the inner three inches of the cylinder specimen, and must be a minimum of 40 grams in weight. The acid soluble and water soluble chloride ion concentrations by weight of cementitious material will be determined by the Materials Engineering Unit in accordance with preparatory standards ASTM C 1152 and ASTM C 1218, respectively, followed by ASTM C 114 (silver nitrate titration) for both the acid soluble and water soluble chloride ion analysis.

10. Pavement Thickness: The Engineer will perform acoustical testing using Impact Echo instrumentation to determine the pavement thickness. Areas indicating pavement thickness below the requirements shown on the Contract Drawings will be cored for verification. The cores will be measured in accordance with ASTM C 174. The average of three test result values for the Sublot will be considered the Sublot test value.

11. Where specified the Engineer will place Remote Temperature Sensing Devices in the in situ concrete to record maximum core temperature and maximum drop of temperature for 24 hours after protection has been removed.

12. Test Cores for Tremie Concrete

    a. The Engineer will drill test cores for every 100 cubic yards of concrete placed in mass pours, such as tremie seal, or one core for every 1000 square feet of surface of thin pours, such as bulkheads or wall facings. Cores will be obtained in accordance with ASTM C 42 and will be drilled full depth (or thickness) through the pour horizontally or vertically as applicable.

    b. Recovery of less than 95 percent will be considered to indicate defective concrete requiring corrective action by the Contractor.

    c. If the cores reveal voids, honeycombing, seams or other defects, the concrete will be subject to rejection for non-uniformity. Additional cores may be obtained by the Engineer for further investigation. The number and location of cores will be determined by the Engineer. All additional cores will be taken at the sole expense of the Contractor.

    d. Fill all test core holes by pressure grouting from the bottom upward, or from the inside out, as the case may be.

    e. Clean out and fill all voids, honeycombing, seams and other defects by pressure grouting with cement or sand-cement to the Engineer's satisfaction. At the Engineer's request and at the sole expense of the Contractor, drill additional cores to verify grouting.

C. In accordance with the Section of Division 1 entitled "Inspections and Rejections", provide labor and means for obtaining all samples required for trial batches and field testing performed by the Engineer. At no additional cost to the Authority, furnish and deliver the following when requested by the Engineer:

1. Provide a representative sample, in the quantity requested by the Engineer, of all cement, fly ash, slag, silica fume, fine and coarse aggregate, admixtures, corrosion inhibitor, latex, fibers, pigment, evaporation retardant and liquid membrane forming curing compound during any day of production the Engineer requests a sample. Take such samples in the presence of the Engineer at the point of storage used for the Work of this Contract. For cement, fly ash, slag and silica fume samples, only use a sampling port on the silo, or drop material in a loader bucket between loads, or take samples from the boot using a "Sample Thief" during loading. Notify the Engineer of aggregates being loaded at their source of supply at least 48 hours in advance of each loading.

2. Provide the cement, fly ash, slag, silica fume or metakaolin manufacturer's Mill Test Certificate and Bill of Lading, if such documents are requested by the Engineer.

3. Allow the Engineer to sample any mix proportion constituents at any time.

D. The Engineer may direct an inspection of the Contractor's concrete plant or precast concrete fabricator to observe operations and review the Quality Control procedures being implemented. Notify the Engineer, in writing, a minimum of 15 days prior to the commencement of production and submit a schedule and Quality Control Plan for all production for the Work of the Contract.

E. Precast Concrete: Obtain from the fabricator and submit to the Engineer a set of approved shop drawings for the Work of the Contract. Fabrication without shop drawings will not be permitted. Clearly mark all precast units with identification numbers for each unit. The Engineer will provide a manifest ticket to be attached to the driver's shipping ticket listing the approved unit identification numbers. Any units shipped to the construction site that are not approved or are not listed on the manifest will not be permitted to be unloaded at the construction site. Shipments not accompanied by a manifest upon delivery will not be permitted to be unloaded at the construction site.

F. For concrete where riding surface tolerances are required, other than pavements, as indicated on the Contract Drawings, the following requirements must be met:

1. The Engineer will test the entire surface of the hardened concrete with a rolling straight edge for conformance to the smoothness requirements. Surface smoothness deviations must not exceed 1/4 inch in 16 feet. Tests will be made in both the longitudinal and transverse direction of the slab and shall span joints. Correct any deficiencies as specified in 4.01 G.1.H and at no cost to the Authority.

2. The Engineer will survey the slab surface for vertical deviation from grade. Vertical deviation from the grade shown on the Contract Drawings must not exceed plus or minus 0.04 foot at any point.

3. The Engineer will determine finished grade by running levels at intervals of 25 feet longitudinally and transversely. Correct all deficiencies as specified in 4.01 G.1.H and at no cost to the Authority.

G. Specified concrete finishes, as shown on the Contract Drawings, must conform to the requirements set forth in 3.03 H.2. Correct all deficiencies as specified in 4.01 G.1.I and at no cost to the Authority.

PART 4. ADJUSTMENTS TO CONTRACT COMPENSATION

4.01 GENERAL

A. Unless otherwise shown on the Contract Drawings, acceptance of material will be based on the method of estimating Percentage of Lot Within Specification Limits (PWL), where the PWL will be determined in accordance with this Section. All Sublot test result values for a Lot, as defined in 3.05 A, Table 1, will be analyzed statistically to determine the total estimated Percent of the Lot that is Within specification Limits, as shown in 4.01 B. The PWL is computed using the Lot sample Average value, $\overline{X}$, as defined in 4.01 D.3 and the Lot sample standard deviation, S_N, as defined in 4.01 D.4, for the specified number of Sublots, n, and for the specification Quality Acceptance Limits, as defined in 2.04 A, where LQL represents the Lower Quality Limit, and UQL represents the Upper Quality Limit, as they apply to each particular acceptance parameter. From these values, the respective Quality Index(ices), Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed in accordance with 4.01 D.5 and 4.01 D.6. Then the PWL for the Lot for the specified number of Sublots, n, is determined from Table 4, "Percent of Lot Within Limits (PWL) (Standard Deviation Method)". The Adjustment to Contract Compensation for each Lot is then calculated using the formulas specified in 4.01 F.

B. Depending on the application, concrete will be tested for the properties shown below. The PWL of each Lot for each parameter will be determined as specified in 4.01 D. Payments will be based on the concrete application for a Lot and the criteria defined below.

Performance Parameters	Minimum PWL
Flexural Strength	95
Compressive Strength	95
Permeability	90
Bond Strength	80
Water to Cement Ratio	80
Air Content	70*
Pavement Thickness	90
Chloride Content	100**

*denotes that in addition to the minimum PWL, the air content will also be evaluated for the average of test results for a given Lot of concrete as per 3.05 B.4 and 4.01 J.

**denotes that the chloride content (acid soluble and water soluble) will be analyzed only for the average of test results for any given Lot of concrete, as per 3.05 B.9 and 4.01 G.1.b.

Table 2 defines the Quality Acceptance performance criteria to be evaluated for Adjustments to Contract Compensation for a given concrete application. In addition, all concrete shall conform to the requirements of 4.01 G. Any deficiencies found to exist as specified in 4.01 G will govern and the Contractor shall either:

1. Remove and replace the concrete in that particular Lot at no cost to the Authority, or

2. Accept a deduction of 50% of the Base Price per cubic yard, as indicated on the Contract Drawings, for that particular Lot of concrete.

TABLE 2
PERFORMANCE CRITERIA PARAMETERS

Category/ Application	Water/Cement Ratio (W/C)	% Air	Permeability	Bond Strength	Compressive Strength	Flexural Strength	Pavement Thickness
Category I - Full Depth Pavements & Unbonded Overlays							
	I	I	---	---	---	P	
LQL:	---	*	---	---	---	700 psi	97%
UQL:	0.45	*	---	---	---	---	---
Category II - Bonded Pavement Overlays							
	I	I	---	P	I	---	---
LQL:	---	*	---	150 psi	***	---	---
UQL:	0.45	*	---	---	---	---	---
Category III - Elevated Structural Overlays							
	I	I	I	P	I	---	---
LQL:	---	*	---	150 psi	***	---	---
UQL:	0.45	*	**	---	---	---	---
Category IV - Structural (exposed to freeze-thaw and/or sulfates, in addition to chlorides or a marine environment)							
	I	I	P	---	I	---	---
LQL:	---	*	---	---	***	---	---
UQL:	0.45	*	**	---	---	---	---
Category V - Structural (exposed to freeze/thaw and/or sulfates only; no exposure to chlorides or a marine environment)							
	I	I	---	---	P	---	---
LQL:	---	*	---	---	***	---	---
SQL:	0.45	*	---	---	---	---	---
Category VI - Standard Structural (not exposed to freeze-thaw cycles) and Miscellaneous Applications (at-grade sidewalks, at-grade curbs, kerfs, foundations, footings, drainage structures, manholes, pipe pile fill and all concrete applications below grade)							
	---	---	---	---	P	---	---
LQL:	---	---	---	---	***	---	---
UQL:	---	---	---	---	---	---	---

* - Refer to 2.04 A.6.

** - 1700 Coulomb counts for mixes without a corrosion inhibitor and 2200 Coulomb counts for mixes with a corrosion inhibitor.

*** - The proportion compressive strength at 28 days or as specified on the Contract Drawings.

P - Used to Calculate Pay Factor per cubic yard. It denotes the concrete property that will be used to calculate payment for a given concrete application. No incentive payments will be made if the performance criteria parameters labeled 'I' for a given application have a PWL less than specified in 4.01 B.

I - Used to Calculate Incentive only when the Pay Factor for the parameter labeled 'P' is greater than 0.00.

C. Full Depth Pavement and Unbonded Overlay (Category I) Final Pay Factor: The Pay Factor for Pavement Thickness will govern only when the Pay Factor for Pavement Thickness is less than the Pay Factor for Flexural Strength, with the exception of when the Pay Factor for Pavement Thickness is 0.00.

D. Method of Estimating Percentage of Material Within Limits (PWL)

1. Locate sampling positions on the Lot by use of random sampling procedures specified in 3.05 A.

2. Take a test sample and make the test specimens on the test sample in accordance with 3.05 A.

3. Determine the Lot sample Average value, $\overline{X}$, by calculating the average of all Sublot test values.

4. Find the Lot sample standard deviation, S_N, by using the following formula:

$$S_N = \sqrt{\frac{d_1^2+d_2^2+d_3^2+ +d_n^2}{n-1}}$$

Where:

S_N = standard deviation of the Sublot test values

$d_1, d_2....$ = deviation from the individual Sublot test values

$X_1, X_2, ...$from the Average value, $\overline{X}$, that is,

$d_1 = (X_1 - \overline{X}), d_2 = (X_2 - \overline{X}), ..., d_n = (X_n - \overline{X})$

n = number of Sublots

5. Find the Lower Quality Index, Q_L, by subtracting the Lower Quality Limit, LQL, from the Average value, $\overline{X}$, and dividing the result by S_N.

$$Q_L = \frac{\overline{X} - LQL}{S_N}$$

6. Find the Upper Quality Index, Q_U, by subtracting the Average value, $\overline{X}$, from the Upper Quality Limit, UQL, and dividing the result by S_N.

$$Q_U = \frac{UQL - \overline{X}}{S_N}$$

7. The percentage of material above lower tolerance limit, P_L, and the percentage of material below upper tolerance limit, P_U, will be found by referring to Table 4, "Percent of Lot Within Tolerance Limit (PWL) (Standard Deviation Method)". Locate Q_L and/or Q_U in the column appropriate to the total number of Sublots, n, and reading the number under the column heading "PWL".

8. For concrete properties with only an Upper Quality Limit (ratio of water to cementitious material, permeability), PWL equals P_U. For concrete properties with a Lower Quality Limit (bond strength, compressive strength, flexural strength, pavement thickness), PWL equals P_L. For concrete properties with both Upper and Lower Quality Limits (air content), first calculate of the Upper Quality Index, Q_U, and the Lower Quality Index, Q_L, by using the Upper Quality Limit, UQL, and the Lower Quality Limit, LQL, respectively, as stipulated in 2.03 A.6. Then determine PWL using the following formula:

$$PWL = (P_U + P_L) - 100$$

E. Pay Factors for each Lot will be computed in accordance with the formulas contained in 4.01 F, Table 3 entitled, "Adjustments to Contract Compensation", by entering the PWL value and performing the calculation indicated for the appropriate PWL range to determine the Pay Factor.

F. Adjustments to Contract Compensation shall be calculated as follows:

TABLE 3

ADJUSTMENTS TO CONTRACT COMPENSATION PER CUBIC YARD

Percent Within Limits (PWL)	Compressive Strength Pay Factor
98 - 100	0.02 (PWL-100) +0.06
95 - 97	0.0
55 - 94	(PWL-95)/100
0 - 54	-0.50

Percent Within Limits (PWL)	Permeability & Bond Strength Pay Factor
91 - 100	0.006 (PWL - 90)
80 - 90	0.0
55 - 79	$0.00017PWL^2 - 0.0105PWL - 0.30$
0 - 54	-0.50

Percent Within Limits (PWL)	Flexural Strength Pay Factor
95 - 100	(PWL-95/100)+.01
55 - 94	(PWL-95)/100
0 - 54	-0.50

Percent Within Limits (PWL)	Pavement Thickness Pay Factor
90 - 100	0.00
55 - 89	(PWL-90)/100
0 - 54	-0.50

Pay Factors are multiplied by the Base Price per cubic yard established in the table below, unless otherwise indicated on the Contract Drawings. The result is the amount to be added or deducted from the compensation for that particular Lot of concrete.

Category	Base Prices for Adjustments to Contract Compensation Per Cubic Yd
I	$100
II	$90
III	$130
IV	$130
IV	$110 when silica fume or metakaolin are not included
V	$90
VI	$80

G. Correction or Cost Adjustments for Deficiencies

1. Remove and Replace Concrete: Remove and replace concrete in a manner approved by the Engineer and at no additional cost to the Authority if any of the following deficiencies exist, unless the Engineer elects to accept the concrete, at which time the Contractor will be compensated at 50% of the Base Price per cubic yard, regardless of the Pay Factors calculated in 4.01 F, Table 3:

   a. Percent Within Limits (PWL) for compressive strength, flexural strength, permeability, bond strength or pavement thickness is below 55.

   b. The average acid soluble chloride ions by weight of cementitious material test results for any given Lot of concrete exceed the limit of 0.10% (reinforced concrete) or 0.08% (prestressed concrete) weight of chloride ions by weight of cementitious material, in accordance with ASTM C 1152 and ASTM C 114, and the average water soluble chloride ions by weight of cementitious material test results for any given Lot of concrete exceed the limit of 0.08% (reinforced concrete) or 0.06% (prestressed concrete) weight of chloride ions by weight of cementitious material, in accordance with ASTM C 1218 and ASTM C 114. The Soxhlet test referenced in ACI 222R will not be considered for chloride evaluations.

   c. For all concrete applications, the cylinder compressive strength shall conform to the following:

      (1) The calculated average of any three consecutive compressive strength tests shall be equal to or shall exceed the specified compressive strength.

      (2) No individual compressive strength test result shall be below the specified compressive strength by more than 500 psi. When the required strength is 5000 psi or less, or by more than 0.10 of the specified strength when greater than 5000 psi is required.

      (3) If either or both of the requirements specified in 4.01 G.1.c.1 and 4.01 G.1.c.2 are not met, investigate the in-place compressive strength in accordance with ACI 318-02, Section 5.6.5, at no additional cost to the Authority. If the compressive strength test results of the in-place concrete fail to meet either or both of the requirements specified in 4.01 G.1.c.1 and 4.01 G.1.c.2, the concrete will be considered deficient, and 4.01 G.1 will apply.

d. Concrete slabs or structures that exhibit any cracks prior to opening to vehicular/aircraft operations or loading will be subject to the actions specified in 4.01 G.1. If the concrete is accepted by the Engineer, seal cracks in accordance with Specification Section 03734 entitled "Concrete Crack Repair" in a manner approved by the Engineer, and at no cost to the Authority.

e. Delamination Testing: The Engineer will check all concrete overlays using the chain drag method in accordance with ASTM D 4580. If more than 5.00% of the total surface area of the Lot is found to be delaminated, remove these areas and replace them at no cost to the Authority. The determination by the Engineer as to the existence of delaminations shall be final and binding.

f. Slabs showing high or low spots exceeding 1/2 inch when tested in accordance with 3.05 F.2.

H. Diamond Grinding and Partial Depth Removal

1. Cured riding surfaces, except pavements, that do not meet the smoothness or finished grade requirements set forth in 2.04 B shall be corrected, to obtain the specified smoothness deviation, as follows:

a. High spots between 1/4 inch and 1/2 inch and surfaces that exceed the finished grade requirements shall be identified and ground with diamond grinding equipment.

b. Low spots between 1/4 inch and 1/2inch and surfaces that are below the finished grade requirements shall be corrected by partial depth removal of the entire slab to 1 inch below rebars by hydrodemolition, or by hydromilling and constructing an overlay in conformance with this Specification.

2. The diamond grinding equipment shall be as approved by the Engineer and shall have a grinding head at least 36-inches wide.

3. Where grinding is required, grind the entire width of the riding surface by the length of defective area. In the sole opinion of the Engineer, if the deficiencies are closely spaced and grinding individual areas will adversely affect ride, grind the entire surface.

4. Dispose of slurry produced from grinding operations off Authority property.

5. Perform diamond grinding, partial depth removal and construction of an overlay, if required to correct deficiencies, at no additional cost to the Authority.

I. If concrete finishes do not meet the requirements set forth for the specified finishes, refinish the hardened concrete as directed by the Engineer, at no additional cost to the Authority.

J. If the average air content for a Lot exceeds either the LQL or the UQL by more than 1% (with the exception of concrete not exposed to freeze/thaw cycles) 10% of the Base Price per cubic yard will be deducted from the compensation for that particular Lot of concrete.

K. If the core temperature of the in situ concrete exceeds 160 deg F, the Engineer will evaluate concrete quality using cores taken from the concrete in question. The cores will be tested in accordance with ASTM C 42 and their compressive strength results will be used to calculate the PWL for payment adjustments.

TABLE 4

PERCENT OF LOT WITHIN TOLERANCE LIMIT (PWL)

(STANDARD DEVIATION METHOD)

Positive Values of Quality Index (QI)

(n = Number of Sublots in the Lot)

PWL	n=3	n=4	n=5	n=6	n=7	n=8
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4716
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630
87	1.0597	1.1100	1.1173	1.1191	1.1199	1.1204
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015
83	.9939	.9900	.9785	.9715	.9672	.9643
82	.9749	.9600	.9452	.9367	.9325	.9281
81	.9550	.9300	.9123	.9025	.8966	.8928
80	.9342	.9000	.8799	.8690	.8625	.8583
79	.9124	.8700	.8478	.8360	.8291	.8245
78	.8897	.8400	.8160	.8036	.7962	.7915
77	.8662	.8100	.7846	.7716	.7640	.7590
76	.8417	.7800	.7535	.7401	.7322	.7271
75	.8165	.7500	.7226	.7089	.7009	.6958
74	.7904	.7200	.6921	.6781	.6701	.6649
73	.7636	.6900	.6617	.6477	.6396	.6344
72	.7360	.6600	.6316	.6176	.6095	.6044
71	.7077	.6300	.6016	.5878	.5798	.5747
70	.6787	.6000	.5719	.5583	.5504	.5454
69	.6490	.5700	.5423	.5290	.5213	.5164
68	.6187	.5400	.5129	.4999	.4924	.4877
67	.5878	.5100	.4836	.4710	.4638	.4592
66	.5563	.4800	.4545	.4424	.4354	.4310
65	.5242	.4500	.4255	.4139	.4073	.4031
64	.4916	.4200	.3967	.3856	.3793	.3753
63	.4586	.3900	.3679	.3575	.3515	.3477
62	.4251	.3600	.3392	.3295	.3239	.3203
61	.3911	.3300	.3107	.3016	.2964	.2931
60	.3568	.3000	.2822	.2738	.2691	.2660
59	.3222	.2700	.2537	.2461	.2418	.2391
58	.2872	.2400	.2254	.2186	.2147	.2122
57	.2519	.2100	.1971	.1911	.1877	.1855
56	.2164	.1800	.1688	.1636	.1613	.1592
55	.1806	.1500	.1408	.1363	.1338	.1322
54	.1447	.1200	.1125	.1090	.1070	.1057

END OF SECTION

SECTION 03301

PORTLAND CEMENT CONCRETE, LONG FORM

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

03301A01 Shop Drawings of forms and test pour details at least 15 calendar days before the test.

Catalog Cuts

03301B01 At least 35 calendar days prior to concrete placement, the following:
Name and address of proposed concrete supplier and type of plant.

03301B02 At least 35 calendar days prior to concrete placement, the following:
Brand name and chemical composition of form oil or release agents, evaporation retardant and liquid membrane curing compounds. For Architectural Concrete, also include this information for forms, form liners, and pigments.

Samples

03301C01 Cement stone,sand, fly ash, slag, admixtures, evaporation retardant, curing compound. Furnish these to the Engineer in whatever quantities he may require. This applies to all mix proportions, including changes to an approved mix proportion.

03301C02 List of materials for Work of this Section.

03301C04 At the request of the Engineer, provide cement, fly ash, slag, and/or silica fume samples to check the Mill Certification at any time in accordance with 3.05.C of the Specification.

Product Data

03301D01 Concrete Mix Proportions:
Appendix "B" "Concrete Materials and Mix Proportion Data" at least 35 calendar days prior to concrete placement in accordance with 2.03.A of the Specification. To substantiate the mix proportions, submit all data and field results in accordance with 2.03.A. of the Specification

03301D02 Written request to the Engineer for approval if a change in the weights of fine and coarse

aggregate and cement is required in the approved mix proportions.

Certificates

03301E01 At least 35 calendar days prior to concrete placement, the following:
Material certifications, source, brand name and test results (where required) of cement, fine and coarse aggregate, fly ash, slag, silica fume, metakaolin and concrete admixtures following guidelines of Appendix "B". In addition, an independent testing laboratory to verify that the Very High Early Strength Cement meets the compressive strength, absolute drying shrinkage, and setting time requirements, as per 2.02.B at the testing frequency specified therein.

03301E02 At least 35 calendar days prior to concrete placement, the following:
Certification of compatibility and five-year performance record for liquid membrane forming curing compound, when used under conditions specified in 3.04.C, and the requirements of 2.02.R.2.

03301E03 At least 35 calendar days prior to concrete placement, the following:
Certification that admixtures conform to the requirements of 2.02.M. submitted with Appendix "B" "Concrete Materials and Mix Proportion Data". Include dosing and re-dosing charts, which shall demonstrate the effects of concrete temperatures from 50°F and 90°F.

03301E04 At least 35 calendar days prior to concrete placement, the following: Documentation of State Certification for plant

03301E05 At least 35 calendar days prior to concrete placement, the following: Documentation of State Certification of ready mix trucks

Manufacturer Test Reports

03301F01 At least 35 calendar days prior to concrete placement, the following:
Test data and field use history for corrosion inhibitor admixtures (when specified on the Contract Drawings) as per 2.02.O.4.:
1. Manufacturer's test method to determine the concentration of the active component of the inhibitor.
2. Procedures for the production of concrete mixes containing a corrosion inhibitor for the range of concrete temperatures from 50°F to 90°F and a procedure for the placement of concrete when a retarder is being used.

03301F02 At least 35 calendar days prior to concrete placement, the following:
A chemical analysis report of the percent by weight of silica fume solids by an approved independent testing laboratory when a wet slurry type of silica fume is being used.

Construction and Installation Procedures

03301G01 At least 35 calendar days prior to concrete placement, the following:
Cold and Hot Weather Concreting Plans to the Engineer in accordance with 1.03 of the Specification. Materials and methods for protecting concrete from freezing.

03301G02 At least 35 calendar days prior to concrete placement, the following:
Pumping Procedure Plan, including, at a minimum, the pumping scheme, pump description, line length, and the number of turns and line offsets.

03301G03 At least 35 calendar days prior to concrete placement, the following:
Written placement procedures that are in conformance with ACI 304R, Chapter 8 if concrete is being placed underwater.

03301G04 At least 35 calendar days prior to concrete placement, the following:
Method of adding concrete admixtures, high range water reducers, non chloride accelerators, corrosion inhibitors, anti-washout agent, latex, fibers, pigment, slag, fly ash, and silica fume.

03301G05 At least 35 calendar days prior to concrete placement, the following:
Mixing and placement procedures and methods, as well as catalog cuts of equipment for installation. For hand mixes, provide the methods of proportioning, mixing (including minimum time requirements), transferring and placing the concrete.

03301G06 At least 35 calendar days prior to concrete placement, the following:
Curing Procedure Plan in accordance with 3.04, including the method and materials for curing.

03301G07 At least 35 calendar days prior to concrete placement, the following:
Control Joint Location Plan.

03301G08 At least 35 calendar days prior to concrete placement, the following:
Materials and procedures for filling cracks and patching honeycombs and/or spalls.

Schedules

03301J01 At least 35 calendar days prior to concrete placement, the following:
Precast concrete fabricators planned schedule for all production and a Quality Control Plan a minimum of 15 days prior to the commencement of production.

Qualifications

03301K01 ACI Grade I certification for all personnel performing concrete testing.

03301K02 AASHTO acreditation for all testing to be performed by the independent laboratory in the formulation and testing of mix proportion to be submitted.

Quality Assurance-Quality Control

03301L01 At least 35 calendar days prior to concrete placement, the following: Contractors Quality Control Plan in accordance with 1.04.B.

Record Documents

03301M01 Daily copy of batch records in accordance with 1.04.A.1.a of the Specification.

Information

03301S01 Pre-concrete construction meeting agenda a minimum of 15 days prior to the scheduled date of the meeting.

03301S02 Minutes of the pre-concrete construction meeting within 5 days of the meeting.

END OF APPENDIX "A"

SECTION 03301

PORTLAND CEMENT CONCRETE, LONG FORM

APPENDIX "B"

CONCRETE MATERIALS AND MIX PROPORTION DATA

A. Materials:

1. Cement: Type.....Source/Brand.....

2. Sand: Fineness Modulus.....Source.....

3. Stone: Size.....Class.....Source.....

4. Fly Ash: Type.....Source.....

5. Slag: Grade.....Source.....

6. Microsilica (Silica Fume): Source/Brand.....

7. Metakaolin: Source/Brand.....

8. Admixtures (Source/Brand):

   Air Entraining Agent.....

   Non-Chloride Accelerator.....

   Retarder.....

   Water Reducer.....

   Water Reducer - Retarder.....

   High Range Water Reducer.....

   High Range Water Reducer - Retarder.....

   Polycarboxylate High Range Water Reducer

   Anti-Washout Admixture.....

   Corrosion Inhibitor.....

   Latex.....

   Pigment.....

B. Mix Proportions

1. Proposed method of placement:.....Tremie/Mobile

.....Mixer/Transit Mixer/Portable Mixer/

Pumping/Tube Diameter:.....

2. Proportion of Ingredients:

Cement.....lbs./cu. yd.

Fly Ash.....lbs./cu. yd.

Slag.....lbs./cu. yd.

Silica Fume.....lbs./cu. yd.

Metakaolin.....lbs./cu. yd.

Pigment.....lbs./cu. yd.

Stone.....lbs./cu. yd.

Sand.....lbs./cu. yd.

Water.....lbs./cu. yd.....gallons

Air Entraining Agent:.....ounces/cu. yd.

Admixtures (specify type and amount):

.....at.....ounces/cu. yd.

.....at.....ounces/cu. yd.

.....at.....ounces/cu. yd.

.....at.....ounces/cu. yd.

3. Mix Properties:

Compressive Strength: f'c =.....psi at.....days/hours

Flexural Strength:.....psi at.....days/hours

Permeability at 28 days:.....Coulombs

Slump:.....inches

Water to Cementitious Ratio:.....

Air Entrainment:.....%

Sand/Stone Ratio:

Combined aggregate gradation chart (% retained on each sieve)

Unit Weight:.....lbs./cu. ft.

C. Conformance with ACI 318

Attach a report on mix proportion and test/statistical data documenting conformance with ACI 318, Chapter 5, or ACI 304R, Chapter 8, as they apply to the Work of the Contract.

D. Concrete Supplier/Batch Plant

1. Name:.....
2. Address:.....
3. Contact Name:.....
4. Telephone number/Fax number/E-mail address:.....
5. Quality Control technician(s):.....

   Name(s):.....

   Telephone number(s):.....

END OF APPENDIX "B"

DIVISION 3

SECTION 03602

GROUTING (NON-METALLIC)

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for non-metallic, non-shrink, cement-based grouting.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Society for Testing and Materials (ASTM)

ASTM C 109	Test Method for Compressive Strength of Hydraulic Cement Mortars
ASTM C 191	Test Method for Time of Setting of Hydraulic Cement by Vicat Needle
ASTM C 827	Test Method for Early Volume Change of Cementitious Mixtures

1.03 JOB CONDITIONS

Do not mix or place grout when the ambient temperature is below 40 degrees F or conditions indicate that the ambient temperature will fall below 40 degrees F within 72 hours, unless the areas to be grouted are enclosed and heated in an approved manner or otherwise approved by the Engineer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver grout in the manufacturer's sealed original bags or containers bearing the manufacturer's name and product identification, in a manner to prevent damage by breakage, water or moisture.

B. Store all material on platforms and cover as necessary to protect it from water and moisture.

C. Deliver, protect and handle all tools and equipment in a manner to prevent damage that may make them defective for the purpose for which they are intended.

1.05 SUBMITTALS

See Appendix "A" for Submittal Requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Grout shall be one of the following:

1. "Masterflow 713" - manufactured by Master Builders
2. "Five Star Grout" - manufactured By U.S. Grout Corporation
3. "Euco N-S Grout" - manufactured by Euclid Chemical Co.

B. Grout shall be premeasured and prepacked by the manufacturer, requiring only addition of potable water for mixing.

PART 3. EXECUTION

3.01 PREPARATION

Areas to be grouted as shown on the Contract Drawings shall be cleaned of all foreign materials, to the satisfaction of the Engineer.

3.02 MIXING AND PLACING

A. Use only the crew trained by the manufacturer's representative.

B. Mix and place the grout in accordance with manufacturer's methods approved by the Engineer.

C. Placement shall be continuous to avoid cold joints and voids. Grout shall be rodded or spaded to prevent the formation of air pockets.

3.03 FIELD TESTS

A. The Engineer may take and test samples of the grout being placed in accordance with ASTM C 109, C 191 and C 827.

B. In the event that tests of the grout placed reveal any failure to meet requirements of this Section, the Engineer will require removal and replacement of all portions of grout from the batch from which the sample was taken and the discontinuance of grouting until the Contractor has demonstrated to the satisfaction of the Engineer that the causes for failure have been corrected.

END OF SECTION

SECTION 03602

GROUTING (NON-METALLIC)

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Samples

03602C01 Submit to the Manager, Materials Engineering Division, Port Authority Technical Center, 241 Erie Street, Jersey City, NJ 07310-1397, a sample of the grout material for approval.

Construction and Installation Procedures

03602G01 Submit manufacturer's instructions and methods for handling, storage, mixing and placing of the grout, for approval.

END OF APPENDIX "A"

DIVISION 5

SECTION 05506

MISCELLANEOUS STEEL

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for metal fabrications, including but not limited to structural steel and iron shapes, plates, bars, tubes and pipe.

B. Items specified in this Section include but are not limited to the following, where shown on the Contract Drawings:

1. Loose steel lintels.
2. Shelf angles.
3. Ladders and safety cages.
4. Floor plates.
5. Nosings and treads.
6. Pipe bollards.
7. Miscellaneous steel framing and supports.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American National Standards Institute (ANSI)
ANSI A 14.3	Safety Requirements for Fixed Ladders.
	American Society of Mechanical Engineers (ASME)
ASME B 18.2.1	Square and Hex Bolts and Screws, Inch Series.
ASME B 18.6.1	Wood Screws (Inch Series).
ASME B 18.6.3	Machine Screws and Machine Screw Nuts.
ASME B 18.21.1	Lock Washers (Inch Series).
ASME B 18.22.1	Plain Washers.
	American Society for Testing and Materials (ASTM)
ASTM A 27	Specification for Steel Castings, Carbon, for General Application.
ASTM A 36	Specification for Carbon Structural Steel.
ASTM A 47	Specification for Ferritic Malleable Iron Castings.
ASTM A 48	Specification for Gray Iron Castings.
ASTM A 53	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
ASTM A 123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
ASTM A 153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A 307	Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
ASTM A 500	Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
ASTM A 501	Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
ASTM A 563	Specification for Carbon and Alloy Steel Nuts.
ASTM A 780	Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
ASTM A 786	Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
ASTM A 1011	Specification for Sheet, Steel and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
ASTM B 633	Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
ASTM C 1028	Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
ASTM C 1107	Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
ASTM D 1187	Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
ASTM E 488	Test Method for Strength of Anchors in Concrete and Masonry Elements.
ASTM E 935	Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
ASTM F 568M	Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners.
ASTM F 593	Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
ASTM F 594	Specification for Stainless Steel Nuts.
	American Welding Society, Inc. (AWS)
AWS D1.1	Structural Welding Code – Steel.
AWS D1.3	Structural Welding Code – Sheet Steel.
	Code of Federal Regulations (CFR)
29 CFR Part 1910, Subpart D	Fixed Ladders.
	The Society for Protective Coatings (SSPC)
SSPC-Paint 20	Paint Specification No. 20 – Zinc Rich Primers (Type I, Inorganic, and Type II, Organic).
SSPC-PA 1	Shop, Field and Maintenance Painting of Steel.
SSPC-SP 3	Surface Preparation Specification No. 3 – Power Tool Cleaning.
SSPC-SP 6	Surface Preparation Specification No. 6 – Commercial Blast Cleaning.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Ladders

When installed, if any, shall comply with the following minimum requirements for structural performance, unless otherwise shown on the Contract Drawings:

1. Treads and Platforms

   Capable of withstanding a uniform load of 100 lbs. per sq. ft. and a concentrated load of 300 lbs., so located as to produce maximum stress conditions.

2. Handrails and Toprails

   Capable of withstanding the following loads applied as indicated below:

   a. Uniform load of 50 lbs. per linear ft. applied simultaneously in both vertical and horizontal directions.

   b. Concentrated load of 200 lbs. applied at any point in any direction when tested per ASTM E 935.

   c. Uniform and concentrated loads above need not be assumed to act concurrently.

3. Guards

   Intermediate rail balusters and panel fillers capable of withstanding a horizontal uniform load of 50 lbs. per sq. ft. of gross area of guard, including open areas of which they are part, of fabrication required or as shown on the Contract Drawings.

1.04 QUALITY ASSURANCE

A. When required by Appendix "A", submit design calculations for ladders, signed and sealed by a Professional Engineer licensed in the state in which Work is to be performed, indicating compliance with these Design and Performance Requirements.

B. Fabricator Qualifications

Firm experienced in producing metal fabrications similar to those indicated for Work of this Contract with a record of successful in-service performance and with sufficient production capacity to produce required units without delaying the Work.

C. Engineer Qualifications

A professional engineer who is legally qualified to practice in jurisdiction where construction site is located and who is experienced in providing engineering services required for applications shown on the Contract Drawings.

D. Welding Standards

Comply with applicable provisions of AWS D1.1 *Structural Welding Code – Steel* and AWS D1.3 *Structural Welding Code – Sheet Steel.*

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

E. Field Measurements

Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabricating. Show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.05 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Ferrous Metals

1. Metal Surfaces: For fabrication of Work exposed to view, use materials that are smooth and free of surface blemishes including pitting, roughness, seam marks, roller marks and rolled trade names.
2. Steel Plates, Shapes and Bars: ASTM A 36.
3. Rolled Steel Floor Plates: ASTM A 786.
4. Steel Bar Grating: ASTM A 1011 or ASTM A 36.
5. Steel Tubing: ASTM A 500, cold-formed; or ASTM A 501, hot-rolled; for exterior installations. Steel tubing shall be hot-dip galvanized coated per ASTM A 53.
6. Steel Pipe: ASTM A 53; type and grade (if applicable) as selected by fabricator and as required for design loading; Schedule 40 (standard weight), unless otherwise shown on the Contract Drawings; black finish, unless galvanized coating is shown on the Contract Drawings.
7. Brackets, Flanges and Fittings: Cast or formed metal of the same type material and finish as supported construction.
8. Gray Iron Castings: ASTM A 48, Class 30.
9. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47 Grade 32510, or cast steel, ASTM A 27. Furnish bolts, washers and shims as required, hot-dip galvanized per ASTM A 153.

B. Fasteners

1. General

   Zinc-Plated: ASTM B 633, Class Fe/Zn 25 (Service Condition 4–very severe) for exterior use and Class Fe/Zn 8 (Service Condition 2–moderate) where built into exterior walls. Select fasteners for type, grade and class required for application shown on the Contract Drawings.
2. Bolts and Nuts: Regular hexagon head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563, and where indicated, flat washers.
3. Machine Screws: ASME B18.6.3.
4. Lag Bolts: ASME B18.2.1.
5. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
6. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.

7. Plain Washers: Round, carbon steel, ASME B18.22.1.

8. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

   a. Interior Locations: Carbon steel components zinc-plated complying with ASTM B 633, Class Fe/Zn 8.

   b. Exterior Locations: Alloy Group 1 stainless steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

C. Paint

1. Shop Primer for Ferrous Metal

   Zinc-rich primer, complying with SSPC-Paint 20, compatible with substrates and finish paint systems shown on the Contract Drawings. Comply with applicable requirements of Division 9 Section on Painting.

2. Galvanizing Repair Paint

   High zinc dust content paint for regalvanizing welds in galvanized steel with dry film containing minimum 94 percent zinc dust content, complying with SSPC-Paint 20.

3. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Grout

Pre-mixed, factory-packaged, nonshrink type, complying with ASTM C 1107, as manufactured by one of the following, or approved equal, for specified application:

1. Non-Metallic:

   "Five Star Grout", Five Star Products, Inc., Fairfield, CT
   "Masterflow 713 Plus", Master Builders, Inc. (Degussa), Cleveland, OH
   "NS Grout", Euclid Chemical Co., Cleveland, OH

2. Metallic:

   "Embeco 636 Plus", Master Builders, Inc. (Degussa), Cleveland, OH
   "Five Star Metallic Grout", Five Star Products, Inc., Fairfield, CT
   "NS Metallic Grout", Euclid Chemical Co., Cleveland, OH

3. Use metallic grout in concealed locations where not exposed to moisture. Use non-metallic nonstaining grout in exposed, wet and exterior locations, unless otherwise shown on the Contract Drawings.

2.02 FABRICATION

A. General

Fabricate items to sizes, shapes, profiles and dimensions required for application shown on the Contract Drawings or approved Shop Drawings, using proven details of fabrication and support. Use materials of type and thickness shown on the Contract Drawings or specified in this Section for various components of Work or, if not shown, as required to produce strength and durability in finished product for intended use.

1. Shop Assembly: Preassemble items in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly match mark units for reassembly and coordinated installation.
2. Form exposed Work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of 1/32 inch, unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
3. Weld corners and seams continuously, complying with AWS D1.1 and D1.3 recommendations as applicable. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
4. Form exposed connections with hairline joints flush and smooth, using concealed fasteners wherever possible. Exposed fasteners, where used, shall be of type as shown on the Contract Drawings or, if not shown, Phillips flathead (countersunk) screws or bolts.
5. Fabricate joints that will be exposed to weather in a manner to exclude water, or with weep holes where water may accumulate.
6. Cut, drill and tap units to receive anchorage, hardware and similar items.
7. Furnish anchorage of type shown on the Contract Drawings, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use and for design loads. Furnish steel washers, except that where heads and nuts bear on wood structural connections, furnish malleable-iron washers.
8. Galvanizing

   Zinc coating by the hot-dip process for items shown on the Contract Drawings or specified in this Section to be galvanized. Coating thickness shall be as specified in the referenced standards.

   a. Rolled, pressed and forged iron and steel shapes, castings, plates, bars and strip 1/8 inch thick and heavier and assembled fabrications: ASTM A 123.
   b. Iron and steel hardware: ASTM A 153.

B. Steel Ladders

1. Fabricate ladders for locations shown on the Contract Drawings, with dimensions, spacings, details and anchorages as shown. Comply with requirements of ANSI A 14.3 or OSHA 29 CFR 1910, whichever is more stringent.
   a. Side rails shall be 1/2 inch by 2-1/2 inches continuous structural steel flat bar with eased edges, spaced 18 inches apart, unless otherwise shown.

b. Bar rungs shall be 3/4-inch diameter solid structural steel, spaced 12 inches on center.

2. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.

3. Top surface of each rung shall be non-slip; either coat the rung with aluminum oxide (corundum) granules set in epoxy resin adhesive or use a type of manufactured rung that is filled with aluminum oxide grout.

4. Support each ladder at top and bottom and at equally spaced intermediate points, so that no unsupported length of ladder shall exceed 5 feet. Use welded or bolted steel brackets, designed for adequate support and anchorage and to hold ladder clear of the wall surface with a minimum 7-inch clearance from wall to centerline of rungs.

5. Extend rails 42 inches above top rung and return rails to wall or structure, unless other secure handholds are furnished. If the adjacent structure does not extend above the top rung, gooseneck the extended rails back to the structure for secure ladder access.

6. Galvanize ladders, brackets and fasteners.

7. Ship's Ladders, if any

   Fabricate of open type construction with structural steel channel or steel plate stringers, pipe handrails and open steel grating treads, unless otherwise shown on the Contract Drawings. Furnish brackets and fittings necessary for installation.

C. Ladder Safety Cages

Fabricate from structural steel flat bars, assembled by welding. Comply with requirements of ANSI A 14.3 or OSHA 29 CFR 1910, whichever is more stringent.

1. Top and bottom primary hoops shall be 5/16 inch by 4-inch bar. For cages longer than 20 feet, space intermediate hoops not more than 4 feet on center from 5/16 inch by 2-inch bar between the primary hoops. Vertical flat bars 5/16 inch by 2 inches shall be secured to each hoop at maximum 9-1/2 inches on center, unless otherwise shown on the Contract Drawings. Secure assembled safety cage to ladder rails and adjacent construction shown.

2. Galvanize ladder safety cages and fasteners.

D. Loose Bearing and Leveling Plates

For steel items bearing on masonry or concrete construction, flat, free from warps or twists and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

E. Loose Steel Lintels

1. Fabricate from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

2. Weld adjoining members together to form a single unit where shown on the Contract Drawings.

3. Size loose steel lintels for equal bearing of 1 inch per foot of clear span, but not less than 8 inches bearing at each side of openings, unless otherwise shown on the Contract Drawings.

4. Galvanize loose steel lintels located in exterior walls.

F. Shelf and Relieving Angles

1. Fabricate from steel angles of sizes indicated and for attachment to concrete framing. Fabricate with slotted holes to receive 3/4 inch bolts, spaced not more than 6 inches from ends and not more than 24 inches on center, unless otherwise shown on the Contract Drawings.
2. Miter and weld corners. Provide open joints at expansion and control joints. Joint width shall be 2 inches larger than expansion or control joint.
3. Galvanize shelf and relieving angles located in exterior walls.

G. Miscellaneous Framing and Supports

1. Furnish miscellaneous steel framing and supports not part of structural steel framework, as required by the Contract Drawings to complete the Work.
2. Fabricate miscellaneous units as shown on the Contract Drawings or, if not shown, of required dimensions to receive adjacent other Work to be retained by framing. Fabricate from structural steel shapes, plates and bars of welded construction using mitered joints for field connection, except as otherwise shown on the Contract Drawings.
3. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Space anchors 24 inches on center and furnish minimum anchor units of 1-1/4 inch by 1/4 inch by 8 inch steel straps, except as otherwise shown on the Contract Drawings.
4. Fabricate support for suspended toilet partitions as follows:
   a. Beams

      Continuous steel shapes of size required to limit deflection to L/360 between hangers, but use not less than C8 by 11.5 channels or another shape with equivalent structural properties.

   b. Hangers

      Steel rods, 1/2-inch minimum diameter, spaced not more than 36 inches on center. Thread rods to receive anchor and stop nuts. Fit hangers with wedge-shaped washers for full bearing on sloping flanges of support beam.

   c. Braces and Angles

      Steel angles of size required for rigid support of beam and for secure anchorage.
5. Galvanize miscellaneous framing and supports at exterior locations and where shown on the Contract Drawings.

H. Miscellaneous Steel Trim

1. Fabricate units from structural steel shapes, plates and bars, with continuously welded joints and smooth exposed edges, unless otherwise shown on the Contract Drawings. Miter corners and use concealed field splices wherever possible. Furnish cutouts, fittings and anchorages as required for coordination of assembly and installation with other Work.
2. Galvanize miscellaneous steel trim at exterior locations. Galvanize miscellaneous steel trim at interior locations where shown on the Contract Drawings.

I. Floor Plate

1. Fabricate raised-pattern floor plates from rolled-steel floor plate of thickness and in pattern shown on the Contract Drawings.
2. Abrasive-Surface: Manufacturer's standard abrasive granules rolled into surface of steel plate where shown on the Contract Drawings. Coefficient of friction (COF) shall be 0.6 or higher when tested according to ASTM C 1028.
3. Include steel angle stiffeners and fixed and removable sections with steel bar drop handles for lifting as indicated.

J. Extruded Nosings and Treads

1. Fabricate of material, color, sizes and configurations shown on the Contract Drawings. If not shown, fabricate cast-iron units with an integral abrasive finish. Lengths shall be as required to accurately fit each opening or conditions.
   a. Integral abrasive filler shall consist of aluminum oxide (corundum), silicon carbide or a combination of both, in an epoxy resin binder.
   b. Solid abrasive type units without ribs.
2. Available Manufacturers

   Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

   American Safety Tread Co., Inc., Helena, AL
   Balco Inc., Wichita, KS
   Safe-T-Metal Co., Inc., Mineola, NY
   Wooster Products Inc., Wooster, OH
3. Drill for mechanical anchors with countersunk holes located not more than 4 inches from ends and not more than 12 inches on center, evenly spaced between ends, unless otherwise shown on the Contract Drawings. Use closer spacing if recommended by the manufacturer.

K. Cast Nosings, Treads and Thresholds

1. Fabricate units of material, color, sizes and configurations shown on the Contract Drawings. If not shown, furnish cast-iron units with an integral abrasive finish. Lengths shall be as required to accurately fit each opening or conditions.
   a. Cast units with an integral abrasive grit consisting of aluminum oxide (corundum), silicon carbide or a combination of both.
   b. Plain surface texture, except where fluted or cross-hatched surfaces are shown on the Contract Drawings.
2. Available Manufacturers

   Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

   American Safety Tread Co., Inc., Helena, AL
   Balco Inc., Wichita, KS
   Safe-T-Metal Co., Inc., Mineola, NY
   Wooster Products Inc., Wooster, OH
3. Furnish anchors for embedding units in concrete, either integral or applied to units, as standard with the manufacturer.

4. Drill for mechanical anchors with countersunk holes located not more than 4 inches from ends and not more than 12 inches on center, evenly spaced between ends, unless otherwise shown on the Contract Drawings. Use closer spacing if recommended by the manufacturer.

L. Corner Guards

Fabricate from steel angles of sizes as shown on the Contract Drawings, but not less than 3 by 3 by 5/16 inch extending from floor to 42 inches above floor. Fabricate with 3/8 inch steel base plates for bolting to floor and with 1/4 by 2 inch steel strap braces at top. Furnish at least 2 vertical angles at each location along the length of the ladder where connections are made (except at internal corners), with strap extended between angles and from each angle to wall or column.

M. Wheel Guards

Fabricate from 3/4-inch thick, hollow-core, gray-iron castings of size and shape shown on the Contract Drawings. Fabricate with holes for countersunk anchor bolts and grouting.

N. Pipe Bollards

1. Fabricate from Schedule 40 black steel pipe, unless otherwise shown on the Contract Drawings. Prime and finish with two coats of paint as specified in Division 9 Section on Painting. Cap bollards with 1/4-inch minimum steel plate finished to match pipe, unless indicated to be concrete filled.
2. Fabricate sleeves for bollard anchorage from steel pipe, matching shape and configuration of bollard and with outside dimensions not less than 3/4 inch greater than outside dimensions of bollard. Weld 1/4-inch thick steel plate closures to bottoms of sleeves. Plate closures shall be 1 inch greater in length and width than outside dimensions of sleeves.
3. Reflective marking tape, if any, shall be in color shown and as specified in Division 2 Section on removable retro-reflective pavement marking tape.

2.03 SHOP PAINTING

A. Surface Preparation

Prepare ferrous metal surfaces to comply with requirements for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications as follows:

1. Exterior: SSPC-SP 6.
2. Interior: SSPC-SP 3.

B. Apply shop primer to surfaces of metal fabrications, except those that are galvanized or shown on the Contract Drawings to be embedded in concrete or masonry, in compliance with requirements of SSPC-PA 1 for shop painting.

PART 3. EXECUTION

3.01 PREPARATION

Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the construction site in time for installation.

3.02 INSTALLATION

A. Furnish and install anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

B. Cutting, Fitting and Placement

Perform cutting, drilling and fitting required for installation of metal fabrications. Set Work accurately in location, alignment and elevation plus level, true and free of rack, measured from established lines and levels. Furnish and install temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

C. Fit exposed connections accurately together to form tight hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

D. Field Welding

Comply with AWS D1.1 and D1.3 for procedures of manual shielded metal-arc welding, appearance and quality of welds made and methods used in correcting welding Work.

E. Setting Loose Plates

1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of bearing plates or surfaces.
2. Set loose leveling and bearing plates on wedges or other adjustable devices. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.

F. Miscellaneous Framing and Supports

Install framing and supports in compliance with requirements of items being supported, including manufacturer's written instructions and requirements.

G. Supports for Toilet Partitions

Anchor supports securely to and rigidly brace from overhead building structure.

H. Nosings, Treads and Thresholds

1. Install with anchorage system indicated complying with manufacturer's recommendations.
2. Apply black bituminous coating to concealed bottoms, sides and edges of cast-iron units set into concrete.
3. Seal thresholds exposed to exterior with elastomeric sealant, complying with the applicable Division 7 Section on Sealants, for a watertight installation.

I. Wheel Guards

Anchor wheel guards to concrete or masonry construction complying with manufacturer's instructions. Fill cores solidly with concrete.

J. Bollards

1. Install bollards vertical to line and grade shown on the Contract Drawings.
2. Anchor bollards with 4 bolts through bottom plate with minimum 4 inch embedment into concrete, by core-drilling and grouting into concrete or by anchoring in place with concrete footings, as shown on the Contract Drawings.
3. Vibrate and tamp concrete to consolidate. Support and brace bollard until concrete has cured.
4. Seal joint between concrete footings and surrounding pavement and sidewalk in accordance with Division 2 Section on Pavement Joint Sealing.

3.03 ADJUSTING

A. Touch-Up Painting

1. Shop Painted Surfaces: Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint. Paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop painted surfaces. Apply by brush or spray in a minimum dry film thickness of 2.0 mils.
2. Galvanized Surfaces: Immediately after erection, clean field welds, bolted connections and abraded areas. Apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 05506

MISCELLANEOUS STEEL

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

05506A01 Shop Drawings
For fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Furnish templates for anchor and bolt installation under other Sections if required.

Samples

05506C01 Samples
Representative samples of materials, color, texture or design of finished products for nosings, treads and thresholds, if any.

Product Data

05506D01 Product Data
Manufacturer's technical information, specifications, anchor details and installation instructions for miscellaneous steel products used, including grout and paint products.

Qualifications

05506K01 Qualifications
1. Professional Engineer: Include experience qualifications.
2. Fabricator: Experience, in-service performance and capability qualifications.
3. Welder: Evidence of current AWS certification.

END OF APPENDIX "A"

DIVISION 16

SECTION 16000

ELECTRICAL GENERAL REQUIREMENTS

PART 1. GENERAL

1.01 SUMMARY

Unless otherwise shown on the Contract Drawings, or unless otherwise specified in other Sections of these Specifications, the general requirements specified in this Section are applicable to all electrical work of this Contract. Additional requirements applicable to individual Sections of these Specifications are specified in those Sections, or are shown on the Contract Drawings.

1.02 REFERENCES

The following is a listing of publications referenced in this Section:

	American National Standards Institute (ANSI)
ANSI C 2	National Electrical Safety Code.
	American Society of Testing and Materials (ASTM)
ASTM D 178	Standard Specification for Rubber Insulation Matting.
	National Fire Protection Association (NFPA)
NFPA 70	National Electrical Code.
	Occupational Safety and Health Administration (OSHA)

1.03 QUALITY ASSURANCE

A. Any entity performing Work shall have had experience on at least two projects involving quantities and complexities at least equal to those required under this Division or the applicable Section thereof.

B. All workmen performing under this Division shall be skilled workers of the trade involved. Where specialty work, such as splicing or welding are required, submit proof of training, experience and work history for each workman, for review by the Engineer. Only approved workmen shall perform specialty work.

C. All electrical work shall be performed under the supervision of an electrical contractor, licensed in the state (and the city as required) in which the work is to be performed. Submit a copy of the qualifying license for review by the Engineer.

D. All calculations required by this and other various Sections of these Specifications, or as shown on the Contract Drawings, shall be certified and sealed by a Professional Engineer licensed in the state in which the Work is to be performed, and shall be submitted to the Engineer for review.

E. Various Sections of these Specifications contain the requirement for the specific material or equipment to be furnished with an experience statement "satisfactorily used for purposes similar to those intended herein" or words of similar intent and a statement that specifies the required experience time. These statements shall mean that the manufacturer of the material or equipment being furnished for the Work specified in this Contract shall have manufactured similar material or equipment to that specified, for at least the time specified.

F. In various Sections of this Division there is a statement that refers to the length of required experience that must be satisfied.

G. Polyvinyl Chloride (PVC): PVC conduits, PVC-insulated power wiring, or items containing PVC, except PVC-insulated wiring for communications systems, remote control, signaling, and power limited circuits, shall not be installed in any indoor area. PVC-insulated wiring for communications systems, remote control, signaling, and power-limited circuits shall be furnished and installed in accordance with NFPA 70.

H. Asbestos

Asbestos or items containing asbestos shall not be furnished or installed.

I. Conformance Labels

All electrical materials and equipment for which there is a nationally recognized standard shall bear the conformance labeling of the third party inspection authority, such as Underwriters Laboratories Inc., Factory Mutual, ETL, or approved equal. Where the phrase "where there are established UL standards, shall bear the UL label", or words of similar intent appear in other Sections, the instructions for the conformance label above shall apply.

1.04 CODES AND STANDARDS

A. The electrical installation shall conform to all requirements of ANSI C2, NFPA 70, and the codes and standards specified in other Sections, all local codes and the requirements of OSHA, which would be applicable if the Authority were a private corporation.

B. Standards publications of technical organizations and regulatory agencies are referenced in other Sections, and unless stricter requirements are indicated, materials and equipment so specified shall be manufactured, tested and installed to conform, as a minimum, to the requirements of such reference standards and publications.

C. Installations for aeronautical markers, lighting, guidance signs, and other work as shown on the Contract Drawings, shall comply with the standards of the Federal Aviation Administration (FAA), where applicable.

D. In case of conflict between provisions of codes, laws and ordinances, the more stringent requirement shall apply.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in manufacturers' original unopened protective packaging.

B. Store materials in original packaging in a manner to prevent soiling, physical damage, wetting or corrosion prior to installation.

C. Handle in a manner to prevent damage to finished surfaces.

D. Where possible maintain protective coverings until installation is complete and remove such covers as part of final cleanup.

E. Touch up any damage to finishes to match adjacent surfaces to the satisfaction of the Engineer.

1.06 SUBMITTALS

See Appendix "A" for submittal requirements.

1.07 SPECIAL TERMS

Throughout this and other Sections of this Division the term "Authority" is used. In PATH contracts, substitute the term "PATH" is deemed substituted for the term "Authority".

PART 2. PRODUCTS

2.01 MATERIAL AND EQUIPMENT TO BE FURNISHED

Equipment and materials furnished shall be new and unused, prior to this installation, first grade commercial quality and shall be essentially the standard cataloged products of a manufacturer regularly engaged in the manufacture of the products. Only those items specifically shown on the Contract Drawings as existing, relocated or Authority furnished shall be reused in this installation. Rebuilt or remanufactured equipment will not be permitted.

2.02 IDENTIFICATION

A. All parts of equipment, such as switchboards, panel boards, safety switches, motor starters, circuit breakers, time clocks, contactors and similar items shall be identified by name, function or control with laminated plastic nameplates consisting of two black sheets with one white sheet bonded to and between the two outer sheets and having letters machine engraved in the face sheet to the depth of the white plastic. Nameplates shall not be smaller than 1 inch by 3 inches with characters not less than one-quarter inch. Where letter sizes are not specified, use one-inch high letters for panel boards, switchboards and motor control centers and one quarter inch high elsewhere. Nomenclature shall be according to a schedule approved by the Engineer.

B. All device plates other than lighting switch plates, telephone and 120 volt, single phase, 15 or 20 ampere receptacles, shall have black or white (as directed) silk-screened lettering Helvetica Medium type face (or other type face as directed by the Engineer) designating:

1. System.
2. Voltage (where applicable).
3. Number of phases (where applicable).
4. Current rating (where applicable).
5. Frequency (where applicable).

C. Before placing orders for nameplates or silk-screened device plates, submit a typewritten list to the Engineer for review.

D. The outside of the covers of all junction or pull boxes located above hung ceilings and the inside of the covers of all junction or pull boxes exposed shall be labeled with an indelible marker indicating the operating voltage and the system contained therein.

E. All device plates of receptacles connected to a standby or emergency power distribution system shall be labeled with an orange plastic nameplate, engraved with the panel board and circuit number to which the receptacle is connected. Nameplate character engraved shall be not less than one-quarter inch in height.

F. Unless otherwise shown on the Contract Drawings, all panel boards, switchboards, switchgear, circuit breakers, switches and transformers connected to a standby or emergency power distribution system shall be finished Federal Safety Orange in color.

2.03 RUBBER MATTING

A. Provide continuous insulated rubber matting not less than 36 inches wide and not less than one quarter inch thick in one piece in front of:

1. Substation transformers.
2. Switchgear.
3. Switchboards.
4. Motor control centers.
5. Panel boards.
6. On each side and end of a standby or emergency generator set.
7. Other locations as shown on the Contract Drawings.

B. Matting shall conform to ASTM D 178, Type 2.

PART 3. EXECUTION

3.01 GENERAL

A. Work of this Division shall include all labor, material and apparatus necessary for the completion of all electrical work as shown on the Contract Drawings and as hereinafter specified, left ready for satisfactory operation.

B. Coordinate with Authority operations and construction by other trades.

1. Coordinate with the Work of all trades as necessary to facilitate timely completion, avoid unnecessary cutting and patching and to ensure proper installation and operation of all equipment.
2. Coordinate all components and aspects of the Work, in order to minimize power shutdowns to the power distribution systems. Should any part of the Work require an "off-hours" shutdown in excess of 8 hours, supply temporary services or feeders as required to maintain operation of the existing systems and equipment.

3. Furnish to appropriate trades, shop drawings, catalog cuts and instructions necessary for construction of concrete bases, concrete encasement, anchor bolts, and other construction required to accommodate installations under other Sections.

4. Obtain all wiring diagrams and other instructions required for proper electrical connection of equipment installed or furnished under other Divisions of these Specifications and coordinate the installation, wiring and connections for equipment furnished under this Division, or other various Divisions.

C. The arrangement of electrical equipment and conduit runs as shown on the Contract Drawings and described in the Specifications is schematic. Locate and install electrical work in coordination with other trades so that all electrical equipment and material is installed with working clearances in accordance with NFPA 70. Route conduit to avoid interference with existing installation and with work to be performed by other trades.

D. The location of equipment and motors shown on the Contract Drawings shall be subject to minor revisions due to field conditions or coordination with other trades without any increase in Contractor's compensation. Prior to roughing-in, verify the exact location of all electrical connections to equipment and motors from reviewed shop drawings and field verification.

E. Maintain records of all inspections, testing, overload and overcurrent settings throughout the construction and any corrective actions taken, and submit records to the Engineer for review.

F. All electrical work shall be subject to inspection by the Engineer. Correct any deficient work, as required for the approval of the Engineer.

G. Any equipment, materials, wiring or labor that are a necessary part of the electrical work and to its proper performance, although not specifically mentioned herein or shown on the Contract Drawings, shall be furnished and installed as if called for in detail, without additional cost to the Authority.

3.02 REMOVALS, RELOCATIONS, RECONNECTIONS, RESTORATIONS

A. Relocate existing equipment and materials as shown on the Contract Drawings.

B. Unless otherwise shown on the Contract Drawings, existing equipment and materials that are to be removed and not required to be relocated under this Contract, will become the property of the Contractor and shall be removed from the property of the Authority, and shall be properly disposed of. Disposal of equipment and materials shall comply with all local, state and Federal laws and regulations as if the Authority was a private corporation.

C. Unless specifically shown on the Contract Drawings, salvaged equipment and materials shall not be reused in the installation.

D. If existing electrical feeders, wiring, conduit, lighting fixtures or equipment interfere with the installation of new construction of any trade, the existing electrical feeder, wiring and conduit shall be rerouted or the equipment relocated in a manner approved by the Engineer to permit installation of the new construction. Where existing circuits or devices, or portions of the existing wiring system are to remain in service, but are interrupted by the construction, continue the existing wiring to maintain the remainder of the wiring system in operation.

E. Notify the Engineer immediately of any damage caused by the Contractor to existing wiring, services or feeders that are to remain in service. Repair the damage in a workmanlike manner to restore to service, at no cost to the Authority.

F. Before shutdown or discontinuation of service on any circuit, system or feeder, coordinate such activities with the Engineer in order to minimize shutdown periods. Provide a minimum of two weeks notice in writing to the Engineer before performing any shutdowns. The minimum period may be reduced with the express written permission of the Engineer.

3.03 LOCATION OF EQUIPMENT

A. Unless otherwise shown on the Contract Drawings, the location of outlets or devices, from finished floor to center of plate or device, shall be as follows:

1. Lighting switches: 48 inches.
2. Thermal switches: 48 inches.
3. Receptacles: 16 inches.
4. Telephone outlets: 16 inches.
5. Fire alarm stations: 48 inches.
6. Fire alarm horn/light signals: 7 feet 6 inches.
7. Clocks: 7 feet 8 inches.

B. Unless otherwise shown on the Contract Drawings, the location of equipment, from finished floor to top of enclosures shall not exceed 6 feet, 6 inches, and shall not protrude more than 4 inches if higher than 27 inches.

1. In exposed or public locations, panel boards and cabinets shall generally be flush mounted and all covers shall be identical in layout and size, and shall be installed to maintain a level and straight top and bottom alignment.
2. In concealed locations, or in closets or electrical or mechanical rooms, or non-public locations, panel boards and cabinets shall generally be surface mounted and shall be installed to maintain a level and straight top alignment.

3.04 DISSIMILAR METALS

A. Dissimilar metals shall mean those metals that are incompatible with one another in the presence of moisture, as determined from their relative positions in the Electrochemical Series, or from test data. Where dissimilar metals come in contact, paint the joint both inside and out with approved coating so as to exclude moisture from the joint, or provide a suitable insulating barrier separating the metals.

B. Transitions in raceways, from one metal to a dissimilar metal shall only be made at boxes or other enclosures, except where shown on the Contract Drawings.

3.05 NAMEPLATES

Secure nameplates on equipment or walls with stainless steel or brass screws.

3.06 RUBBER MATS

A. Install rubber mats in front of each panelboard, switchboard, motor control center, switchgear and substation transformers, and along each side and the end or each generator set, or as shown on the Contract Drawings.

B. Rubber mats, when installed, shall lay flat without curling.

3.07 CUTTING AND PATCHING

A. Perform all cutting and patching of existing construction required for installation of all materials and equipment as specified in this Division.

B. Perform all patching to match existing adjacent construction to the satisfaction of the Engineer and using the best possible workmanship of the various trades involved.

3.08 FINAL FIELD TESTS

A. The entire electrical installation shall be inspected prior to final acceptance testing, thoroughly cleaned, and damaged finishes touched up after final completion and prior to final acceptance testing being performed. Not less than 30 days prior to the testing, furnish a test plan, to the Engineer for review, outlining all aspects of the testing, including tests to be performed and the expected results.

B. Perform the following field test in the presence of the Engineer to demonstrate the reliability of the electrical installation. Give the Engineer a minimum of one-week advance notice of such tests.

1. Operate all electrical systems and equipment for a period of 24 hours, unless in the opinion of the Engineer, a different test period is required, to prove the operation and performance of a system and its equipment.

2. Should the foregoing test reveal any defects, promptly correct such defects and re-run the tests until the entire installation conforms to the requirements of these Specifications and the Contract Drawings.

C. Tests requiring certified reports and those requiring factory or field inspection shall be conducted and reported to the Engineer in conformance with standards herein specified.

D. In addition to the tests outlined above, after completion of the electrical system and prior to occupancy:

1. The following equipment and devices, as a minimum, shall be thermographically inspected utilizing a Hughes Aircraft Probeye infrared detector, or approved equal, with videotaping attachment.

   a. High voltage cable splices and connections.

   b. Switchboard.

   c. Transformer.

   d. Switchgear.

   e. Panelboards.

   f. Motor control centers.

g. Automatic transfer switch and emergency power system connections.

h. Chiller motor and starter connections.

i. All 600 volt (nominal) cable connections rated 100 amperes (#3 AWG) or greater.

j. Other equipment as shown on the Contract Drawings.

2. The inspection shall be made by an independent inspection company such as Infrared Services, Inc, Montville, N.J., General Electric Apparatus Service Division, or approved equal. The inspection shall be made with all equipment, motors, lighting fixtures, and miscellaneous loads operating and with all equipment covers removed. Inspection reports complete with color photographs of the infrared scan and control photographs indicating the ambient temperature and any hot spots of each item inspected shall be submitted to the Engineer for approval. Any equipment, connections or devices indicated to be operating improperly performing equipment shall be replaced or repaired by the Contractor at no cost to the Authority. The cost of the inspections and necessary repairs shall be included in the Contract.

E. Demonstrate to the Engineer equipment or systems installed or modified in this Contract.

1. After completion of all testing, and prior to placing equipment or systems in operation, demonstrate the features and operation of the equipment or systems to the Engineer, and all other staff or interested parties, as designed by the Engineer, so that operational and maintenance personnel are familiarized with the equipment and systems, as follows:

a. Switchboards and panelboards.

b. Transformer.

c. Switchgear.

d. Motor control centers.

e. Fire alarm and smoke detection systems.

f. Automatic transfer switches.

g. Standby/Emergency generator sets.

h. Other equipment as shown on the Contract Drawings.

2. Provide the necessary accessories, test equipment, and personnel, for each demonstration.

3. Complete all arrangements for the demonstrations through the Engineer.

4. Upon the completion of each demonstration or instructional session, obtain "sign-off" from the Engineer. The "sign-off" shall state that the demonstration or instructions for use were provided, that they were complete and were given to the designated personnel.

END OF SECTION

SECTION 16000

ELECTRICAL GENERAL REQUIREMENTS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Catalog Cuts

16000B01 Conduit, and fittings.

16000B02 Wire and cable.

16000B03 Wiring devices.

16000B06 Medium voltage cable, splicing and termination kits.

16000B11 Circuit breakers.

16000B12 Lighting fixtures.

16000B13 Pulling devices and end seals.

16000B15 Supporting devices.

Product Data

16000D01 Nameplate designations.

Calculations

16000H01 Calculations where required by the Specifications or the Contract Drawings.

Manuals, Warrantees/Guarantees

16000I01 Operation and maintenance manuals, where required by the Specifications or the Contract Drawings.

Qualifications

16000K01 Training, , experience and work history for certified splicers and welders.

Record Documents

16000M01 One set of Shop Drawings revised, completed and brought up to date showing the permanent construction as actually made, in accordance with "Shop Drawings, Catalog Cuts and Samples" of Division 1, and showing the exact location of all equipment and conduit runs, as actually installed.

Inspection Reports

16000O02 A final copy of the records and certified test reports for all tests, to the Engineer for review, for not less than the following:
Insulation testing of 600V (nominal) cables rated 100 amperes (#3 AWG) and above.

16000O03 A final copy of the records and certified test reports for all tests, to the Engineer for review, for not less than the following:
Ground resistance test of each service ground.

16000O05 A final copy of the records and certified test reports for all tests, to the Engineer for review, for not less than the following:
Setting of all adjustable overcurrent devices.

END OF APPENDIX "A"

DIVISION 16

SECTION 16110

RACEWAYS

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for raceways.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American National Standards Institute (ANSI)
ANSI C 80.1	Rigid Steel Conduit - Zinc Coated
ANSI C 80.3	Electrical Metallic Tubing - Zinc Coated
ANSI C 80.5	Rigid Aluminum Conduit
ANSI C 80.6	Intermediate Metal Conduit - Zinc Coated
	National Electrical Manufacturers Association (NEMA)
ANSI/NEMA FB 1	Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
NEMA RN 1	Polyvinyl – Chloride (PVC) externally coated galvanized rigid steel conduit and intermediate metal conduit
NEMA TC-3	PVC Fittings for use with rigid PVC Conduit and Tubing
NEMA TC-6	PVC and ABS plastic utilities duct for underground installation
NEMA TC-8	Extra-strength PVC plastic utilities duct for underground installation
NEMA TC-14	Filament – Wound Reinforced Thermosetting Resin Conduit and Fittings
	National Fire Protection Association (NFPA)
NFPA 70	National Electric Code
	Underwriters Laboratories Inc. (UL)
ANSI/UL 1	Flexible Metal Conduit
ANSI/UL 5	Surface Metal Raceways and Fittings
ANSI/UL 6	Rigid Metal Conduit
ANSI/UL 209	Cellular Metal Floor Raceways and Fittings
ANSI/UL 360	Electrical Liquid-tight Flexible Steel Conduit

ANSI/UL 514B	Fittings for Conduit and Outlet Boxes
ANSI/UL 651	Schedule 40 and 80 Rigid PVC Conduit
ANSI/UL 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit
ANSI/UL 797	Electrical Metallic Tubing
ANSI/UL 870	Wireways, Auxiliary Gutters, and Associated Fittings
ANSI/UL 884	Underfloor Raceways and Fittings
ANSI/UL 1242	Intermediate Metal Conduit
ANSI/UL 1479	Fire Tests of Through-Penetration Firestops

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in manufacturer's original, unopened, protective packaging. Protective caps shall be removed only upon installation of conduit.

B. Store materials in a clean, dry space and protect them from weather.

C. Handle in a manner to prevent damage to finished surfaces.

1.04 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. General

1. Locations, types and sizes of raceways are shown on the Contract Drawings.
2. Minimum size of conduit shall be 3/4 inch.
3. Conduit shall be supplied in a minimum of 10-foot lengths and accordance with UL 6.

B. Rigid Metal Conduit

1. RGS - Rigid galvanized steel conduit (Heavy-wall) hot dipped galvanized inside and out, with hot dipped galvanized threads, conduit shall conform to UL 6 and ANSI C80.1.
2. RGS/PVC - PVC coated, rigid galvanized steel conduit (Heavy-wall) hot dipped galvanized inside and out with hot dipped galvanized threads. The interior of the conduit shall have a thermoplastic or thermosetting coating of a nominal thickness of .007 (7 mils) and shall conform to NEMA TC-14. All PVC coated conduit shall conform to NEMA RN-1.
3. IMC - Intermediate metal conduit, galvanized steel (medium-wall) conduit, threads shall be galvanized and shall conform to ANSI/UL 1242 and ANSI C80.6.
4. ALC - Aluminum conduit shall conform to UL 6 and ANSI C 80.5.

5. All preformed elbows shall be the same in construction to and of a type designed for use with the appropriate conduit and shall conform to UL 6.

6. All fittings shall be threaded and shall conform to NEMA FB-1.

7. If threads are cut after the zinc coating has been applied, the threads shall be treated with protective coating of zinc equivalent to hot-dipped process and conform to NEMA RN-1.

C. Electrical Metallic Tubing

1. EMT - Electrical metallic tubing (thin-wall) shall be galvanized steel and shall conform to ANSI/UL 797 and ANSI C 80.3.

2. All fittings shall be indenter or compression type made of malleable or pressed steel and shall conform to ANSI/NEMA FB 1.

D. Cellular Metal Floor Raceway

Cellular Metal Floor Raceway and Fittings shall conform to NFPA 70 and ANSI/UL 209.

E. Flexible Metal Conduit

1. FSC - Flexible steel (galvanized) conduit shall conform to ANSI/UL 1.

2. LSC - Liquid-tight flexible metal conduit shall conform to ANSI/UL 360.

3. Fittings shall be of a type designed for use with the respective conduit and shall conform to ANSI/UL 514B.

F. Surface Metal Raceways

1. Surface raceways shall conform to ANSI/UL 5.

2. Surface metal raceways shall come complete with all necessary accessories for installation.

G. Underfloor Raceways

1. Duct, fittings, and accessories shall be suitable for encasement in concrete and shall conform to NFPA 70 and ANSI/UL 884.

2. Underfloor raceways shall come complete with all necessary accessories for installation.

H. Rigid Nonmetallic Conduit

1. PVC Type 40 Standard Wall polyvinyl chloride (PVC) conduit shall conform to ANSI/UL 651 and NEMA TC-3.

2. PVC Type 80 Heavy wall polyvinyl chloride (PVC) conduit shall conform to ANSI/UL 651.

3. PVC Type "A" Light wall polyvinyl chloride (PVC) conduit shall conform to ANSI/UL 651A

4. PVC Type EB Light wall polyvinyl chloride (PVC) conduit shall conform to ANSI/UL 651A and NEMA TC-8.

5. PVC Type DB Light wall polyvinyl chloride (PVC) conduit shall conform to ANSI/UL 651A and NEMA TC-8.

6. HDPE Type 40 Standard wall High-Density Polyethylene (HDPE) Conduit shall conform to ANSI/UL 651A and NEMA TC-6.

7. FRE - Fiberglass Reinforced Epoxy (FRE) conduit shall conform to ANSI/NEMA TC-14.

I. Fire stops, Through Penetrations of Conduits

1. Where raceways penetrate wall or floor, fire stops with a fire rating equal or greater than the rating of the penetrated wall or floor shall be provided.

2. All fire stops shall conform to the UL 1479.

J. Wireways

1. Wireways shall be seamless galvanized steel construction, cover to be locked with captive screws and shall conform to ANSI/UL 870.

2. Wireways shall come complete with all necessary accessories for installation.

K. Fastening Devices

Provide inserts, clamps, bolts and washers, or any other type of fastening devices conforming to the requirements of the Section entitled "SUPPORTING DEVICES", required to secure conduits to walls or above hung ceilings. Unless otherwise shown on the Contract Drawings, all fasteners shall be hot dipped galvanized and of sizes and types recommended by the equipment manufacturer.

PART 3. EXECUTION

3.01 INSTALLATION

A. General

1. All conduit bends shall be accomplished with a trade approved bending tool and in accordance with the manufacturer's recommendations and NFPA 70.

2. Ream conduit ends free from burrs prior to installation, and draw joints up tight.

3. Make transitions in conduit from one metal to a dissimilar metal only at boxes or other enclosures, unless otherwise shown on the Contract Drawings.

4. Install concealed conduits or tubing in as direct a line as possible.

5. Install exposed raceways, located above hung or accessible ceilings, parallel with or at right angles to the lines of buildings and as close to the ceiling as possible, unless otherwise shown on the Contract Drawings.

6. Install expansion fittings in all conduits that cross expansion joints, where conduits attach to independent structures, or where exposed to large temperature changes.

7. Securely fasten threaded conduits entering enclosures, other than threaded cast boxes, by means of two lock-nuts, one on each side of the enclosure. Terminate the conduits in insulated bushings.

8. Cap all free ends of empty conduit to prevent water entrance.

9. Conduit through roofs and external walls of buildings, manholes and other structures shall be watertight. Contractor shall submit detailed shop drawings for the Engineer's approval.

10. Where portions of an interior raceway system are exposed to widely different temperatures, make provisions to prevent circulation of air from a warmer to a colder section through the raceways.

11. Apply zinc rich paint to all exposed threads after joints have been made up clean and tight.

12. Support all conduits as required in these Specifications under Section entitled "SUPPORTING DEVICES".

13. All conduit runs shall leave or enter structures perpendicularly.

14. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or mono-filament plastic line having not less than 200-lb tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

B. Rigid Metal Conduit

1. RGS shall be used where Fire Alarm Systems are installed.

2. RGS/PVC shall not be used indoors.

3. IMC may not be used in wet locations, or high corrosive area, otherwise NFPA 70 Article 345 fully applies.

C. Electrical Metallic Tubing

EMT used for power feeder or branch circuits, shall not exceed 2-inch trade size. EMT used for control circuits and communications systems shall not exceed 4-inch trade size.

D. Cellular Metal Floor Raceway

Installation limits shall be defined by NFPA 70.

E. Flexible Metal Conduit

1. Install FSC for motor connections and for other equipment connections where subject to movement and vibration. Conduit shall be installed to permit maximum flexibility, without crushing or permanent deformation, and shall not exceed 18 inches in length, without approval of the Engineer.

2. Use LSC for the same installation conditions as FSC above, and where also subjected to one or more of the following conditions:

   a. Exterior locations;

   b. Condensating, moist, wet or humid conditions;

   c. Corrosive atmospheres;

   d. Water spray;

   e. Dripping oil, grease or water.

3. Install FSC and LSC with a separate, insulated copper, code-sized, equipment-grounding conductor, installed inside the flexible conduit.

F. Surface Metal Raceways

1. Only metallic surface metal raceways will be permitted, unless otherwise shown on the Contract Drawings. Installation shall be in accordance with manufacturer's written recommendations and instructions accompanying the raceways.

2. Provide surface raceway system with means for assuring a continuous ground path throughout.

3. Use fittings without sharp edges introduced into any part of the raceway system.

G. Underfloor Raceways

Install underfloor raceways in accordance with the Contract Drawings NFPA 70, ANSI/UL 884 and the recommendations and requirements of the manufacturer.

H. Polyvinyl Chloride (PVC) Conduit

1. PVC Conduit shall not be used indoors.

2. PVC Conduits Types 40 and 80 conform to NFPA 70 Article 347 except it shall not be used indoors.

3. PVC Conduits Types 40, A and EB shall be used for concrete encasement.

4. PVC Conduit Type DB shall be used for direct burial, sand encased.

I. High-Density Polyethylene (HDPE) Conduit

1. HDPE conduit shall not be used indoors.

2. HDPE Type 40 shall be used for direct burial or encased in concrete.

J. Fiberglass Reinforced Epoxy (FRE) Conduit

1. Shall be installed as described in NFPA 70.

2. All sweeps, bends, or changes in direction shall be done with fittings only.

3. Elbows and fittings shall be manufactured from the same resin/hardener/glass system as the conduit.

K. Dissimilar Metals

1. "Dissimilar metals" shall mean those metals which are incompatible with one another in the presence of moisture, as determined from their relative positions in the Electrochemical Series, or from test data.

2. Where dissimilar metals come in contact, paint the joint both inside and out with approved coating to exclude moisture from the joint, or provide a suitable insulating barrier separating the metals.

3.02 FIELD TESTS

A. Conduit Cleaning and Testing

1. After installation of conduits and accessories and completion of all concreting operations, if any, carefully clean and clear all conduit runs of all obstructions and foreign matter to the satisfaction of the Engineer.

2. Test conduits, in the presence of the Engineer, by pulling through each conduit a flexible cylindrical mandrel having an outside diameter not more than 1/4 inch smaller than the inside diameter of the conduit, but nominally 85 percent of the trade diameter, whichever is larger. Only nylon cable of adequate strength shall be used to pull the mandrel through the conduit system. The use of rope will not be permitted.

B. Connections to Existing Conduits

1. Where conduits installed under this Contract are connected to existing conduits, or conduits installed by others, test the entire run to the nearest box, manhole, handhole, or equipment enclosure as specified in 3.02 A.2 above.

2. Report immediately to the Engineer any defect or stoppage found in portions of the conduit system not installed under this Contract. Do not attempt to rectify any defect or stoppage found in conduit not installed under this Contract unless specifically instructed to do so by the Engineer. The Contractor's compensation for the rectifying of such defects or stoppages at the direction of the Engineer will be determined in accordance with the Clause of the Contract providing compensation for Extra Work.

3. The Engineer shall be the sole judge as to whether a defect or stoppage exists. Perform all tests required by the Engineer to enable him to make his decision.

END OF SECTION

SECTION 16110

RACEWAYS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16110A01 Raceway systems - only when shop drawings are required by the Contract Drawings.

Catalog Cuts

16110B01 Conduit and Tubing.

END OF APPENDIX "A"

DIVISION 16

SECTION 16115

UNDERGROUND CONDUIT SYSTEMS

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for underground conduits, manholes, handholes, vaults and accessories.

B. Definitions

1. Conduit: A single enclosed raceway for wires or cables; duct.
2. Ductbank: A structure containing one or more ducts or conduits.
3. Conduit System: A combination of conduit, conduits, manholes, handholes and vaults joined to form an integrated whole.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American National Standards Institute (ANSI)
ANSI C 2	National Electrical Safety Code
ANSI C 80.1	Rigid Steel Conduit - Zinc Coated
	American Society for Testing and Materials (ASTM)
ASTM A 185	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
	Institute of Electrical and Electronics Engineers, Inc. (IEEE)
IEEE 837	Standard for Qualifying Permanent Connections Used in Substation Grounding
	National Electrical Manufacturers Association (NEMA)
NEMA RN 1	Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	Electric Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
NEMA TC 14	Filament-Wound Reinforced Thermosetting Resin Conduit and Fittings
	National Fire Protection Association (NFPA)
NFPA 70	National Electrical Code
OSHA	Occupation Safety and Health Administration
	Underwriters Laboratories Inc. (UL)
UL 6	Rigid Metal Conduit
UL 514B	Fittings for Conduits and Outlet Boxes

UL 467	Electrical Grounding and Bonding Equipment
UL 651	Schedule 40 and 80 Rigid PVC Conduit
UL 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

The underground conduit system shall be furnished and installed in accordance with this Section and as specified on the Contract Drawings.

A. Components of the underground conduit system manufactured, supplied, and installed shall comply with the requirements of NFPA 70, all local codes, and the requirements of OSHA.

1.04 QUALITY ASSURANCE

A. The manufacturer shall have had a minimum of three years experience within the last five years in manufacturing the products of the type(s) and size(s) described in this Section. Those products shall have been satisfactorily used for purposes similar to those intended herein. The Contractor shall provide a list of installations and contracts for which the manufacturer has produced such materials.

B. All electrical materials and equipment for which there is a nationally recognized standard, shall bear the conformance label of the nationally recognized third party inspection authority, such as Underwriters Laboratories Inc. (UL), Factory Mutual (FM) or ETL.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, protective packaging. Protective caps shall be removed immediately prior to installation of conduit.

B. Store materials in a clean, dry space and protect them from weather.

C. Handle in a manner to prevent damage to finished surfaces.

1.06 SUBMITTALS

For submittal requirements, see Appendix "A".

PART 2. PRODUCTS

2.01 MATERIALS

A. General

1. Location, types and sizes of conduits and conduit systems are shown on the Contract Drawings.

2. Conduits shall be supplied in standard lengths in accordance with applicable UL standards.

3. Unless otherwise shown on the Contract Drawings, conduit or duct shall be type RGS as specified in this Section.

B. Rigid Metal Conduit

1. RGS - Galvanized steel conduit (heavy-wall) shall be hot dipped galvanized after cutting and threading and shall conform to UL 6 and ANSI C 80.1.

2. RGS-PV - PVC coated, galvanized steel conduit (heavy-wall) shall be hot dipped galvanized after cutting and threading, shall be coated with 40 mils of PVC and shall conform to NEMA RN 1, Type A 40.

3. All preformed elbows shall be similar in construction to and of a type designed for use with the appropriate conduit and shall conform to UL 6.

4. All fittings shall be threaded.

C. Rigid Nonmetallic Conduit

1. PVC-T - Schedule 20 (thin-wall) polyvinyl chloride (PVC) conduit shall conform to UL 651A.

2. PVC-H - Schedule 40 (standard-wall) polyvinyl chloride (PVC) conduit shall conform to UL 651.

3. PVC-80 - Schedule 80 (extra heavy-wall) polyvinyl chloride (PVC) conduit and elbows shall conform to NEMA TC 2 and UL 651.

4. Fiberglass reinforced epoxy conduit shall be glass filament wound, embedded in ultra-violet resistant epoxy. Conduit fittings and elbows shall conform to NEMA TC 14 and the following:

   a. FGS-T - Standard-wall conduit, wall thickness shall be not less than 70 mils for all sizes. Type FGS-T conduit shall be used only where encased in concrete.

   b. FGS-S - Heavy wall conduit, UL listed, with a wall thickness not less than 70 mils for conduits less than 4 inch trade size, not less than 90 mils for conduits 4 inch trade size and not less than 110 mils for conduits larger than 4 inch trade size. Type FGS-H shall be used where direct buried, encased in concrete, or where conduit risers extend to above grade, in accordance with the requirements of the UL listing.

   c. FGS-E - Extra-heavy wall conduit, with a wall thickness not less than one-quarter inch. Type FGS-E conduit shall be used for exposed exterior conduit runs on bridges and elevated structures.

5. Elbows, fittings, offsets, etc. shall be preformed and similar in materials and construction to the conduit.

6. Couplings shall be of a type to provide a watertight installation of the conduit system.

D. Manholes, Handholes, and Vaults

1. Precast manholes, handholes and vaults shall be as shown on the Contract Drawings. Concrete shall be in accordance with the requirements of Division 3 Section on concrete.

2. Cast-in-place manholes, handholes and vaults conforming in size and strength to the precast manholes, handholes and vaults shown on the Contract Drawings may be substituted, subject to the approval of the Engineer.

3. Continuous inserts shown on the Contract Drawings shall be hot-dipped galvanized steel, and shall be supplied complete with end caps and waxed cardboard closure strips. All metallic parts shall have a hot-dipped galvanized finish.

4. Racking assemblies shall be capable of being mounted on the continuous inserts supplied in manhole, handhole and vault walls, without modification, utilizing hot-dipped galvanized spring nuts and bolts.

   a. The racking assemblies shall, at a minimum, include supports on each wall of the manhole, handhole or vault, with arms on each support for each cable or arc-proofed cable group. Each arm shall have insulators to support each cable or cable group. Provide additional arms and insulators as shown on the Contract Drawings.

   b. Racking assembly arms and insulators, for installation on existing supports, shall match the existing supports without modification.

5. Manhole, handhole and vault frames and covers shall be as shown on the Contract Drawings.

6. Provide pulling hooks shall be Hubbard Co. No. 9119, or approved equal.

E. Grounding Assemblies

1. Grounding bushings shall be plated malleable iron body, insulated type, rated 150 degrees C.

2. Ground rods shall be minimum 3/4-inch diameter, copper-clad steel. Unless otherwise shown on the Contract Drawings, ground rods shall be 10 feet long.

3. Unless otherwise shown on the Contract Drawings, conductors for grounding assemblies within manholes, handholes, or vaults shall be copper, minimum #4 AWG.

4. Ground rod connections shall be either exothermic welds, or high-strength compression-crimp system conforming to the requirements of IEEE 837 and UL 467, or approved equal.

5. Ground cable clamps shall be split-bolt, high strength, copper alloy connectors.

PART 3. EXECUTION

3.01 EXAMINATION

A. Inspect all conduit, equipment and accessories prior to installation. Replace any damaged items.

3.02 PREPARATION

A. The Contractor shall be responsible for field verification of dimensions and existing underground utilities.

3.03 INSTALLATION

A. General

Underground conduit systems shall be installed in accordance with the requirements of ANSI C 2, NFPA 70 and as shown on the Contract Drawings.

B. Excavation and Backfill

Excavation and backfill for underground conduits, handholes, manholes and shall be in accordance with the applicable requirements of the Section entitled "EXCAVATION, BACKFILLING AND FILLING" of these Specifications.

C. Concrete Encased Conduit

1. Concrete encasement of conduit shall conform to the details shown on the Contract Drawings and the requirements of Division 3 Section on concrete.
2. The dead-ending of conduit shall be accomplished as shown on the Contract Drawings.
3. No variation from a straight line of greater than 1/2 inch in fifty feet will be permitted when installing a concrete encased conduit.
4. Reinforce junctions with existing concrete encased conduit, or existing systems, with W8 x W4 - 10 x 10 welded wire fabric, conforming to ASTM A 185, encased in four inches additional thickness of concrete around each set of conduits. The additional encasement shall extend at least four feet in each direction from the junction.
5. Where the placing of concrete is interrupted for one hour or more, reinforce the concrete encasement at the point of interruption with W4 x W4 - 10 x 10 welded wire fabric, conforming to ASTM A 185.
6. Preformed or precast conduit may be substituted for the field-encased type, subject to the approval of the Engineer. All precast conduit shall meet the same requirements specified herein or shown on the Contract Drawings.
7. All conduits shall leave or enter structures perpendicularly.
8. Changes in direction of conduits shall be made by bends having a minimum radius of 15 feet. Elbows or sweeps to equipment or foundations shall have a radius not less than 10 times the trade diameter of the conduit.
9. Conduits shall be installed in true alignment and shall be sloped for drainage toward manholes or handholes. All free ends of empty conduits shall be sealed to prevent water entrance.
10. Openings for conduits in manhole construction shall be sealed and made watertight in an approved manner.
11. Transitions between conduits of different materials shall be made using the manufacturer's standard adapters.
12. Terminations of rigid nonmetallic conduits in manholes, handholes, and other concrete structures, shall be made with end bells, set flush with the inside face of the concrete.

13. Terminations of rigid metal conduits in manholes, handholes, vaults and other concrete structures, shall be made with insulated grounding bushings, projecting 2 inches beyond the inside face of the concrete.

D. Direct-Buried, Rigid Nonmetallic Conduit (PVC-H or FRE)

1. Direct-buried conduits shall be laid on firmly tamped and graded stone-free sand not less than 2 inches deep. Backfill in contact with the conduits shall be sand to a minimum of 3 inches above the conduits and the remainder of the backfill shall be unfrozen, stone-free earth. Buried depth shall be as shown on the Contract Drawings.

2. Conduit entering or exiting manholes, handholes, vaults and other concrete structures shall be a 10-foot length of rigid metal conduit protected with two coats of asphaltic paint.

3. Terminations of conduits in manholes, handholes, vaults and other concrete structures shall be made with insulated grounding bushings projecting 2 inches beyond the inside face of the concrete.

E. Manholes, Handholes, and Vaults

1. Set precast manholes, handholes and vaults so that they are firmly and fully bedded at required grades.

2. Set frames and covers using mortar and masonry as required. Radially laid concrete brick shall have 1/4-inch thick vertical joints at inside perimeter. Lay all concrete brick in a full bed of mortar and completely fill all joints. Where more than one course of concrete brick is required, stagger vertical joints.

3. Set racking assemblies as required so that the unsupported length of wires or cables shall not exceed 30 inches.

F. Vertical Adjustment of Existing Manholes, Handholes, and Vaults

1. Adjust the top elevation of existing structures to suit new finished grades in accordance with the details shown on the Contract Drawings.

2. Existing frames and covers shall be carefully removed, cleaned of all mortar fragments to the satisfaction of the Engineer and reset at the required elevation in accordance with the requirements shown on the Contract Drawings.

G. Grounding

1. Install a complete grounding system in each manhole or vault, and in selected handholes shown on the Contract Drawings. Electrically bond all arm supports, insulated grounding bushings, and ground rods together.

2. After installation, coat all bare surfaces or connections in the grounding system with asphaltic paint.

H. Testing

1. Test conduits, in the presence of the Engineer, by pulling through each conduit a flexible cylindrical mandrel having an outside diameter not more than 1/4 inch smaller than the inside diameter of the conduit, but nominally 85 percent of the trade diameter, whichever is larger. Only nylon cable of adequate strength shall be used to pull the mandrel through the conduit system. The use of rope will not be permitted.

I. Connections to Existing Conduits

1. Where conduits installed under this Contract are connected to existing conduits, test the entire run to the nearest box, manhole, handhole, vault or equipment enclosure, including all existing conduits installed by others, that will be used under this Contract.

2. Where any work shall be performed in conduits emanating from a manhole, handhole, vault or equipment enclosure, all existing spare conduits (conduits containing no electric wire or cable) shall be tested to the nearest manhole, handhole, vault or equipment and a pull line shall be left in place in each such conduit.

3. Report immediately to the Engineer any defect or stoppage found in portions of the conduit system not installed under this Contract. Do not attempt to rectify any defect or stoppage found in conduit not installed under this Contract unless specifically instructed to do so by the Engineer. The Contractor's compensation for the rectifying of such defects or stoppages at the direction of the Engineer will be determined in accordance with the clause of the Contract providing compensation for Extra Work.

4. The Engineer shall be the sole judge as to whether a defect or stoppage exists. Perform all tests required by the Engineer to enable him to make his decision.

3.04 ADJUSTMENTS

A. Conduit Cleaning

After installation of conduits, manholes, handholes, vaults, accessories and completion of all concreting operations, if any, carefully clean and clear all conduits of all obstructions and foreign matter to the satisfaction of the Engineer.

END OF SECTION

SECTION 16115

UNDERGROUND CONDUIT SYSTEMS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16115A01 Handholes.

16115A02 Vaults.

16115A03 Frames and covers.

16115A04 Manholes, including "exploded" views with complete details as to the location of all existing and new conduits, wires and cables identified by permanent feeder numbers, racking assemblies and grounding assemblies. Manhole drawing blanks will be furnished by the Engineer.

Catalog Cuts

16115B01 Conduit.

16115B02 Racking assemblies.

16115B03 Grounding assemblies.

16115B04 Continuous inserts

END OF APPENDIX "A"

DIVISION 16

SECTION 16120

WIRES, CABLES, SPLICES, TERMINATIONS (600 VOLTS OR LESS)

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for wires, cables, splices, terminations, and appurtenances for electrical systems of 600 volts or less.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Society for Testing and Materials (ASTM)

ASTM B 1	Hard-Drawn Copper Wire
ASTM B 2	Medium-Hard-Drawn Copper Wire
ASTM B 3	Soft or Annealed Copper Wire
ASTM B 8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 33	Tinned Soft or Annealed Copper Wire for Electrical Purposes
ASTM B 174	Bunch-Stranded Copper Conductors for Electrical Conductors
ASTM B 189	Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes
ASTM D 2802	Ozone-Resistant Ethylene-Propylene-Rubber Insulation for Wire and Cable
ASTM D 3005	Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
ASTM E 662	Standard Test Method for specific Optical Density of Smoke Generated by Solid Materials

Federal Specifications (FS)

HH-I-553	Insulation Tape, Electrical (Rubber, Natural and Synthetic)

Insulated Cable Engineers Association (ICEA)

ICEA S-19-81	Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC 3)

ICEA S-61-402	Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC 5)
ICEA S-66-524	Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC 7)
ICEA S-68-516	Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC 8)
ICEA T-33-655	Guide for Low Smoke, Halogen-Free (LSHF) Polymeric Cable Jackets

Institute of Electrical and Electronics Engineers (IEEE)

IEEE 383	Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations
IEEE 837	Standard for Qualifying Permanent Connections Used in Substation Grounding

Military Specifications

MIL C-24643	Electrical Cable and Cord for Shipboard Use, Testing for Low Smoke and Halogens

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code

Naval Engineering Standards

NES 713	Determination of Toxicity Index of Products of Combustion From Small Specimens of Materials

Underwriters Laboratories Inc. (UL)

UL 44	Rubber-Insulated Wires and Cables
UL 62	Flexible Cord and Fixture Wire
UL 83	Thermoplastic-Insulated Wires and Cables
UL 467	Grounding and Bonding Equipment
UL 510	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 854	Service-Entrance Cables
UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
UL 1685	Standards for Safety Vertical Tray Fire Propagation and Smoke Release Test for Electrical and Optical Fiber Cables

1.03 QUALITY ASSURANCE

A. Wires and cables which have been manufactured more than two years prior to installation shall not be used in the Work of this Section.

B. Tapes for splices or terminations shall be dated by the tape manufacturer to indicate that they have been manufactured no longer than six months prior to use in the Work of this Section.

C. Polyvinyl Chloride (PVC): PVC-insulated power wiring and items containing PVC, except PVC-insulated wiring for communications systems, remote control, signaling, and power-limited circuits, shall not be installed in indoor area. PVC-insulated wiring for communications systems, remote control, signaling, and power-limited circuits shall be furnished and installed in accordance with NFPA 70.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Single conductor wire or cable sizes #4/0 AWG and larger that are to be installed in the same raceway shall be paralleled by the cable manufacturer prior to shipment. Cable assembly overall diameter shall be kept to a minimum.

B. Wire and cable sizes #4/0 AWG and larger shall be provided with fctory-applied caps unless otherwise shown on the Contract Drawings. End seals shall be heat-shrink, irradiated, modified polyolefin, and shall be sized for individual wires and cables.

C. Store material in a clean, dry space and protect it from the weather.

1.05 SUBMITTALS

See Appendix "A" for submittals requirements.

PART 2. PRODUCTS

2.01 MANUFACTURERS

Subject to compliance with requirements of this Section, provide wires, cables, wire and cable splicing, terminating and arcproofing materials of manufacturers as shown on the Contract Drawings.

2.02 WIRES AND CABLES

A. General

1. Definitions

a. Wire shall be defined as a solid or stranded conductor smaller than No. 6 AWG with or without insulation.

b. Cable shall be defined as a single conductor No. 6 AWG or larger, or two or more conductors of any size wire under a common covering.

2. Locations, types, sizes and numbers of wires and cables are shown on the Contract Drawings. Where not indicated, provide proper wire and cable selection to comply with this section and NFPA 70 Standards.

3. Unless otherwise shown on the Contract Drawings, solid conductors shall be soft or annealed copper, conforming to ASTM B 33 (tinned), ASTM B 189 (lead-coated or lead-alloy coated), or ASTM B 3 (uncoated). Unless otherwise specified in this Section or unless otherwise shown on the Contract Drawings, stranded copper conductors shall be concentric stranding conforming to ASTM B 8.

4. Unless otherwise shown on the Contract Drawings, cable jackets for interior use shall be low smoke, low toxicity, non-halogen, flame retardant type and shall meet the following performance characteristics:

   a. Cables shall pass the flame propagatory and smoke release criteria according to the test method of UL 1685.

   b. The halogen content of cable jackets shall not exceed 0.2 percent according to the test method of MIL-C-24643. The Authority classifies 0.2 percent or less halogen content as "non-halogen".

   c. The toxicity index of cable jackets shall not exceed 4.0 according to the test method of NES 713.

   d. The cable jackets shall comply with ICEA T-33-655 for smoke generation.

   e. The acid gas content of cable jackets shall not exceed a maximum of 3.0 percent according to the test method of MIL-C-24643.

5. Use the additional performance characteristics for wires and cables which will be installed in subway areas, substations, tunnels, etc. where stringent flame retardency, low smoke, low toxicity, zero halogen and good circuit integrity during a fire are required.

   a. Wires shall pass the flame propagatory criteria according to the test method of VW-1.

   b. The halogen content of both the wire and cable insulation and cable jacket(s) shall not exceed 0.2 percent according to the test method of MIL-C-24643. The Authority classifies 0.2 percent or less halogen content as "non-halogen".

   c. The toxicity index of both the wire and cable insulation and cable jacket(s) shall not exceed 2.0 according to the test method of NES 713.

   d. The acid gas content of both wire and cable insulation and cable jacket(s) shall not exceed a maximum of 2.0 percent according to the test method of MIL-C-24643.

e. The wire and cable insulation materials shall pass the smoke generation test in accordance with ASTM E 662. Wire and cable insulation when tested on a specimen of 80 mils thick slab shall not exceed the following values:

Flaming Avg. Ds (4 minutes)	100
Flaming Avg. Dm (20 Minutes)	200
Non-Flaming Avg. Ds (4 minutes)	100
Non-Flaming Avg. Dm (20 minutes)	350

f. The cable jacket materials shall pass the smoke generation test in accordance with ASTM E 662. Wire and cable jacket when tested on a specimen of 80 mils thick slab shall not exceed the following values:

Flaming Avg. Ds (4 minutes)	50
Flaming Avg. Dm (20 minutes)	150
Non-Flaming Avg. Ds (4 minutes)	50
Non-Flaming Avg. Dm (20 minutes)	250

6. Color-Coding for Power and Lighting Conductors

a. Insulation or covering of wires and cables shall be factory color-coded by the use of colored compounds or coatings. The color-code shall be followed cnsistently throughout the performance of the Work.

b. Upon written request of the Contractor, the Engineer may permit the use of the following methods in lieu of the wire or cable manufacturer's color-coding, when limited quantities of wire and cable are involved, for sizes #8 AWG and larger.

(1) For dry locations only, spiral application of 3/4 inch wide, colored pressure sensitive plastic tape, half lapped for a distance of not less than six inches may be used. To prevent unwinding, the last two wraps of tape shall be applied with no tension.

(2) For wet or dry locations, application of three, 3/16 inch wide, colored, fungus-inert, self-extinguishing, self-locking, nylon cable ties spaced 3 inches apart may be used. The ties shall be snugly applied with a special tool or pliers, and any excess removed.

(3) Each wire and cable shall be color-coded at all terminal points, in all manholes, boxes, or other similar enclosures.

(4) Color markings shall be applied so as not to obliterate the manufacturer's identification markings.

c. Color code chart shall be as follows:

	System Voltage	
Conductor	208Y/120V	480Y/277V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

7. All wires, cables, splices and terminations, for which there are established UL standards, shall bear the UL label.

B. General-Purpose Wires and Cables

Unless otherwise shown on the Contract Drawings, general purpose wires and cables shall be as follows:

1. General-purpose wires and cables shall be single conductor, ASTMB8, Class B stranded for sizes #8 AWG and larger, and solid for sizes #10 AWG and smaller.

2. Select from the following list of UL wire and cable types:

a. Type XHHW: Flame retarding, Cross-linked-polyolifin insulation, conforming to UL 44, for dry locations only.

b. Type XHHW-2: Flame retardant, Cross-linked-polyolifin insulation, conforming to UL 44.

c. Type THWN: Flame retardant, moisture and heat resistant thermoplastic insulation with a nylon jacket or equivalent; Double rated THHN-THWN gasoline-oil resistant II; conforming to UL 83.

The use of this cable shall be in accordance with the requirements of paragraph 1.03C of this Section.

d. Type USE: Heat and moisture resistant ethylene- propylene-rubber insulation with heavy duty thermosetting chlrosulphanated polyethylene or heavy- duty neoprene jacket; multiple rated "USE-RHH-RHW"; conforming to ASTM D 2802, ICEA S-68-516, UL 44 and UL 854. Unless otherwise indicated, Type USE shall be the only wire and cable used for underground installations.

C. Overhead Service Cables

Unless otherwise shown on the Contract Drawings, overhead service cables shall be two or more type SE, ASTM B 8, Class B or Class C stranded, hard-drawn copper conductors, ethylene-propylene-rubber insulation, with heavy duty neoprene or heavy duty thermosetting chloro-sulphonated polyethylene jacketed, marked "sunlight resistant", conforming to ASTM D 2802, UL 44 and UL 854. Cable shall be factory assembled with copper-clad messenger conforming to ICEA S-68-516.

D. Portable Cords

Unless otherwise shown on the Contract Drawings, portable cords shall be as follows:

1. Type S shall be 60 degrees C rated, with heavy-duty thermosetting insulation and jacket, conforming to UL 62, 600-volt rated.

2. Type SO shall be oil resistant, 60 degrees C rated, with heavy-duty thermosetting insulation and jacket, conforming to UL 62, 600-volt rated.

3. Type G or Type W shall be 90 degrees C rated, with ethylene-propylene-rubber insulation and Hypalon jacket, 600-volt rated.

4. Special types shall be used only where shown on the Contract Drawings.

E. Lighting Fixture Wires

Unless otherwise shown on the Contract Drawings, lighting fixture wires shall be stranded only, and shall be Type SF-2, silicone rubber insulated conforming to UL 62.

F. Grounding Wires and Cables

Unless otherwise shown on the Contract Drawings, grounding wires and Cables shall be as follows:

1. Insulated

   a. Solid for sizes #8 AWG and smaller; ASTM B 8, Class B stranded for sizes #6 AWG and larger; and of the same insulation type as the power conductors.

   b. Covering shall be a continuous green color and conform to ASTM B 33 and UL 44.

2. Uninsulated

   a. General

      Solid for sizes #8 AWG and smaller; ASTM B8, Class B stranded for sizes #6 AWG and larger.

   a. In raceways

      Soft-drawn and conforming to ASTM B 3.

   b. Direct buried or encased in concrete

      Soft-drawn, medium-hard-drawn, or hard-drawn and conforming to ASTM B 1, B 2 or B 3, respectively.

G. Control Wires and Cables

Unless otherwise shown on the Contract Drawings, control wires and cables shall be as follows:

1. Single conductor wires and cables shall be ASTM B 8, Class B stranded, type XHHW or XHHW-2 flame retardent, cross-linked-polyolifin insulation. Both shall conform to UL44 and ICEA S-66-524.

2. Multiconductor cables shall be ASTM B 8, Class B or Class C stranded, Control Cable Type B, conforming to ICEA S-61-402. Color-coded as per ICEA S-61-402, Method No. 1 for NFPA 70 applications (with white and green) or ICEA S-19-81, for paired conductor cables. Select from the following list of cable types.

   a. Individual ethylene-propylene rubberinsulation with overall flame retardent, cross-linked-polyolifin jacket; conforming to ICEA S-68-516, UL 44, and UL 1581.

   b. Individual ethylene-propylene-rubber insulation with individual and overall flame-retardent, cross-linked polyolifin jackets; conforming to ICEA S-68-516 and UL 44.

   c. Individual flame retardent, cross-linked-polyolifin insulation with and overall flame retardent, cross-linked-polyolifin jacket; conforming to ICEA S-66-524.

   d. Individual cross-linked-polyolifin insulation with overall polyvinyl chloride jacket conforming to ICEA S-66-524.

   e. Individual polyolifin insulation with individual and overall polyvinyl chloride jackets conforming to ICEA S-61-402.

H. Switchboard Wires and Cables

Unless otherwise shown on the Contract Drawings, switchboard wires and and cables shall be as follows:

1. Switchboard wires and cables shall be single conductor, ASTM B 8, Class B stranded, except that for wires and cables crossing hinged joints and swinging panels, and where "Extra Flexible" wire or cable is shown on the Contract Drawings, conductors shall be ASTM B 174, Class K stranded.

2. Wires and cables shall be Type SIS, cross-linked-thermosetting-polyethylene insulation, conforming to ICEA S-61-402, IEEE383 and UL 44.

I. Cable Tags

1. Dry Locations

   a. Fiberglass tags, 1/16 inch thick and 3/4 inch wide, indented with letters and numbers 5/16 inch high, with #14 AWG copper or nylon, weather-resistant cable ties.

   b. Lighting branch circuit wiring and single conductor signal and control wiring may be identified with "Quiklables" manufactured by W. H. Brady Company, or approved equal.

2. Wet Locations

   Stainless steel metal tags, No. 28 gauge and 3/4 inch wide, embossed with letters and numbers 5/16 inch high, with #14 AWG copper or nylon, weather-resistant cable ties, or stainless steel cable ties.

2.03 SPLICING, TERMINATING AND ARCPROOFING MATERIALS

A. General

1. All splicing, terminating and arcproofing materials shall be compatible so that no one material will adversely affect the physical or electrical properties of any other, or of the wire or cable itself.

2. All materials for making splices and terminations shall be specifically designed for use with the type of wire or cable, insulation and installation and operating conditions of the specific application.

B. Connectors

Subject to compliance with requirements of this Section, provide connectors of the following types:

1. Solderless, uninsulated, high conductivity, corrosion resistant, compression connectors conforming to UL 467 and IEEE 837;

2. Insulated, indenter type compression butt connectors;

3. Insulated, integral self-locking flexible shell, expandable spring connectors;

4. Uninsulated, indenter type compression pigtail connectors;

5. Welded type connectors.

C. Terminals

Subject to compliance with requirements of this Section, provide terminals of the following types:

1. Solderless, uninsulated, high conductivity, corrosion resistant, compression terminals conforming to UL 467 and IEEE 837;

2. Insulated, compression terminals;

3. Solderless, high conductivity, corrosion resistant, hex screw type, bolted terminals;

4. Welded type terminals.

D. Shrinkable Tubing

Subject to compliance with requirements of this Section, provide shrinkable tubing of the following types:

1. Either irradiated modified polyvinyl chloride or irradiated modified polyolefin heat shrinkable tubing;

2. Cold shrinkable tubing.

E. Tapes and Sealers

1. Vinyl Tapes

Flame-retardent, cold and weather-resistant, 3/4 inch or 11/2 inches wide, as required, and conforming to UL 510 and ASTM D 3005.

a. For interior, dry locations, provide 7 mils, conforming to ASTM D 3005 (Type I); Scotch (3M) No. 33, or approved equal.

b. For exterior or damp and wet locations, provide 8.5 mils, conforming to ASTM D 3005 (Type II); Scotch (3M) No. 88, or approved equal.

2. Rubber Tapes

Ethylene-propylene, rubber-based, 30-mil splicing tape, rated for 130 degrees C operation; 3/4inch and wider (1, 1 1/2, 2 inches) as shown on the Contract Drawings or approved by the Engineer, conforming to Federal Specification HH-I-553 (Grade A); Scotch (3M) No. 130C, or approved equal.

3. Insulating Putty

Rubber-based, 125-mil elastic filler putty; 1 1/2 inches wide; Scotch (3M) Scotchfil, or approved equal.

4. Silicone Rubber Tapes

Inorganic silicone rubber, 12-mil, 130 degrees C rated, anti-tracking, self-fusing tape; 1 inch wide; Scotch (3M) No. 70, or approved equal.

5. Sealer

Liquid applied, fast-drying sealant; Scotch (3M) Scotchkote, or approved equal.

F. Resin Filled Splices

1. Epoxy Molded Type

Two-piece, snap-together molded bodies, sized for wire or cable, with two-part low viscosity polyurethane insulating and sealing compound, rated for 600 volts, using crimp-type wire connector; Scotch (3M) No. 82-A1, 82-A2 or 82-A3 compound, or approved equal.

2. Re-Enterable Type

Transparent, molded bodies clamped with stainless steel strain-relief bar and shield continuity connectors, sized for wire or cable, with loosely woven polyester spacer web and jelly-like urethane formulation for permanent re-entry capability; Scotch (3M) No. 78-R1 thru 78-R5, with No. 2114 compound, or approved equal.

G. Arcproofing Materials

1. Fire resistant tapes shall be Scotch (3M) No. 77, or approved equal.

2. Glass cloth binding tapes shall be Scotch (3M) No. 69, or approved equal.

H. Special splicing materials and methods shall be as shown on the Contract Drawings.

2.04 SHOP TESTS

A. For quantities as shown on the Contract Drawings, regular dielectric-withstand and insulation-resistance in water tests for wires and cables shall be performed in accordance with UL44.

B. Flame tests for wires and cables shall be performed in accordance with IEEE 383.

C. The test results shall be certified for each reel/coil/box of wire or cable.

D. Factory inspection and witnessing of tests by the Engineer shall be required for all wires and cables furnished under this Contract. The Engineer reserves the right to require additional testing, or to waive factory inspection or witnessing of tests. The Contractor shall notify the Engineer 14 days in advance of the scheduling of such factory tests.

PART 3. EXECUTION

3.01 PREPARATION

A. Prior to pulling wires and cables, clean raceway systems of all foreign matter and perform all operations necessary so as not to cause damage to wires and cables while pulling.

B. Prior to pulling wires and cables into underground conduit systems, place a feeding tube approved by the Engineer at the entrance end of such systems.

3.02 INSTALLATION

A. Wire and Cable Installation

1. General

a. Keep wires and cables dry at all times.

b. Seal wire and cable ends with watertight end seals if splicing or terminating does not follow at once.

c. Before splicing or terminating wires and cables, make a thorough inspection to determine that water has not entered the wires and cables or that the wires and cables have not been damaged.

d. Use adequate lubrication when installing cables in conduits or raceways. Any pulling compounds shall be compatible with the finish of the wires and cables furnished.

2. General Purpose Wires and Cables

a. Minimum wire or cable size shall be #12 AWG for light and power service.

b. Wires or cables shall be at least #10 AWG for the entire length of branch circuits, where distances to first outlets are as follows:

(1) 100 feet or more on 480Y/277 Volt systems.

(2) 70 feet or more on 208Y/120 Volt systems.

3. Lighting Fixture Wires

a. For wiring within lighting fixtures only, where sizes #14 AWG or smaller are required, use Type SF-2 fixture hookup wire. Type SF-2 wire shall not be used for wiring end-to-end connected fluorescent fixtures.

b. For connecting lighting fixtures to branch circuit conductors, use either Type RHH-VW-1, XHHW or USE, up to 90 degrees C, in dry locations.

4. Grounding Wires and Cables

a. Use bare, uninsulated wire and cable only where shown on the Contract Drawings or where approved by the Engineer.

b. Insulated grounding cable shall be of the type specified in this Section or as shown on the Contract Drawings.

5. Control Wires and Cables

Control wires and cables shall not be smaller than #14 AWG unless otherwise shown on the Contract Drawings.

B. Splicing and Terminating

1. General

Splicing and terminating shall be as specified in this Section. Details of special splicing and terminating shall be as shown on the Contract Drawings. Any splicing or terminating methods other than those specified below, for which the components are in accordance with the requirements of this Section, shall be submitted to the Engineer for approval.

2. General Purpose Wires and Cables

a. Splices in dry locations for sizes #10 AWG and smaller

Splicing shall be completed using one of the following:

(1) Insulated, integral, self-locking flexible shell, expandable spring connectors shall be applied to the twisted conductors. Two, half-lapped layers of vinyl tape, extending to a distance of not less than one inch from the connector, shall be applied.

(2) Compression type, insulated butt connectors shall be applied to the butted conductors by means of an appropriate crimping tool, providing controlled indentation. Two, half-lapped layers of vinyl tape, extending to a distance of not less than one inch from the connector, shall be applied.

(3) Compression type, pigtail connectors shall be applied to the conductors by means of an appropriate crimping tool, providing controlled indentation. The connector shall be covered with a polyamide cap and two, half-lapped layers of vinyl tape, extending to a distance of not less than one inch from the connector, shall be applied.

b. Splices in dry locations for sizes #8 AWG and larger

Splicing shall be completed using all of the following:

(1) Connectors shall be split sleeve solderless type or solderless compression type.

(2) Fill indents of connectors with Scotchfil insulation putty.

(3) Apply rubber splicing tape equal to the original insulation rating.

(4) Apply two, half-lapped layers of vinyl tape, or a shrinkable tubing.

c. Splices in wet locations

(1) Same as dry locations specified in 3.02B.2.a and 2.b, except that after vinyl tape is applied, cover with two coats of sealer or shrinkable tubing.

(2) Resin-filled splice shall be covered with two, half-lapped layers of vinyl tape and two coats of sealer or shrinkable tubing.

d. Terminations in dry locations for sizes #10 AWG and smaller

Terminations shall be compression terminals, insulated or uninsulated.

e. Terminations in dry locations for sizes #8 AWG through #3/0 AWG

(1) Ring tongue terminals shall be solderless, uninsulated compression crimp type.

(2) Ring tongue lugs shall be bolted hex screw type.

f. Terminations in dry locations for sizes #4/0 AWG and larger.

Ring tongue terminals shall be solderless, uninsulated compression crimp type.

g. Terminations in wet locations

In addition to the dry location terminations specified in 3.02 B.2.d, 2.e and 2.f, cover the entire termination area with two, half-lapped layers of vinyl tape and apply two coats of sealer over the tape.

3. Overhead Service Cables

Splices and terminations in overhead service cables shall be the same as specified in 3.02 B.2.c and 2.g, respectively, appropriate for overhead service.

4. Portable Cords

a. Splices shall not be made in portable cords.

b. Terminations shall be made only at apparatus to be served or at branch circuit connection by means of any of the following:

(1) Insulated, integral, self-locking flexible shell, expandable spring, or crimp type connectors;

(2) Insulated, crimp type, compression connectors;

(3) Uninsulated, ring tongue terminals for connection to wire terminal strip block.

5. Lighting Fixture Wires

Connections to branch circuit and to fixture wiring shall be made by either insulated, integral, self-locking flexible shell, expandable spring, or crimp type connectors.

6. Grounding Wires and Cables

a. Splices and terminations shall be installed in accordance with the manufacturer's recommendations.

b. In hazardous or classified locations, splices and terminations shall be solderless high conductivity, corrosion resistant, compression type connectors and terminations shall be clamp type pressure connectors, suitable for such use.

c. All underground connections shall be covered with two coats of asphalt base paint.

7. Control Wires and Cables

a. Splices shall be made in accordance with the requirements specified in 3.02 B.2.c and shall be enclosed in a re-enterable splicing case. Where shielded cable is shown on the Contract Drawings, the shielding shall be continued through the splice. Shields shall be grounded at one location only unless otherwise shown on the Contract Drawings.

b. Terminations shall be insulated, indenter type ring tongue terminals.

8. Switchboard Wires

a. No splices are permitted.

b. Terminations shall be insulated, indenter type ring tongue terminals.

C. Arcproofing

1. Arcproofing shall be applied where shown on the Contract Drawings.

2. Arcproofing, which has been disturbed for any reason, shall be reinstalled as soon as possible after the disturbance.

3. Arcproofing shall be installed as follows:

a. Wires and cables shall be grouped by circuit and arcproofing applied over the group of wires and cables comprising one circuit. Splices shall be arcproofed individually and the taping shall join with and be overlapped by the group taping.

b. Arcproofing shall be applied in two wrappings of half-lapped tape, bound with glass cloth tape applied at the ends of the fire resistant tape, and at intervals not to exceed 24 inches along the entire length of the cables. The two wrappings shall be applied with opposing-lays.

c. Arcproofing shall be extended into the conduit opening or end bell of the raceway entering a handhole, manhole or box.

d. Arcproofing tape shall be 1 1/2 inches wide where the diameter of the individual cable, or of the circumscribed circle for the circuit group, is less than 1 3/4 inches. For larger diameters, the tape shall be 3 inches wide.

D. Identification of Wires and Cables

1. Each wire and cable shall be identified by its circuit in all cabinets, boxes, manholes, handholes, wireways and other enclosures and access locations, and at all terminal points.

2. The circuit designations shall be as shown on the Contract Drawings. Tags shall be attached to wires and cables in such a manner as to be readily visible.

3. The tag ties shall be wrapped around all conductors comprising the circuit or feeder to be identified.

4. Wires and cables which are arcproofed shall also be identified outside the applied arcproofing.

3.03 FIELD TESTS

Test all wires and cables up to equipment installed under this Contract with a 1000-volt Megohmmeter. Furnish the Engineer with a copy of the "Megger" readings together with an outline of the method used. If, in the opinion of the Engineer, any reading is lower than that required by applicable codes, promptly replace the materials involved, at the Contractor's expense, and retest.

END OF SECTION

SECTION 16120

WIRES, CABLES, SPLICES, TERMINATIONS (600 VOLTS OR LESS)

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Catalog Cuts

16120B01 Catalog Cuts
a. Wires and cables for each type and size
b. Splice kit materials and installation procedures

Manufacturer Test Reports

16120F01 Submit certified shop test reports for wires and cables.

Record Documents

16120M01 Submit field test results for wires and cables, including "Megger" readings with the test method used.

END OF APPENDIX "A"

DIVISION 16

SECTION 16121

WIRES, CABLES, SPLICES, TERMINATIONS

(MEDIUM VOLTAGE: 601 VOLTS TO 34,500 VOLTS, INCLUSIVE)

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for wires, cables, splices, terminations and appurtenances for electrical systems of medium voltage: 601 volt to 34,500 volts, inclusive.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American Society for Testing and Materials (ASTM)
ASTM B 1	Hard-Drawn Copper Wire
ASTM B 2	Medium-Hard-Drawn Copper Wire
ASTM B 3	Soft or Annealed Copper Wire
ASTM B 8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 29	Pig Lead
ASTM B 33	Tinned Soft or Annealed Copper Wire for Electrical Purposes
ASTM B 189	Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes
ASTM D 1373	Medium-Voltage Rubber Insulating Tape
ASTM D 2802	Ozone-Resistant Ethylene-Propylene-Rubber Insulation for Wire and Cable
	Association of Edison Illuminating Companies (AEIC)
AEIC CS-6	Ethylene-Propylene-Rubber Insulated Shielded Power Cable Rated 5 through 69 KV
	Federal Specifications (FS)
HH-I-553	Insulation Tape, Electrical (Rubber, Natural and Synthetic)

Insulated Cable Engineers Association (ICEA)

ICEA S-68-516	Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

Institute of Electrical and Electronics Engineers (IEEE)

IEEE 48	High Voltage AC Cable Terminators, Test Procedure and Requirements
IEEE 383	Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations
IEEE 404	Standard for Type Test of Cable Joints for Use with Extruded Dielectric Cable Rated 5,000 through 46,000 Volts, and Cable Joints for Use with Laminated Dielectric Cable Rated 2,500 through 500,000 Volts
IEEE 837	Standard for Qualifying Permanent Connections Used in Substation Grounding

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code
NFPA 258	Standard Research Method for Determining Smoke Generation of Solid Materials
OSHA	Occupation Safety and Health Administration

Underwriters Laboratories Inc. (UL)

UL 44	Rubber-Insulated Wires and Cables
UL 467	Grounding and Bonding Equipment
UL 510	Insulating Tape
UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Wires, cables, splices and terminations for medium voltage: 601 Volts to 34,500 Volts, inclusive, shall be furnished and installed in accordance with this Section and as specified on the Contract Drawings.

B. Components of the medium voltage system, manufactured, supplied and installed, shall comply with the requirements of NFPA 70, all local codes, and the requirements of OSHA.

1.04 QUALITY ASSURANCE

A. Wires and cables that have been manufactured more than two years prior to installation shall not be used in the Work of this Section.

B. Tapes for splices or terminations shall be dated by the tape manufacturer to indicate that they have been manufactured no longer than six months prior to use in the Work of this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Where multiple single conductor cables are to be installed as one cable, single conductor cables shall be paralleled by cable manufacturer prior to shipment. Cable assembly overall diameter shall be kept to a minimum.

B. Store material in a clean, dry space and protect it from the weather.

1.06 SUBMITTALS

See Appendix A.

PART 2. PRODUCTS

2.01 MANUFACTURERS

Provide wires, cables, splices and terminations, and ancillary equipment, in compliance with the requirements of this section, and as shown on the Contract Drawings.

2.02 MATERIALS

A. Wires and Cables

1. Locations, types, sizes and numbers of wires and cables are shown on the Contract Drawings.

2. Unless otherwise shown on the Contract Drawings, solid conductors shall be soft or annealed copper, conforming to ASTM B 33 (tinned), ASTM B 189 (lead-coated or lead alloy coated), or ASTM B 3 (uncoated).

3. Pulling Devices and End Seals

   a. Wires and cables shall be provided with factory fitted pulling devices and end caps unless otherwise shown on the Contract Drawings. Shop drawings showing the pulling devices and end caps to be used shall be submitted to the Engineer for approval.

   b. For pulling tensions up to 1000 pounds per grip, basket grips may be utilized.

   c. All wires and cables shall be end-sealed, at both ends of each length. Lead cable shall be solder-wiped sealed with a heat-shrinkable cap, to prevent the entrance of moisture.

   d. Lead-sheathed cables shall be provided with either compression type or solder-wiped style pulling bolts or eyes on the leading end of each conductor, or on the overall assembly. The pulling device shall be installed and fitted with either solder-wipe or heat-shrinkable sleeve to prevent the entrance of moisture.

4. Wires and cables shall be identified in accordance with AEIC CS 6. Outer jacket shall be printed with manufacturer's identification, type of insulation, size of conductor, rated voltage, year of manufacture, insulation thickness and UL listing. Each reel shall carry a tag identifying manufacturer, cable type, size, voltage and length of cable on reel.

   In addition, on each single conductor cable when shipped triplexed or paralleled, there shall be a unique series of "111" or "222" or "333" respectively per phase or leg to identify the phase connection.

5. Grounding Wires and Cables

   Unless otherwise shown on the Contract Drawings, grounding conductors shall be as follows:

   a. Insulated

      (1) Solid for sizes #8 AWG and smaller, Class B stranded for sizes #6 AWG and larger, 600 volt rated, XHHW or RHW.

      (2) Covering shall be a continuous green color and conform to ASTM B 33 and UL 44.

   b. Uninsulated

      (1) Solid for sizes #8 AWG and smaller, Class B stranded for sizes #6 AWG and larger.

      (2) In raceways

      Soft-drawn and conforming to ASTM B 3.

      (3) Direct buried or encased in concrete

      Soft-drawn, medium-hard-drawn or hard-drawn and conforming to ASTM B 1, B 2 or B 3, respectively.

6. Medium Voltage Flat Strap Cable, (FSC).

   a. Flat Strap Cable shall be used for all underground and outdoor locations unless otherwise shown on the Contract Drawings.

   b. Jacketed, single conductor cable.

      (1) Voltage rating shall be as shown on the Contract Drawings.

      (2) Insulation

      Insulation shall be Ethylene-Propylene-Rubber (EPR). Cables shall conform to AEIC CS-6, ASTMD-2802 and ICEA S-68-516.

      (3) General Construction

      In cross section from center to circumference, jacketed, single conductor cable shall consist of the following:

         (a.) Copper conductor shall be annealed, uncoated, compressed round strand or compact round strand when shown on the Contract Drawings.

         (b.) Extruded conductor shielding;

         (c.) Insulation shall be EPR, 133 percent insulation level;

(d.) Extruded semiconducting insulation shielding;

(e.) Flat strap neutral shall consist of tin coated, annealed flat copper wires per ASTM B272, helicaly applied over the insulation shield. The edges of the straps shall be rounded. The equivalent conductor size shall be #2 AWG unless otherwise shown. It shall cover not less than 80% of the insulation-shielding surface;

(f.) Jacket of linear low-density polyethylene (LLDPE) in accordance with ASTM D1248. The jacket thickness shall be 50 mils and shall conform to IPCEA and UL standards. For cable used for indoor locations, jacketing material shall be selected to receive the UL label for tray use;

(g.) Maximum outside diameter shall be as shown on the Contract Drawings;

c. Assembly

Unless otherwise shown on the Contract Drawings, cables shall be triplexed at the factory prior to shipping.

7. Medium Voltage Lead-sheathed Cables (For Exterior and Underground Use)

a. Lead-Sheathed Cable shall only be used where specifically shown on the Contract Drawings.

b. Jacketed, Single Conductor Cable

(1) Voltage ratings shall be as shown on the Contract Drawings.

(2) Insulation

Insulation shall be ethylene-propylene-rubber (EPR). Cables shall conform to AEIC CS-6, ASTM D 2802 and ICEA S-68-516.

(3) General Construction

In cross section from center to circumference, jacketed, single conductor cable shall consist of the following:

(a.) Copper conductor, annealed, uncoated, Class B stranded or compact strand or sector, as shown on the Contract Drawings;

(b.) Extruded conductor shielding;

(c.) Insulation shall be EPR, 133 percent insulation level;

(d.) Extruded EPR, semi-conducting, insulation shielding;

(e.) Lead sheath overall;

(f.) Jacket of black polyethylene, polyvinyl chloride, or as shown on the Contract Drawings.

(g.) Maximum outside diameter shall be as shown on the Contract Drawings.

c. Jacketed, Three Conductor Cable

(1) Voltage ratings shall be as shown on the Contract Drawings.

(2) Insulation

EPR insulated cables shall conform to AEIC CS-6 and ASTM D 2802, ICEA S-68-516.

(3) General Construction

In cross section from center to circumference, jacketed, single conductor cable shall consist of the following:

(a.) Three insulated, shielded conductors, each with:

i. Copper conductor, uncoated, Class B stranded or compact strand or sector;

ii. Extruded conductor shielding;

iii. Insulation shall be EPR, 133 percent insulation level;

iv. Extruded, semi-conducting, insulation shielding;

v. Copper shielding tape, 5-mil, spirally wrapped with 12.5 percent overlap.

(b.) Ground conductors and fillers as necessary to provide an overall round cross section;

(c.) Tape binder over the three insulated, shielded conductors;

(d.) Lead sheath overall;

(e.) Jacket of black polyethylene, polyvinyl chloride, or as shown on the Contract Drawings.

(f.) Maximum outside diameter shall be as shown on the Contract Drawings.

8. Medium Voltage Cables (For Interior Use)

a. Jacketed, Single Conductor Cable

(1) Voltage ratings shall be as shown on the Contract Drawings.

(2) Insulation

Insulation shall be Ethylene-propylene-rubber (EPR). Insulated cables shall conform to AEIC CS-6, ASTM D 2802 and ICEA S-68-516.

(3) General Construction

In cross section from center to circumference, jacketed, single conductor cable shall consist of the following:

(a.) Copper conductor, uncoated, Class B stranded or compact strand or sector, as shown on the Contract Drawings;

(b.) Extruded conductor shielding;

(c.) Insulation shall be EPR, 133 percent insulation level;

(d.) Extruded EPR, semi-conducting, insulation shielding;

(e.) Tinned copper braided shield, 85% minimum coverage, or copper shielding tape, 5-mil, spirally wrapped with 12.5 percent overlap;

(f.) Jacket of flame retardant, low smoke chemically cross-linked polyolefin (XLPO), or chlorosulfonated polyethylene (CSP), or as shown on the Contract Drawings.

(g.) Maximum outside diameter shall be as shown on the Contract Drawings.

b. Jacketed, Three Conductor Cable

(1) Voltage ratings shall be as shown on the Contract Drawings.

(2) Insulation

EPR insulated cables shall conform to AEIC CS 6 and ASTM D 2802, ICEA S-68-516.

(3) General Construction

In cross section from center to circumference, jacketed, three conductor cable shall consist of the following:

(a.) Three insulated, shielded conductors, each with:

i. Copper conductor, uncoated, Class B stranded or compact strand or sector;

ii. Extruded conductor shielding;

iii. Insulation shall be EPR, 133 percent insulation level;

iv. Extruded, semi-conducting, insulation shielding;

v. Tinned copper braided shield, 85% minimum coverage, or copper shielding tape, 5-mil, spirally wrapped with 12.5 percent overlap.

(b.) Ground conductors and fillers as necessary to provide an overall round cross section;

(c.) Tape binder over the three insulated, shielded conductors;

(d.) Jacket of flame retardant, low smoke chemically cross-linked polyolefin (XLPO), or chlorosulfonated polyethylene (CSP) or as shown on the Contract Drawings.

(e.) Maximum outside diameter shall be as shown on the Contract Drawings.

9. Cable Tags

Stainless steel metal tags, No. 28 gauge and 3/4-inch wide, embossed with letters and numbers 5/16-inch high, fastened to the cable at both ends of tags with nominal 1/16-inch diameter monel metal wire or stainless steel cable ties.

10. Splicing, Terminating and Arcproofing Materials

a. General

(1) All splicing, terminating and arcproofing materials shall be compatible so that no one material will adversely affect the physical or electrical properties of any other, or of the wire or cable itself.

(2) All materials for making splices and terminations shall be specifically designed for use with the type of wire or cable, insulation and installation and operating conditions of the specific application.

(3) Splices and terminations shall be supplied as complete kit assemblies with all components and detailed installation instructions. Unless otherwise shown on the Contract Drawings, splices and terminations for medium voltage cables shall be heat-shrink polymeric type as manufactured by Raychem.

b. Connectors

Subject to compliance with requirements of this Section, provide Split-sleeve, solder, high conductivity, corrosion resistant connectors.

c. Terminals

Subject to compliance with requirements of this Section, provide Solder type, high conductivity, corrosion resistant terminals.

d. Shrinkable Tubing

Subject to compliance with requirements of this Section provide shrinkable tubing of the following types:

(1) Either irradiated modified polyvinyl chloride or irradiated modified polyolefin heat shrinkable tubing.

(2) Cold, shrinkable tubing.

e. Tapes and Sealers

(1) Vinyl Tapes

Flame-retardant, cold and weather-resistant, 3/4 inch and 1 1/2 inches wide, as required, and conforming to UL 510 and ASTM D 3005.

(a.) For interior, dry locations, provide Tape 7 mils thick, conforming to ASTM D 3005 (Type I).

(b.) For exterior or damp and wet locations, provide tape 8.5 thick, mils conforming to ASTM D 3005 (Type II).

(2) Rubber Tapes

Ethylene-propylene, rubber-based, 30-mil splicing tape, rated for 130 degrees C operation; 3/4 inch and wider (1, 1 1/2, 2 inches) or as shown on the Contract Drawings, or as approved by the Engineer, conforming to ASTM D 1373 and Federal Specification HH-I-553 (Grade A).

(3) Insulating Putty

Rubber-based, 125-mil elastic filler putty; 1-1/2 inches wide; Scotch (3M) Scotchfil, or approved equal.

(4) Silicone Rubber Tapes

Inorganic silicone rubber, 12-mil 130 degrees C rated, anti-tracking, self-fusing tape; 1 inch wide.

(5) Sealer

Liquid applied, fast-drying sealant; Scotch (3M) Scotchkote, or approved equal.

f. Binding wire shall be uninsulated, tinned copper.

g. Lead sleeve shall be 5/32 inches thick, commercially and chemically pure, and shall conform to ICEA S-68-516 and ASTM B 29.

h. Solder

(1) Solder used on the shielding braids of any cable shall be 50% Tin / 50% Lead.

(2) Solder used for wiping the lead splice sleeve to the lead sheath of any cable shall be 40 Tin/60 Lead, Class A.

(3) Flux used when soldering conductor connectors or shielding tapes and shielding braids shall be of a non-corrosive and non-acid type.

i. Insulating compound shall be installed in all lead-covered splices and all potheads.

j. Arcproofing Material

For arcproofing materials, refer to Section 16128 of the Specification.

k. Ground Straps

Flexible, tinned copper braid, equivalent to #6 AWG.

l. Special splicing materials and methods shall be as shown on the Contract Drawings.

PART 3. EXECUTION

3.01 EXAMINATION

A. Inspect all wire, cables, equipment and accessories prior to installation. Replace any damaged items.

3.02 PREPARATION

A. Prior to pulling wires and cables, clean raceway systems of all foreign matter and perform all operations necessary so as not to cause damage to wires and cables while pulling.

B. Prior to pulling wires and cables into underground conduit systems, place a feeding tube approved by the Engineer at the entrance end of such systems.

3.03 INSTALLATION

A. Wire and Cable Installation

1. General

a. Keep wires and cables dry at all times.

b. Seal wire and cable ends with watertight end seals if splicing or terminating does not follow at once.

c. Before splicing or terminating wires and cables, make a thorough inspection to determine that water has not entered the wires and cables or that the wires and cables have not been damaged.

d. Use adequate lubrication when installing cables in conduits or raceways. Any pulling compounds shall be compatible with the finish of the wires and cables furnished.

B. Splices and Terminations

1. General

a. All medium voltage wires and cables shall be spliced in each manhole through which they pass.

b. Any splicing or terminating methods other than those required by this Section, for which the components are in accordance with the requirements of this Section, shall be submitted to the Engineer for approval.

c. All cables shall be checked for phase identification before and after terminations have been made. All phase discrepancies shall be corrected.

2. Insulated Wires and Cables

a. Splices and terminations shall be completed by workmen trained and experienced in the type of cable and the voltage class specified in this Section, with not less than 3 years experience in this specialty type of work, and who perform similar splices and terminations on a regular basis.

b. Where required by the Engineer, sample splices shall be demonstrated to the Engineer by each splicer performing the Work of this Section. The sample shall be provided to the Engineer after completion of the demonstration.

c. Terminations using stress-relief cones, which conform to Class 1, IEEE 48 shall be made in accordance with the cable manufacturer's recommendations.

d. Splices shall conform to IEEE 404 and shall:

(1) meet the full electrical and physical integrity of the wire and cable construction, including voltage rating, ampacity, BIL, and type of waterproofing;

(2) conform to the wire and cable manufacturer's requirements and recommendations.

e. For cable where moisture is present, each such cable shall be nitrogen-purged to remove all moisture. The purging procedure shall be submitted to the Engineer for approval.

f. Where splices or terminations are on the Electrical Utility Company (Utility) side of incoming service equipment, the splices or terminations shall be of the type and style approved by the Utility and shall be submitted to the Utility for approval.

3. Grounding Wires and Cables

a. Splices and terminations shall be installed in accordance with the manufacturer's written recommendations.

b. In hazardous or classified locations, splices and terminations shall be solderless, high conductivity, corrosion-resistant, compression type connectors.

c. All underground connections shall be covered with two coats of asphalt base paint.

d. Each splice shall be bonded to ground, using a flexible ground strap, 2 feet long, not less than #6 AWG or equivalent size.

C. Arcproofing

For arcproofing of cables, see Section 16128, of the Specification.

D. Identification of Wires and Cables

1. Each wire and cable shall be identified by its circuit in all cabinets, boxes, manholes, handholes, wire ways, and other enclosures, and at all terminal points.

2. The circuit designations shall be as shown on the Contract Drawings. Tags shall be attached to wires and cables in such a manner as to be readily visible.

3. The tag ties shall be wrapped around all conductors comprising the circuit or feeder to be identified.

4. Wires and cables that are arcproofed shall be identified outside the applied arcproofing.

E. Field Tests

1. Medium Voltage Shielded Cables

a. After installation and before they are placed in service, run direct current voltage tests in accordance with AEIC CS 6, paragraphs K.2 and K.3, on all shielded cables.

b. A copy of all test reports, together with an outline of the test method used, shall be submitted to the Engineer for review.

2. Ground Wires and Cables

a. Ground wires and cables shall be tested to prove continuity and proper connections to equipment and ground rods.

b. The Contractor shall certify all field testing and shall submit the test results to the Engineer for approval.

F. Factory Tests

1. For quantities as shown on the Contract Drawings, regular dielectric-withstand and insulation-resistance in water tests for wires and cables shall be performed in accordance with UL 44.

2. The following tests for wires and cables shall be performed and certified reports of these tests shall be submitted to the Engineer:

a. Flame tests in accordance with IEEE 383 (were appllicable).

b. Jacket tests in accordance with ICEA 5-68-516.

c. Cable tests in accordance with AEIC CS-6.

3. The test results shall be certified for each shipping reel of wire or cable.

4. Factory inspection and witnessing of tests by the Engineer shall be required for all wires and cables furnished under this Contract. The Engineer reserves the right to require additional testing, or to waive factory inspection or witnessing of tests. The Contractor shall notify the Engineer 14 days in advance of the scheduling of such factory tests.

G. Independent Laboratory Test

1. Unless otherwise shown on the Contract Drawings, submit a 2'-0" sample from 25% of the shipping reels to an independent laboratory for the following tests which shall be performed in accordance with AEIC and ICEA standards.

   a. A.C. Voltage Breakdown Tests

   b. Adhesion of Insulation Shield to Insulation

   c. Volume Resistivity of Conductor Shield to Insulation Shield

   d. Dissection and Dimensional Analysis

   e. Microscopic examination for voids, contaminants, and protrusions

   f. Hot Creep Test to determine state of cure of insulation

   g. Partial Discharge (DC) measurements

   h. Dissipation factor of cable insulation

   i. Impulse breakdown tests.

3.04 ADJUSTMENTS

A. Should the test results reveal any defects, promptly correct such defects and rerun the tests until the entire installation is satisfactory to the Engineer in all aspects.

END OF SECTION

SECTION 16121

WIRES, CABLES, SPLICES, TERMINATIONS (MEDIUM VOLTAGE: 601 VOLTS TO 34,500 VOLTS, INCLUSIVE)

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16121A01 Submit Shop Drawings for the installation sequence, pulling tensions and sidewall pressure of all wire and cable pulls, including identification of manhole or pullbox locations with splices.

Catalog Cuts

16121B01 Catalog Cuts
a. Medium voltage cable(s)
b. Ground wire(s)
c. Terminators
d. Splices
e. Pulling devices and end seals

Manufacturer Test Reports

16121F01 Submit certified shop test reports for wires and cables.

Construction and Installation Procedures

16121G01 Submit nitrogen purge procedure for moisture laden wires and cables.

Record Documents

16121M01 Submit field test results for wires and cables, including all test data and methodology.

END OF APPENDIX "A"

DIVISION 16

SECTION 16127

CONTROL/SIGNAL TRANSMISSION MEDIA

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for the following types of control and signal transmission media:

A. Coaxial Cable

B. Twisted Pair Cable

C. Video - Pair Cable

D. Optical Fiber Cable

E. Optical Fiber Connectors and Couplers

1.02 REFERENCES

The following is a listing of the publications referenced in this section:

	American Society for Testing and Materials (ASTM)
ASTM B 3	Soft or Annealed Copper Wire
ASTM B 8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 33	Tinned Soft or Annealed Copper Wire for Electrical Purposes
ASTM E 662	Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
	Electronics Institute of America (EIA)
EIA FOTP-25	Fiber Optic Test Procedures for Impact Resistance
EIA FOTP-33	Fiber Optic Test Procedures for Maximum Pulling Load
EIA FOTP-41	Fiber Optic Test Procedures for Crush Resistance
EIA FOTP-104	Fiber Optic Test Procedures for Flexibility
EIA TIA-598	Optical Fiber Cable Color Coding Standards
	Insulated Cable Engineering Association (ICEA)
ICEA T-33-655	Guide for Low Smoke, Halogen-Free (LSHF) Polymeric Cable Jackets
	Military Standards
MIL-C-17	Standards for Radio Frequency Coaxial Cables
MIL-C-24643	Electrical Cable and Cord for Shipboard Use, Testing for Low Smoke and Halogens

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code

Naval Engineering Standards

NES 713	Determination of Toxicity Index of Products of Combustion From Small Specimens of Materials

Underwriters Laboratories Inc.

UL 910	Test for Flame - Propagation and Smoke - Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air
UL 1666	Test for Flame Propagation Height of Electrical and Optical - Fiber Cables Installed Vertically in Shafts
UL 1685	Standards for Safety Vertical Tray Fire Propagation and Smoke Release Test for Electrical and Optical Fiber Cables

1.03 QUALITY ASSURANCE

A. Wires and cables that have been manufactured more than two (2) years prior to installation shall not be used in the Work of this Contract.

B. Where cables specified in this Section are used to provide signal paths for systems specified in other Sections of these specifications, or for systems shown on Contract Drawings, the Contractor shall obtain review of the cable characteristics and certification for use with the connected system equipment by the connected equipment manufacturer.

C. All optical fiber cable installations, splices and terminations shall be performed by qualified workers with prior experience in installing optical fiber cable and working on optical fiber systems. Work experience shall include the successful installation of at least 3 other optical fiber systems of similar complexity to the Work of this Contract. Qualifications shall include successful completion of training classes covering optical fiber cable installation, termination, splicing and connectorizing.

D. Cable manufacturers shall be regularly engaged in manufacturing control/signal transmission media products of the types, sizes, and characteristics specified in this section and on the Contract Drawings. Cable manufacturers' products shall have been in satisfactory use in similar service for not less than 3 years.

E. The Contractor shall comply with NFPA 70 "National Electric Code" for components and installation.

F. All cable of each kind shall be the product of a single manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver to the worksite cable properly packaged in factory-fabricated type or wound on NEMA specified type cable reels.

B. The Contractor shall store cable in clean dry space in original containers, protected from weather, theft, vandalism, damaging fumes, construction debris and traffic.

C. The Contractor shall handle cable carefully to avoid braising, puncturing and tearing cable insulation and sheathing. Ensure that dielectric resistance and characteristic impedance integrity of transmission media are maintained.

1.05 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MANUFACTURERS

Subject to compliance with requirements of this Section, the Contractor shall provide wires and cables and wire and cable splicing and terminating products of manufacturers as shown on the Contract Drawings.

2.02 Control/ Signal Transmission Media

A. General

1. Locations, types, sizes and numbers of wires and cables are shown on the Contract Drawings.

   Where not indicated, the Contractor shall provide proper wire and cable selection to comply with this section, contract requirements and NFPA 70 Standards, or approved by the Engineer.

2. Unless otherwise shown on the Contract Drawings, solid conductors shall be soft, or annealed copper, conforming to ASTM B 33 (tinned), or ASTM B 3 (uncoated). Unless otherwise specified in this Section or unless otherwise shown on the Contract Drawings, stranded copper conductors shall be concentric stranding conforming to ASTM B 8.

3. Unless otherwise shown on the Contract Drawings, wires and cables that will be installed in riser areas shall pass the flame propagatory and smoke release criteria according to the test method of UL 1666.

4. Unless otherwise shown on the Contract Drawings, wires and cables that will be installed in plenum areas shall pass the flame propagatory and smoke release criteria according to the test method of UL 910.

5. Unless otherwise shown on the Contract Drawings, use the following performance characteristics for wires and cables which will be installed in subway areas, substations, tunnels, etc. where flame retardency, low smoke, low toxicity, zero halogen and good circuit integrity during a fire are required.

   a. Wires shall pass the flame propagatory criteria according to the test method of VW-1.

   b. Cables shall pass the flame propagatory and smoke release criteria according to the test method of UL 1685.

   c. The halogen content of the cable shall not exceed 0.2 percent according to the test method of MIL-C-24643. The Authority classifies 0.2 percent or less halogen content as "non-halogen".

   d. The cable shall comply with ICEA T-33-655 for smoke generation.

e. The toxicity index of the cable shall not exceed 2.0 according to the test method of NES 713.

f. The acid gas content of the cable shall not exceed a maximum of 2.0 percent according to the test method of Mil-C-24643.

6. All wires, cables, splices and terminations, for which there are established UL standards shall bear the UL label.

7. Cable Jacket Labeling

a. The cable jackets shall be labeled using environmental resistant printing in the range of 2 to 4 foot intervals.

b. The label shall indicate:

(1) The length to the end of the cable in feet

(2) The number of wires or optical fibers in the cable

(3) The date of manufacture

(4) The manufacture's name and part number

B. Electronic Cable

1. Single Conductor Coaxial

75-ohm characteristic impedance, solid polyethylene core 97 percent coverage, copper-braid shield, polyethylene jacket; conforming to MIL-C-17.

2. Single Conductor Plenum Coaxial

75-ohm characteristic impedance, solid base copper, central conductor, foamed Teflon dielectric, 100 percent coverage tinned-copper, double-braid shield, Teflon jacket, suitable for installation in air-handling spaces; conforming to MIL-C-17.

3. Direct Burial Coaxial

Single conductor, 75-ohm characteristic impedance, 18 AWG copper clad, steel-center conductor, solid polyethylene dielectric, 34 AWG bare copper-braid outer conductor shield with 95 percent coverage, polyvinyl chloride (PVC) jacket.

4. Aerial Coaxial

Single conductor, 75-ohm characteristic impedance, 18 AWG copper-clad, steel-center conductor, cellular expanded polyethylene dielectric, 34 AWG bare, copper-braid outer conductor shield with 95 percent coverage, ultraviolet-resistant polyvinyl chloride (PVC) jacket.

5. Multiconductor Cable

Quantity and size of conductors shall be as indicated on the Contract Drawings; color coded, low-loss polyvinyl chloride (PVC) insulation; aluminum/mylar shield and 22 AWG tinned-copper drain wire; PVC jacket.

6. Single Twisted Pair

Single-twisted pair, tinned-copper conductors , size of conductors shall be as indicated on the Contract Drawings; color-coded, low-loss polyethylene insulation; unshielded.

7. Multiple Twisted Pair

Quantity of twisted pairs and size of conductors shall be as indicated on the Contract Drawings; tinned-copper conductors; color-coded, low-loss polyethylene insulation; unshielded, polyvinyl chloride (PVC) jacket.

8. Multiple Shielded Twisted Pair

Quantity of twisted pairs and size of conductors shall be as indicated on the Contract Drawings; tinned-copper conductors; color-coded, polyvinyl chloride (PVC) insulation; overall aluminum/polyester shield and 22 AWG tinned-copper drain wire; PVC jacket.

9. Twisted Pair Plenum

Quantity of twisted pairs and size of conductors shall be as indicated on the Contract Drawings; 7-strand, tinned-copper conductors; Teflon insulation; overall aluminum/polyester shield and 22 AWG tinned-copper drain wire; Teflon jacket; suitable for use in air-handling spaces.

10. Video Pair

Balanced pair coaxial cable, 125-ohm characteristic impedance, 16 AWG soft-drawn, bare copper conductors twisted to form pairs, expanded polyethylene core insulation, copper shielding tape, expanded polyester film covering.

C. Optical Fiber Cables

1. Optical fiber cables shall be factory-fabricated, single channel, low-loss, glass, graded index type. The number of fibers and optical requirements shall be as shown on the Contract Drawings.

2. Unless otherwise shown on the Contract Drawings, the optical fibers shall have a 62.5-micron core diameter, 125-micron cladding diameter and 250 micron (nominal) coat diameter.

3. The optical fibers shall be incorporated in the cable construction using either the loose buffer tube or tight buffer tube method. The optical fibers shall be individually cladded, jacketed, and identified within the buffer tubes.

4. Each fiber shall be distinguishable by means of a continuous color code, continuous numbering, continuous lettering, or a combination of methods. Color coding of optical fiber cables shall be in compliance with EIA/TIA-598.

5. Unless otherwise shown on the Contract Drawings, the optical fibers shall have an attenuation of no more than 3.75 dB/Km at a wavelength of 850 nm, and 1.0 dB/Km at a wavelength of 1300 nm.

6. Unless otherwise shown on the Contract Drawings, the optical fibers shall have a minimum bandwidth of 200 MHz-Km at a wavelength of 850 nm, and a minimum bandwidth of 600 MHz-Km at a wavelength of 1300 nm.

7. Optical fiber cables shall conform to EIA FOTP-25 standard for impact resistance.

8. Optical fiber cables shall conform to EIA FOTP-33 standard for maximum pulling load.

9. Optical fiber cables shall conform to EIA FOTP-41 standard for crush resistance.

10. Optical fiber cables shall conform to EIA FOTP-104 standard for flexibility.

11. Optical fiber cables with PVC jackets are acceptable in indoor, general purpose and riser areas. Optical fiber cables with PVC jackets are not acceptable in indoor plenum areas.

12. Optical fiber cable for outdoor use shall be able to sustain the traffic-induced vibrations at all sites without damage to the physical and optical characteristics of the optical fiber.

13. Optical fiber cable for outdoor use shall be moisture resistant as per EIA FOTP-892 standard.

14. All materials used in the optical fiber cable shall be suitable for use under the following climatic conditions:

    a. Temperatures of -40 to +70 degrees centigrade

    b. Relative humidity of 5% to 100% condensing

15. Optical fiber cable for outdoor use shall be resistant to the following chemicals:

    a. Petroleum products (gasoline, diesel fuel, lubricants, etc.)

    b. Atmospheric nitric acid

    c. Carbon dioxide

    d. Carbon monoxide

    e. Nitrous oxides

    f. Atmospheric sulfuric acid

D. Optical Fiber Connectors

Where shown on the Contract Drawings, Contractor shall install stainless-steel optical fiber cable connectors, capable of terminating optical fiber glass cables. Optical fiber connectors shall have an insertion loss of not greater than 1.0 dB.

2.03 FACTORY TEST

A. Factory Inspection

The Authority shall have the right to inspect the manufacturer's quality control, manufacturing, and testing facilities at any time during the procurement process. Inspection by the Authority will include visual examination of the cables, and all related documentation to ensure that the cables are being fabricated in accordance with the Specifications.

B. Test Plan

Where required by the Contract Drawings, the Contractor shall submit a test plan for each type of cable shown on the Contract Drawings. The test plan shall be approved prior to the start of the factory test. The test plan shall include test schedule, lists of test to be conducted, test equipment to be used, expected test results and test documents produced, and copies of any certified test data to be used in lieu of testing.

C. Factory Test

1. For those tests that are not conducted during factory tests, the Contractor shall submit certification by a recognized independent testing laboratory, showing the complete test results. The Contractor shall notify the Engineer 14 days in advance of the scheduling of such factory tests. The Engineer reserves the right to require additional testing, or to waive factory inspection or witnessing of tests.

2. If factory tests are required by the Engineer, the cables shall not be shipped until after the factory tests have been satisfactorily completed and the cables are approved by the Authority.

3. Factory tests for optical fiber cable shall include, but not necessarily be limited to, the following:

   a. Attenuation of each fiber

   b. Bandwidth of each fiber

   c. OTDR (Optical Time Domain Reflectometer) image of each fiber

4. For all cable the following items shall be tested on a sample basis per the applicable test method:

   a. Consistency of color coding

   b. Cable length

   c. Dimensional tolerances

PART 3. EXECUTION

3.01 PREPARATION

Examine raceways and other elements to receive cable for compliance with installation tolerances and other adverse conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install cable as indicated in accordance with NFPA 70 requirements and manufacturer's written instructions. Cable shall be installed in locations as shown on the Contract Drawings by experienced workers in a careful professional manner.

   1. Install transmission media without damaging conductors, shield, or jacket.

   2. Do not bend cable, in handling or installation, to smaller radii than minimum recommended by manufacturer.

B. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

   1. Pull cables simultaneously where more than one is being installed in same raceway.

   2. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation.

   3. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage media or raceway.

C. Splicing Of Cable

1. Splicing of optical fiber cable shall be permitted only when the length of the cable run exceeds those of the cable manufacturers pulling distance restrictions.

2. The number of splices per cable shall be kept to a minimum. Splicing shall be permitted only in electrical closets. Splicing of cable runs in roadway or ramp areas shall not be permitted.

3. Splicing of optical fiber cable shall be performed by means of fusion splicing. The Contractor shall submit, for approval, a detailed written procedure, prior to start of work, which shall include:

   a. The number of splices per fiber, and location of each splice, for all optical fiber cables.

   b. The proposed means to support the splice.

   c. Covering or sheathing of splice

4. Splicing shall be performed in a professional manner by experienced workers.

5. Splices shall not have losses exceeding 0.5 dB per splice.

6. All splices shall be enclosed in a splice organizer and then placed in a splice enclosure box to be mounted in the electrical closet. The Contractor shall submit catalog cuts for splice organizers and enclosures to the Engineer for approval.

D. Use splice and tap connectors that are compatible with cable material. All splice locations shall be approved by the Engineer.

E. Bond shields and drain conductors to ground at only one point in each circuit.

F. Connect components to wiring system and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A.

3.03 FIELD TESTS

After installation of cable and before energizing, the Contractor shall perform the following field tests:

A. Copper cable procedures

Inspect for physical damage and test cable for continuity and shorts. Use time domain reflectometer with strip chart recording capability and anomaly resolution to within 12 inches (300 mm) in runs up to 1000 feet (300 m) in length. Test cable segments for faulty connectors, splices, terminations, and the integrity of the cable and its component parts.

B. Optical fiber cable procedures

Perform each visual and mechanical inspection and electrical test, including optional procedures, stated in NETA Standard ATS, section 7.25. Certify compliance with test parameters and manufacturer's recommendations. The attenuation of each fiber of each cable shall be tested after the cable has been installed. The Authority reserves the right to require:

1. OTDR (Optical Time Domain Reflectometer) tests to be repeated in the field on any fibers that show evidence of physical damage or out-of-specification attenuation. If the field test results indicate that one or more fibers in any segment do not meet the attenuation requirements of this specification, the segment shall be replaced at no cost to the Authority.

C. Operate control/signal systems to demonstrate proper functioning. Replace malfunctioning cable with new materials, and then retest and recommission until satisfactory performance is achieved.

D. All equipment, and personnel, and supervision necessary to conduct the field test shall be provided by the Contractor.

END OF SECTION

SECTION 16127

CONTROL/SIGNAL TRANSMISSION MEDIA

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Catalog Cuts

16127B01 Catalog cuts for control/signal transmission media.

Certificates

16127E01 Cable certificates, acknowledged by the Communication System Manufacturers, certifying that the cables are suitable for the connected equipment as described in Section 1.03 "Quality Assurance".

Manufacturer Test Reports

16127F01 Certified shop test reports for control/signal transmission media.

Manuals, Warrantees/Guarantees

16127I01 Maintenance requirements for cables.

Qualifications

16127K01 Qualification data for manufacturers as per Section 1.03 "Quality Assurance" stating their capabilities and experience. Include list of completed projects and other information specified.

Record Documents

16127M01 Field test reports indicating and interpreting test results.

END OF APPENDIX "A"

SECTION 16129

TAXIWAY / RUNWAY WIRES AND CABLES

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for wires, cables, splices, terminations, and appurtenances for airfield construction.

1.02 DESIGN AND PERFORMANCE REQUIREMENTS

A. Wires, cables, splices and terminations for airfield construction furnished and installed in accordance with this Section, and as indicated on the Contract Drawings.

B. Components of the taxiway / runway wires and cables shall be manufactured and installed to meet all of the applicable requirements of FAA Advisory Circulars and all local codes.

1.03 RELATED SECTIONS

A. None

1.04 REFERENCES

A. ASTM International (ASTM)

1. B1 - Standard Specification for Hard-Drawn Copper Wire
2. B2 - Standard Specification for Medium-Hard-Drawn Copper Wire
3. B3 - Standard Specification for Soft or Annealed Copper Wire
4. B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
5. B33 - Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
6. D2802 - Standard Specification for Ozone-Resistant Ethylene-Alkene Polymer Insulation for Wire and Cable

B. Federal Aviation Administration, Advisory Circular (FAA-AC)

1. 150/5340-30 – Design and Installation Details for Airport Visual Aids
2. 150/5345-7 – Underground Electrical Cables for Airport Lighting Circuits (FAA Specification L-824B)
3. 150/5345-26 – Specification for Plug and Receptacle Cable Connectors (FAA Specification L-823)

C. Federal Specifications (FS)

1. SS-S-1401 – Sealing Compound, Hot Applied for Concrete and Asphalt Pavements

D. Insulated Cable Engineers Association (ICEA)

1. S-96-659 – Standard for Non-shielded Cables Rated 2001-5000 Volts

E. Institute of Electrical and Electronics Engineers (IEEE)

1. 383 – Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations

F. National Electrical Manufacturers Association (NEMA)

1. WC-71 – Standard for Non-shielded Cables Rated 2001-5000 Volts

G. Underwriters Laboratories Inc. (UL)

1. 44 – Thermoset-Insulated Wires and Cables
2. 83 – Standard for Thermoplastic-Insulated Wires and Cables

1.05 SUSTAINABLE DESIGN REQUIREMENTS

A. Not Applicable

1.06 QUALITY ASSURANCE

A. Tests requiring certified reports and those requiring factory witness or field inspection shall be conducted and reported to the Engineer in conformance with those standards specified in this Section.

B. Installations shall comply with the standards of the Federal Aviation Administration (FAA) where applicable.

C. Wires and cables that have been manufactured more than two years prior to installation shall not be used in the work of this Section.

D. All wires, cables, splices and terminations, for which there are established UL standards, shall bear the UL label.

1.07 SUBMITTALS

See Appendix "A" for Submittal requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Where multi-conductors are to be installed as one cable, single conductor cables shall be combined together by the cable manufacture prior to shipment. Cable assembly overall diameter shall be kept to a minimum.

B. Store material in a clean, dry space and protect it from the weather.

PART 2. PRODUCTS

2.01 MATERIALS

A. General

1. Locations, types, sizes and numbers of wires and cables are shown on the Contract Drawings.
2. Unless otherwise shown on the Contract Drawings, solid conductors shall be soft or annealed copper, conforming to ASTM B 33 (tinned), ASTM B 189 (lead-coated or lead-alloy coated), or ASTM B 3 (uncoated).
3. All electrical materials and equipment, for which there are stabled UL standards, shall bear the UL Label.

B. 600-volt Insulated Wires and Cables

1. Power Wires and Cables

a. Secondary Series Lighting wire and cable shall be watertight thermoplastic rubber insulated.

2. Grounding Wires and Cables

Unless otherwise shown on the Contract Drawings, grounding conductors shall be as follows:

a. Insulated

(1) Solid for sizes # 8 AWG and smaller, Class B Stranded for sizes # 6 AWG and larger, 600 volt rated.

(2) Insulation shall be a continuous green color, double rated THHN-THWN thermoplastic insulated and nylon jacketed, gasoline and oil resistant and conform to UL 83.

b. Un-insulated

(1) Solid for sizes # 8 AWG and smaller, Class B Stranded for sizes # 6 AWG and larger.

(2) In raceways

(a.) Soft-drawn and conforming to ASTM B3

(3) Direct Buried or Encased in Concrete

(a.) Soft-drawn, medium-hard-drawn or hard-drawn and conforming to ASTM B3, B2, or B1, respectively.

C. 5000 volt Insulated Wires and Cables:

1. Primary Series Lighting Cable shall be Non-Shielded 5000 Volt Rated, Type 'B', Single Conductor, Coated Copper, Class C, 19 Strands, Ethylene-Propylene-Rubber-Insulated (ASTM D-2802 and ICEA S-68-516) and Chlorinated Polyethylene Jacket (CPE-EPR). The cable shall comply with FAA-AC 150/5345-7 and shall be approved under FAA Specification No. L-824B. Where two cables of a single circuit are indicated on the Contract Drawings, the two cables shall be combined together in one reel, with one of the cables identified with a yellow stripe running the entire length of the cable jacket.

2.02 SPLICING AND TERMINATING MATERIALS

A. General

1. All materials for making splices and termination shall be specifically designed for use with the type of wire or cable, insulation and installation and operating conditions of the specific application.

B. Power Wire and Cable Splices

1. Connector shall be insulated compression (indenter) type as specified on the contract drawings.
2. Silicone Sealant shall be as specified on the contract drawings.
3. Heat Shrinkable Tubing shall be either irradiated modified polyvinyl-chloride or irradiated polyolefin as specified on the Contract Drawings.

C. Secondary Series Lighting Cable Connectors

1. Double Pole plug and receptacle connectors for the secondary series lighting system shall comply with Section 1.04.B.3 and shall be approved under FAA Specification No. L-823 in accordance with Figure No 1. Plug and Receptacles shall be as specified on the Contract Drawings.

D. Series Lighting Cable Connectors

1. Single Pole plug and receptacle connectors for the primary series lighting cable system shall comply with FAA-AC 150/5345-26 and shall be approved under FAA Specification No. L-823 in accordance with Figure No. 2. Plug and receptacles shall be as specified on the contract drawings. Coordinate the connector size for use with the cable.

E. Cable Tags

1. Stainless steel metal tags, No. 25 gauge, and 3/4 inch wide and length as required by circuit designation, embossed with letters and numerals 1/4 inch high fastened to the cable at both ends of tags with stainless steel cable ties. Circuit designation shall be as specified on Contract Drawings or otherwise directed by the Engineer.

2.03 FACTORY / SHOP TESTS

A. General

1. Factory or in-plant and independent laboratory tests shall be in conformance with the applicable standards and as specified in this Section. All testing, and the results thereof shall be certified, in writing, to the Engineer for approval.

B. Factory or In-Plant Tests

1. Factory inspection and witnessing of tests by the Engineer shall be required for all wires and cables furnished under this contract. The Engineer reserves the right to require additional factory tests as required, or to waive factory inspection or witnessing of tests.
2. The Contractor shall notify the Engineer 14 days in advance of such factory tests.
3. 600 Volt Insulated Wires and Cables
   a. For quantities as shown on the Contract Drawings, regular dielectric-withstand and insulation-resistance in water tests for wires and cables shall be performed in accordance with UL 44.
   b. Flame tests for wires and cables shall be performed in accordance with IEEE 383.
4. 5000 Volt Insulated Wire and Cables
   a. Tests for wires and cables shall be in accordance with 1.04.B.2 and 1.04.D.1.
   b. Independent Laboratory Tests

      The following tests shall be performed by an independent test laboratory:

      (1) Specific Surface Resistivity

      The specific surface resistivity of the cable jacket shall have a value greater than 200,000 Mega-ohms under all of the following conditions:

      (a.) As Manufactured
      (b.) After immersion in tap water at 30 Degrees Celsius for 28 days with measurements performed after the first day and then every week.
      (c.) After immersion in a 50/50 solution of potassium acetate (KAc) deicer and tap water at 30 Degrees Celsius for 28 days with measurements performed after the first day and then every week.

(2) The values of specific surface resistivity obtained in 2.03 C.1.a shall be plotted to demonstrate stability over time.

(3) Drip Track Resistance

Using apparatus described in ASTM Standard D2303, the cable jacket shall pass the following test:

(a.) No. of Samples: 6 – after immersion for 28 days in KAc / Water Solution.
(b.) Wetting Solution: 50 / 50 KAc / Water
(c.) Wetting Rate: 0.2 cm^3 / minute
(d.) Applied Voltage Steps: 100 Volts / 30 Minutes
(e.) Initial Tracking Voltage: greater than 1000 Volts(Median Value)

Airport lighting cables that satisfy the above requirements should bear the following jacket printing:

"Cable Manufacturer" FAA-L-824 Type B MOD A

(4) Certification and test required under Section 2.03 A shall be performed by an independent test laboratory. Submit qualifications and the test procedure of the test lab for approval prior to testing.

(5) Testing shall not be required for a previously certified cable if the same manufacturer for the identical cable using identical materials has performed successful testing. The certified test data shall be submitted for approval.

PART 3. EXECUTION

3.01 PREPARATION

A. Inspect the raceways and conduits prior to installation of wires and cables and notify the Engineer in writing in the event of the finding conditions that would prevent the proper installation of materials using the methods specified in this Section.

B. Prior to puling wires and cables, clean the raceway systems of all foreign matter and perform all operations necessary so not as to cause damage to wires and cables while pulling.

C. Prior to pulling wires and cables into underground conduit systems, place a feeding tube approved by the Engineer at the entrance end of such systems.

3.02 INSTALLATION

A. Wire and Cable

1. General

a. Keep wires and cables dry at all times.

b. Seal wire and cable ends with watertight end seals if splicing or terminating does not follow at once.

c. Before splicing or terminating wires and cables, make a thorough inspection to determine that water has not entered the wires and cables or that the wires and cables have not been damaged.

d. Use adequate lubrication when installing cables in conduits or raceways. Any pulling compounds shall be compatible with the finish of the wires and cables furnished.

2. General Purpose Wires and Cables

a. For the connection of taxiway and runway lights to the secondary side of the isolating transformers as per the latest FAA Advisory Circulars.

b. Leave sufficient slack in each cable, but in no case less than:

(1) Three feet in base cans

(2) Three feet in light boxes

3. 5000 Volt Series Lighting Cables

a. For connection of the airport Constant Current Regulator output to the primaries of the isolating transformers.

b. Leave sufficient slack in each cable, but in no case less than:

(1) Fifteen feet in manholes

(2) Ten feet in handholes

(3) Three feet in light boxes

(4) Three feet in base cans

B. Connections and Terminations

1. General Purpose Wires and Cables

a. After the cable has been installed, the connections and terminations shall be installed in accordance with the manufacturer's instructions.

2. 5000 Volt Series Lighting Cables

a. Connections to Transformers

(1) At each isolating transformer for runway and taxiway lights and taxiway signs and as shown on the Contract Drawings, the primary connectors shall consist of an assembly of L-823 Single Pole Plug and Receptacle cable connectors, and heat shrinkable insulation tubing.

(a.) Heat shrinkable insulation tubing shall be 12 inches minimum length and its interior shall be coated with elastic mastic to assure a watertight seal after shrinking.

(b.) Heat shrinkable insulation tubing may be installed in three sections to accommodate a connector that is not uniform in shape. The lengths of the sections shall be two (2) at six (6) inches long and one (1) at nine (9) inches long.

(2) After the cable has been installed, the connectors shall be installed on the ends of the Series Lighting Cable in accordance with the manufacturer's instructions.

(a.) The receptacle shall be installed at one end of the cable and the plug at the other end to establish a continuous plug and receptacle sequence through the wiring system and its associated isolating transformers.

(b.) Precautions shall be taken to release trapped air when inserting the plug in the receptacle. After the joint has been made and wiped clean of excess jelly, a heat shrinkable insulation tube shall be applied over the plug and receptacle in accordance with the manufacturer's recommendations and as approved by the Engineer.

b. Connections

(1) Where the Primary Series Lighting Cables are run through or into taxiway light boxes, hand holes, or manholes, without connection to an isolating transformer, a plug and connector type installation as described immediately above, shall be used.

(2) The maximum lengths of uncut wires and cables shall depend on the lengths of wire and cable that can be installed without damage.

C. Identification of Wires and Cables

1. Each wire and cable shall be identified by its circuit in all cabinet boxes, manholes, hand holes, wireways and other enclosures or access locations, and at all terminal points.
2. The circuit designations shall be as shown on the Contract Drawings or as directed by the Engineer. Tags shall be attached to wires and cables in such a manner as to be readily visible.
3. Wire and Cable tags shall be fastened to both ends of the series lighting wires and cables.

3.03 FIELD TESTS

In addition to other tests that may be required in other Sections, the Contractor shall perform the following field tests in the presence of the Engineer, to demonstrate the reliability of the electrical installation.

A. Tests on the cables shall be made in accordance with the FAA-AC 150/5340-30.

B. All series lighting cables and circuits shall be tested with a 5000-volt megohmmeter. Insulation resistance test equipment shall be battery operated. All testing shall be performed for one minute durations. Readings shall be taken after circuits have been de-energized for several hours as reading may appear higher immediately after operating the circuit. The following test procedure shall be performed on all series lighting circuits:

1. Remove all electrical power from the cable that shall be tested. Cover one end of the cable with an insulator to prevent the cable from accidentally shorting to ground and thereby giving a false reading.
2. Attach the positive (+) end of the megohmmeter to the exposed end of the bare copper cable. Connect the ground wire from the meter to the ground of the electrical system, a ground wire or ground electrode.
3. Switch the meter to the "on" position. Press the charge button or meter button designated to perform the charge function to commence the testing as described in the operating manual for the megohmmeter. Observe the meter for one minute. Once the readings stabilize, record the final value.
4. The testing shall use the step voltage method, using a minimum of 3 voltage levels; 1000 volts, 2500 volts, and 5000 volts. Sufficient time shall be allowed for charging currents to subside. Minimum insulation values shall be met at any and all voltage levels. (See Appendix "A" for calculation of insulation values.) A written record of all tests shall be furnished to the Engineer before acceptance of the insulation. Records shall include date and time of testing, test voltage levels and megohmmeter reading results.
5. Qualified personnel shall perform tests following strict adherence to the requirements of the Port Authority and the manufacturer of the equipment. All safety and operating rules shall be strictly observed and enforced.

C. After the installation has been completed, the Contractor shall successfully operate all electrical equipment for a continuous 24-hour period.

D. Unless otherwise shown on the Contract Drawings, all labor, materials and power required for the above tests shall be furnished by the Contractor. The Authority will furnish only power for the operating test.

E. Should the foregoing test results reveal any defects, promptly correct such defects and rerun the test until the entire installation is satisfactory to the Engineer in all aspects.

F. If any defects in existing equipment or materials are disclosed by the foregoing tests, the Contractor shall so notify the Engineer. After verification by the Engineer, and upon the Engineer's written order, the Contractor shall correct the installation to the extent directed by the Engineer. Any work so ordered by the Engineer and performed by the Contractor in connection with replacing of existing defective equipment or materials shall be compensated for in accordance with the clause of the Form of Contract entitled "Compensation for Extra Work." Damage to existing equipment or materials caused by the Contractor's acts or omissions shall be repaired at the Contractor's cost.

END OF SECTION

SECTION 16129

TAXIWAY / RUNWAY WIRES AND CABLES

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16129A01

1. Primary Series Lighting Cable
2. Primary Series Lighting Cable Connections and Terminations
3. Secondary Series Lighting Cable
4. Secondary Series Lighting Cable Splices
5. Grounding Cable
6. Single Pole Plug Connector
7. Double Pole Plug Connector
8. Flanged Receptacle Connector
9. Cable Tags
10. Sealer

Manufacturer Test Reports

16129F01 Submit certified factory or in-plant test reports for wires and cables.

Calculations

16129H01 Submit calculated insulation resistance values for airfield circuits. Utilizing the following formula:
The first portion of the circuit analyzed is the single conductor 5000 volt insulated cable from the constant current regulator to the first L-823 connector splice. RC1 calculates the insulation resistance of the cable, which connects the Constant Current Regulator (CCR) to the first L-823 connector in the circuit.
Measured insulation values shall not be below RC1, computed by the following formula:
RC1 = K * Log(D/d)* (1000/Lc1)

Where:
RC1, Ris, RC2, RC3 = Insulation resistance in mega ohms
K = Specific insulation resistance in mega ohms per 1000 feet at 60°F, K for Ethylene Propylene Rubber Insulation (EPR) = 20,000 mega ohms, or as per manufacturer specifications.

D = Outer diameter of insulation
d = Outer diameter of bare copper wire
Lc1, Lc4 = Total length of airfield cable in feet for the given portion
The second portion of the calculation involves the insulation resistance contribution from the first L-823 connector splice, cables, isolation transformers, L-823 connector splices to the last L-823 connector splice within the circuit.

The measured insulation resistance value shall not be below Ris, computed by the following formula:
R1= Rit/Nit

R2 = Rs/Ns1
R3 = [K * Log (D/d)*((1000/Lc2))/Nc1]
Ris = 1/(1/R1+1/R2+1/R3)

Where:
R1, R2, R3 = Equivalent insulation resistance of isolation transformer, connection splices and cables.
Nit = Quantity of isolation transformers
Rit = Insulation resistance of each isolation transformer
Ns1, Ns2 = Quantity of L-823 connector splices
Rs = Insulation resistance of each splice
Rit = 7,500 MO (FAA AC 150/5345-47) or per manufacturer
Rs = 25,000 MO (FAA AC 150/5345-26) or per manufacturer
Lc2, Lc3 = Length of each airfield cable segment for the given portion
Nc1, Nc2 = Number of cable segments
The third portion includes the single conductor 5000 volt insulated cable and the L-823 connectors associated with the return cable from the last L-823 connector splice in the last light base back to the first L-823 connector associated with the return cable in the first light base.

The measured insulation resistance value shall not be below Ris1, computed by the following formula:
R4= Rs/Ns2
R5=[K*Log(D/d)*((1000/Lc3))/Nc2]
Ris1= 1/(1/R4+1/R5)
Where:
R4, R5 = Equivalent insulation resistance of connector splices and cables.
The fourth portion includes the length of single conductor 5000 volt return cable from

the first L-823 connector in the first light base associated with the return cable in the circuit back to the CCR.
The measured insulation resistance value shall not be below RC2, computed by the following formula:
RC2=K*Log(D/d)*(1000/LC4)
The final circuit after all splices are completed must have an insulation resistance value of not less than Rt. Rt is the final equivalent insulation resistance of the four parts of the calculation.
Rt is computed by the following formula:
Rt= 1/(1/RC1+1/Ris+1/Ris1+1/RC2)

Quality Assurance-Quality Control

16129L01 Submit Field Test reports for wires and cables, including all test data and methodology.

Information

16129S01 Submit certified independent laboratory test report for wires and cable.

END OF APPENDIX "A"

DIVISION 16

SECTION 16133

CONTROL PANELS, ENCLOSURES/CABINETS, AND TERMINAL BOXES

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for control panels, electrical enclosures and cabinets.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American National Standards Institute (ANSI)
ANSI Z 55.1	Gray Finishes for Industrial Apparatus and Equipment
	National Electrical Manufacturers Association (NEMA)
NEMA ICS 1	Industrial Control and Systems. General Requirements
NEMA ICS 1.1	Industrial Control and Systems. Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control
NEMA ICS 2	Industrial Control and Systems. Controllers, Contractors, and Overload Relays Rated Not More Than 2000 Volts AC or 750 Volts DC
NEMA ICS 3	Industrial Control and Systems. Factory Built Assemblies
NEMA ICS	Industrial Control and Systems. Terminal Blocks
NEMA ICS 6	Industrial Control and Systems. Enclosures.
NEMA ICS 9	Industrial Control and Systems. Power Circuit Accessories
NEMA PB 250	Enclosures for Electrical Equipment (1000 Volts maximum)
NEMA Z 535.4	Product Safety Signs and Labels
	National Fire Protection Association (NFPA)
NFPA 70	National Electric Code
	Underwriters Laboratories Inc. (UL)
ANSI/UL 50	Cabinets and Boxes
ANSI/UL 65	Electric Wired Cabinets
ANSI/ UL 486E	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
ANSI/UL 486A	Wire Connectors and Soldering Lugs for Use with Copper Conductors
ANSI/UL 969	Marking and Labeling systems
UL 1059	Electrical Terminal Blocks
ANSI/UL 467	Electrical Grounding and Bonding Equipment
UL 437	Key Locks
ANSI/UL 508	Electric Industrial Control Equipment

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Control Panels, Enclosures/Cabinets and Terminal boxes shall be designed in accordance with applicable standards of ANSI, NEMA, NFPA, and UL.

B. Unless otherwise shown on the Contract Drawings, enclosures/cabinets shall meet the following environmental requirements:

1. Enclosures/Cabinets located in heated areas shall be NEMA Type 1.
2. Enclosures/Cabinets located in unheated areas or in areas subject to dust or oil, shall be NEMA Type 12.
3. Enclosures/Cabinets located in exterior areas or in areas subject to rain, dripping liquid, or hosing shall be NEMA Type 4X, stainless steel.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Control panels, Enclosures/Cabinets and Terminal boxes shall be delivered to the construction site complete. All electrical devices and accessories shall be in place and wired.

B. Control panels, Enclosures/Cabinets, Terminal boxes and accessories shall be packaged to prevent damage due to vibration, jarring and the like during transportation and handling.

C. If any electrical devices or accessories must be shipped loose they shall be delivered in the manufacturer's original unopened protective packaging and shall be identified with suitable non-corrosive tag.

D. Store components and devices in clean and dry space, protected from weather.

E. Where possible, maintain protective covering until installation is complete and remove such covering as part of final cleanup.

F. Touch up any damage to finishes to match adjacent surfaces.

1.05 SPARE PARTS AND TOOLS

A. One set of all special tools and wrenches required for assembly or disassembly of the panel or cabinet and the installation of devices shall be furnished.

B. Furnish a list of recommended spare parts for each panel or cabinet. This list shall contain the prices and availability of the spare parts recommended.

1.06 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 GENERAL

A. List of acceptable manufacturers is shown on contract drawings.

B. All Enclosures/cabinets and equipment, for which there are established UL standards, shall bear the UL label.

C. Location of control panels and enclosures/cabinets and their approximate dimensions shall be as shown on the Contract Drawings.

D. Each control panels, enclosures and cabinets shall be factory assembled, wired, tested and shipped as a single complete unit, with all devices, terminal blocks and internal wiring installed, unless written permission is given by the Engineer to disassemble any components or parts for shipment. Shipped loose components must fit and be ready for immediate installation in the field.

E. Devices installed shall be grouped according to their function. 15% spare mounting space shall be provided for future alterations.

F. All indicating devices, instruments, control switches and indicating lights shall be mounted on the door or front panel. Protection relays, if used, shall be semi-flush type with built-in test facilities wherever possible.

G. No polyvinyl chloride (PVC) materials, insulation or products shall be used.

2.02 CONSTRUCTION FEATURES

A. Interior

1. Control panel interior shall be designed and assembled so that individual devices, terminal blocks and other removable components and wiring may be easily accessible in order to add, remove or replace them without disturbing or removing adjacent units. All devices shall be located on two surfaces only - front and rear. No intermediate swing panels are allowed unless specified on Contract Drawings.

2. The distance between devices and wiring ducts and between terminal blocks and wiring ducts shall be sufficient to install and make clearly visible full wire designation, but not less than 1 inch.

3. All control cables shall be installed in gutters and wiring ducts with removable covers. Filling of gutters and ducts shall not exceed 50 %. Wireways shall have 0.06 square inch area for each external connection terminal point. This area shall be in addition to wireways required for internal wiring.

4. All internal connections to door mounted devices shall be made with extra-flexible (19 strand) wiring bundled together into the cable tie harness with sufficient slack for opening/closing of the door. The bundle shall be enveloped with a helical plastic lacing to prevent wire abrasion. The wire bundle shall be carried between supporting clamps on the door and fixed portion of the enclosure.

5. Devices and terminal blocks shall be mounted on a mounting panel to space them away from rear wall of the enclosure/cabinet.

6. Enclosures/Cabinets with terminal blocks only shall include terminal straps and brackets sized for the particular enclosure/cabinet and designed to space the terminal blocks away from rear wall of the enclosures/cabinets. Straps and brackets shall be Hoffman Engineering Co., Bulletin A-80 or approves equal.

7. Thermostatically controlled space heaters with mechanical guards shall be provided for all outdoor-located enclosures and for indoor enclosures if requested on the Contract Drawings. Heaters shall be rated 240 volts and operated at 120 volts, each with an individual circuit breaker of suitable rating. Heaters shall be sized to keep the air inside the cabinet above the dew point.

B. Enclosures and Cabinets

1. Enclosures/Cabinets shall be fabricated of code-gauge, sheet-steel, unless hot-dipped galvanized steel or stainless steel is shown on the Contract Drawings.

2. Enclosures and Cabinets shall have a hinged door unless otherwise indicated on the Contract Drawings. Doors shall be fitted with concealed, continuous, flush piano hinges.

3. Enclosures/Cabinets and trims shall be for surface-mounting, recessed installation or free standing (floor mounting) installation as shown on the Contract Drawings.

4. Trim for recessed or flush-mounted enclosures/cabinets shall consist of a one-piece sheet-steel frame with hinged door, catch and lock. Frame shall extend 3/4-inch beyond each side of the cabinets and shall be set with their backs flush with the finished wall. Rolled lip around all sides of the enclosure shall be provided to exclude liquids and contaminants. Door and body stiffeners shall be provided where required to assure rigid construction.

5. Enclosures/Cabinets for surface mounting shall be provided with the door, hinged directly to enclosures/Cabinets. Door shall be made of one piece of sheet-steel, shall have a 3/4-inch flange around all edges shaped to cover the edge of the box, and shall be provided with a catch and lock. Rolled lip around all sides of the enclosure shall be provided to exclude liquids and contaminants. Door and body stiffeners shall be provided where required to assure rigid construction.

6. Floor mounting (freestanding) enclosures/cabinets shall be fabricated of 10-gauge steel with steel channel base to form a rigid, self-supporting structure. Heavy duty lifting eyes anchor into reinforced top shall be provided.

7. On panels or doors weakened by excessive area punched out for device mounting, reinforcing stiffeners shall be provided for extra rigidity.

8. Enclosures/Cabinets with through wiring shall be provided with side gutters 4 inches wide. Enclosures/Cabinets shall be provided with top and bottom gutters not less than 6 inches wide.

9. All doors shall close against a rabbet placed all around the inside edge of the frame, with a close-fitting joint between the door and frame.

10. Each door shall be furnished with a flush cylinder tumbler lock, with catch, and spring loaded type stainless steel door pull. Doors more than 48 inches high shall be provided with a heavy-duty, three-point latching mechanism with rollers on ends of latch rods for easy door closing. Locks shall be fitted to separate keying for each system. Furnish one key for each cabinet installed and a maximum of 20 keys per system.

11. Fastening door screws or door clamps, where required, shall be stainless steel. Door screws shall be of the captive, tamper proof type.

12. Collar studs shall be provided with internal mounting panel.

13. Provide large removable print pockets, mounted inside of each enclosure/cabinet door.

C. Wiring

1. Wiring shall be sized to the duty required. Control wires shall be # 14 AWG minimum

2. Wiring of all relays, instruments, and other devices shall conform to the arrangement shown on approved wiring diagrams.

3. All control wiring, including all spare contacts of all devices, shall be wired to terminal blocks. Terminals shall be arranged for consecutive connections of conductors which compose a given control circuit or connected device. Number of spare contacts in each device shall be as shown on Contract Drawings.

4. All bus wiring such as 125 V DC, 120 V AC, alarm, etc. shall be insulated wire, run from terminal block to terminal block and not rigid buses.

5. Connections made on terminal blocks and devices shall be by means of insulated locking fork, or insulated ring type crimp terminals. All crimps shall be made with a ratchet type compression tool specifically made for this application to produce optimum mechanical and electrical performance.

6. On devices that do not permit locking fork or ring type terminals, control wiring shall be held by tubular screw-type connectors.

7. Internal wiring shall have no splices, nor shall more than two wires be terminated on one terminal point.

8. Seller is solely responsible for correctness of the internal wiring and proper functioning of the equipment being connected.

D. Terminal blocks

1. Terminal blocks shall be as shown on the Contract Drawings, as follows:

   a. Sliding link disconnect terminal blocks shall be rated 600 volt AC and shall be UL recognized, Powerright Products Inc., series SLD-78-S, or approved equal.

   b. Add on type terminal blocks with screw terminals and clamps, rated 600 volts, and sized to accept a wire range of #22 to #8 AWG, UL recognized and CSA certified.

   c. Solderless tubular terminal blocks add-on type shall be rated 600 volts, and sized to accept a wire range of #22 to #8 AWG, with non-rotating clamping surfaces, UL recognized and CSA certified.

   d. Fuse blocks shall be furnished with 600 volt rated fuses and switch-action, blown fuse indicator, pullers.

   e. Provide terminal block accessories, including fanning strips, jumpers, marking strips and terminal covers.

2. Terminal block housings shall be molded from flame-retardant Lexan, Nylon or Polypropylene and terminal block accessories shall be made of flame-retardant materials. All terminal blocks shall be barrier type.

3. Each terminal block assembly shall be supported after every twelve points.

4. Terminal blocks rated 600 volts, 30 Amps shall be provided for all external connections by purchaser, unless otherwise shown on the Contract Drawings.

5. At least 20% uniformly distributed spare terminals shall be provided.

E. Identification

1. All devices shall be indelibly identified with legend plates inscribed in accordance with approved schematic diagrams and layout drawings.

2. Each Enclosure/Cabinet shall be provided with large engraved nameplate on its front. Nameplate nomenclature shall be according to a schedule approved by the Engineer.

3. Unless otherwise shown on the Contract Drawings, fabricate nameplates from an approved type of lamacoid plastic with letters engraved on the plate in white on black background. Where letter sizes are not shown on the Contract Drawings, use 1/2-inch high letters.

4. Secure nameplates on equipment with brass or stainless steel screws.

F. Accessories

1. Front of board test facilities shall be provided for all instrument and relay current and potential circuits that cannot be individually tested by test devices inherently built into relays or meter. Auxiliary contacts and switches shall be provided where necessary to form part of the test blocks.

2. Interior lighting with switches and receptacles, 120 volts AC, shall be provided if called for on Contract Drawings.

3. A color-coded mimic bus shall be provided if called for on Contract Drawings.

4. Internal copper ground bus, size 1/4 x 1 inch and extended throughout the structure, shall be provided in free standing enclosures/cabinets if called for on Contract Drawings. Ground bus shall be bolted, brazed or welded to the framework, side sheets, etc.

2.03 PAINTING

A. Surfaces to be painted shall be prepared by the removal of all grease, oil, rust, scale or other foreign material and chemically treated to provide a bond between the paint and metal surface preventing the entrance of moisture and the formation of rust under the paint film.

B. A prime coat of zinc chromate paint and two (2) finish coats of enamel paint conforming to ANSI Z 55.1 shall be applied. The gray prime and finish paints shall be a compatible finish system. In public areas the cabinets shall be painted as above, unless otherwise shown on Contract Drawings.

C. Furnish a can of touch up paint for use after equipment is positioned.

D. Stainless steel panels shall not be painted. Galvanized panels shall be painted if shown on the Contract Drawings.

2.04 SHOP TEST

A. Shop tests shall be in accordance with NEMA, ANSI and IEEE specifications, including:

1. High potential and operating tests on power equipment to demonstrate that this equipment will function correctly and in accordance with the intent of the specifications. Check rating of all protective devices (circuit breakers and fuses).
2. Insulation resistance test for each circuit with equipment connected, except those containing electronic components, using a 1000-volt megger. The insulation resistance shall be no less than 25 megohms.
3. Every control circuit continuity test. Use all schematic diagrams.
4. All control devices functional performance test to determine that all devices are wired and function correctly when energized.
5. Simulated operating test for the entire system.

B. Information outlining the test methods and procedures to be followed shall be submitted to the Engineer for approval during the period of shop drawing submission. A copy of test forms to be used shall be furnished at the time.

C. The Engineer shall be permitted to inspect any equipment, material or work to be furnished under this specification and shall have the right to reject any parts considered defective, unsuitable for the purposes or not in accordance with these specifications. Free entry shall be permitted to the Engineer at all times and to all parts of the works engaged in the manufacturing of this equipment.

D. The Engineer shall be notified in writing at least two weeks before testing. This notification shall list all units to be tested. The Engineer reserves the right to require additional testing or to waive factory inspection or witnessing of tests. The Engineer will advise the Contractor which tests will be witnessed and which will be waived.

E. Facilities for any reasonable tests that may be considered necessary in connection with any inspection shall be furnished free of charge. The shop shall provide equipment, instruments, cables, tools and personnel required and shall bear all expenses incidental to the foregoing tests, including replacement of damaged parts and material.

F. During the witnessing of tests, all original test data shall be initiated by the Engineer, and at the conclusion of the tests he shall be furnished with one copy of all original test data. If any data was modified, the Engineer shall be apprised and such modification shall be subject to the approval of the Engineer.

G. The accuracy of the calibration of all instruments to be employed during the tests shall be ascertained and recorded at the beginning of the tests. All readings shall be directed and visible to the Engineer.

H. Five (5) certified copies of all test results shall be furnished to the Engineer. Certification shall be by a Professional Engineer, licensed in the State in which tests were performed and so stamped.

I. Release of equipment shall not relieve the Contractor of the responsibility of furnishing equipment conforming to all specification requirements.

PART 3. EXECUTION

3.01 EXAMINATION

A. Verify that electrical installations, structural, mechanical and other related Work satisfy the requirements for performance of the work of this Section in accordance with the Contract Documentation.

B. Before delivering the equipment to the site, the Contractor shall investigate the site conditions to determine the best method of shipment, what preparatory Work, if any, will be needed to bring the equipment onto the site, and what will be the best and quickest method of unloading the equipment and setting it in place.

C. Report immediately to the Engineer any electrical, structural or related construction defects in areas where control panels or cabinets are to be installed, and do not attempt to rectify any defect unless specifically instructed to do so by the Engineer.

D. Before unloading the equipment it shall be inspected for damage during shipment. Any damage shall immediately be brought to the attention of the Engineer for resolution.

3.02 PREPARATION

A. Install any channels, angles or other supports that are required to support or mount the control panels and enclosures/cabinets.

B. Use supports and fasteners as specified in the Section of the Specifications entitled "SUPPORTING DEVICES" or as shown on the Contract Drawings.

3.03 INSTALLATION

A. Surface and flush mounted enclosures/cabinets shall be installed with tops 6 feet-6 inches above the floor, unless otherwise shown on the Contract Drawings.

B. Control panels and enclosures/cabinet shall be installed true and plumb on supporting struts and shall not be mounted directly on concrete, concrete block walls, or any other walls subject to moisture. Leave a minimum gap of 1/2 inch between the back of the enclosure/cabinet and the wall, using stainless steel hardware.

C. Where mounting directly on the wall is unavoidable the back of the enclosure shall be painted with two coats, minimum, of a bituminous paint.

D. Cables shall be neatly racked and bundled with nonflammable nylon ties, routed and supported within the enclosures/cabinets, cable ducts or gutters. Minimum bending radii as recommended by cable manufacturers shall not be reduced.

E. After conduits and cables are installed, the enclosures/cabinets shall be inspected for foreign materials and shall be vacuumed clean. Prior to energization, the panels shall be tested as described below.

F. A new set of as-built drawings, neatly bound together in plastic covers, shall be placed in the print pocket of each enclosure/cabinet.

3.04 FIELD TESTS

A. Visually inspect each device in the panel and operate manually.

B. Check all connections for tightness.

C. Check rating of all protective devices (circuit breakers and fuses). To each pole of the circuit breakers apply current 3 times its rating, recording currents and breaker trip times. Apply rapidly increasing currents and record the value that consistently causes instantaneous tripping of the breaker. Compare these recorded times with manufacturer's time current curves.

D. Perform each panel control wiring tests to determine that all devices are function correctly when energized and in accordance with the intent of the Contract Drawings and Specifications.

E. Perform control system functional test. This test shall include step by step procedure to determine that entire control system (this control panel could be just part of it) operate properly.

F. All discrepancies found by the contractor shall be brought to the attention of the Engineer.

G. All testing shall be performed in the presence of and as directed by the Engineer. The Contractor shall notify the Engineer when the equipment is installed and ready for testing.

END OF SECTION

SECTION 16133

CONTROL PANELS, ENCLOSURES/CABINETS, AND TERMINAL BOXES

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16133A01 Shop drawings for each enclosure/cabinet shall include:

1. Job name
2. Item number
3. Quantity of each enclosure/cabinet configuration
4. Nameplate schedule in accordance with design drawings
5. Complete assembly drawings including plan, elevation and section views with dimensions. Show dimensioned location of all devices, terminal blocks, accessories and details for purchaser cable support. Indicate conduit entrance areas and mounting details.
6. Cabinet/Enclosure construction details, floor plan and channel base detail drawings
7. Specification for enclosure/cabinet mechanical and electrical parts, and assemblies.
8. Wiring interconnection and schematic diagrams as follows:

a. The elementary diagrams supplied by panel vendor shall contain

(1) Each device designation corresponding to panel layout drawing and wiring diagrams

(2) All device terminal numbers corresponding to device vendor information

(3) Contact development diagrams of all control, selector, and transfer switches, protection and auxiliary relays, pushbuttons, etc. Indicate connections to control panel terminal blocks

(4) Contact diagrams for all alarm and indication circuits. Indicate connections to control panel terminal blocks

b. Control panel internal connection wiring diagram shall contain

(1) Each device designation corresponding to panel layout drawing and elementary diagrams. All device terminals shall be identified identical to device vendor drawing and arranged in correct physical relationship.

(2) Sufficient information at each wire termination to locate the other termination without recourse to routing sheets, supplementary tabulations, or any other document.

(3) Terminal strips numbered sequentially from top to bottom and left to right. Show terminals requiring external connections. The terminal strips shall be shown on drawings spaced at least 4 inches apart, so as to permit purchaser's external wiring to be shown on the same drawings.

c. External connection diagram between the control panel and the equipment connected to it.

9. Bill of materials: Components shall be identified by manufacturer's catalog number, technical characteristics and settings required for the installation. Bill of materials shall

correlate components to panel layout drawing and diagrams.

Catalog Cuts

16133B01 Catalog cuts
a. Enclosures
b. Cabinets
c. Terminal blocks
d. All factory or field mounted devices and equipment shown on the control panel or Enclosure/Cabinet drawings.

Schedules

16133J01 Schedules
a. Nameplate nomenclature
b. Terminal block designations

Record Documents

16133M01 As-built documentation.

END OF APPENDIX "A"

DIVISION 16

SECTION 16135

BOXES AND FITTINGS

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for electrical boxes and fittings.

B. Types of electrical boxes and fittings specified in this Section are:

1. Outlet Boxes
2. Device Boxes
3. Pull Boxes
4. Junction Boxes
5. Conduit Bodies
6. Fittings

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	National Electrical Manufacturers Association (NEMA)
NEMA OS1	Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports
NEMA OS2	Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)
	National Fire Protection Association (NFPA)
NFPA 70	National Electrical Code
	Underwriters Laboratories Inc. (UL)
UL 50	Cabinets and Boxes
UL 514A	Metallic Outlet Boxes
UL 514B	Fittings for Conduit and Outlet Boxes
UL 514C	Nonmetallic Outlet Boxes, Flush Device Boxes, and Covers
UL 886	Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations

1.03 QUALITY ASSURANCE

Boxes and fittings, of types and sizes required, shall have been satisfactorily used for purposes similar to those intended herein for not less than three years. A list of acceptable manufacturers is shown on Contract Drawing.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in manufacturer's original, unopened, protective packaging.

B. Store materials in a clean, dry space and protect them from weather.

C. Handle in a manner to prevent damage to finished surfaces.

D. Where possible, maintain protective coverings until installation is complete and remove such coverings as part of final cleanup.

E. Touch up any damage to finishes to match adjacent surfaces.

1.05 SUBMITTALS

"Submittal Requirements" shall be in accordance with APPENDIX A.

PART 2. PRODUCTS

2.01 MATERIALS

A. General

1. Locations, types and sizes of boxes and fittings are shown on the Contract Drawings.
2. Boxes and fittings shall be metallic, unless otherwise shown on the Contract Drawings, and shall conform to NEMA 0S1, NEMA 250, UL 50, UL 514A, UL 514B, and NFPA 70.
3. Nonmetallic boxes and fittings, shown on the Contract Drawings, shall conform to NEMA 0S2, NEMA 250, UL 50, UL 514C, and NFPA 70.
4. Boxes and fittings to be located in hazardous (classified) areas, as shown by "area plans" on the Contract Drawings shall conform to UL 886 & NFPA 70.
5. All electrical materials and equipment, for which there are established UL standards, shall bear the UL label.
6. Where the sizes or dimensions of a box are not shown on the Contract Drawings, all boxes, whether for use on power, communications, signaling, control, telephone, or other purposes, shall be sized as follows:

   a. In straight pulls, the length of the box shall not be less than 8 times the trade diameter (nominal inside diameter) of the largest raceway.

   b. Where angle or "U" pulls are made, the distance between each raceway entry inside the box and the opposite wall of the box shall not be less than 6 times the trade diameter of the largest raceway. The distance shall be increased for additional entries by the amount of the sum of the diameters of all other raceway entries in any row on the same wall of the box. The distance between raceway entries enclosing the same conductor shall not be less than 6 times the trade diameter of the larger raceway.

c. Where a conduit entry is in the wall of a box opposite a removable cover, the minimum distance between the entry and the cover shall be as follows:

Conduit Size	Distance Between Entry and Cover
Up to 1-1/4"	4"
1-1/4" and 1-1/2"	6"
2" and 2-1/2"	8"
3" and larger	12"

d. The minimum depth of a box shall be not less than two times the trade diameter of the conduit entries in a single row and not less than 1-1/2 times the sum of the trade diameter of the largest raceway in each row for multiple rows.

7. Weatherproof cast boxes shall be used for exterior or damp locations. Weatherproof boxes shall be hot-dipped galvanized cast-steel or cast-aluminum. Cast boxes shall be threaded conduit entrance type provided with mounting lugs. Materials shall match the type of conduit i.e., galvanized steel or aluminum, used in the conduit run.

8. Covers for boxes located in public spaces or where shown on the Contract Drawings shall be furnished with tamper-resistant hardware.

9. Cover plates for outlet boxes are specified in the Section 16140 entitled "WIRING DEVICES".

B. Interior Outlet and Device Boxes

1. Provide galvanized, flat-rolled, sheet-steel interior outlet wiring boxes, of types, shapes and sizes, including box depths, to suit each respective location and installation; construct boxes with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices.

2. Outlet boxes shall be of proper sizes and shapes for conduits and wires entering them, and equipped with plaster ring or cover as necessary for the wiring devices to be installed.

3. Boxes for switches and receptacles shall be 4-inch square, minimum 2 1/8-inch deep, for up to two devices; solid, ganged boxes for over two devices; and installed so that device covers shall be tight and plumb with wall finish.

4. Provide suitable barrier in boxes where two or more 277-volt switches are to be installed, to isolate each on its own phase.

5. Boxes for lighting fixture installation shall be 4-inch square, minimum 2 1/8-inch deep, and provided with 3/8-inch studs.

6. Boxes to be installed in ceilings, plenums, or spaces used for supply or return of environmental air shall be UL listed for such use, without holes, openings or penetrations, and complete with gasketed cover plates.

7. Provide all sheet-steel boxes with suitable knockouts.

C. Exterior Outlet and Device Boxes

1. Provide corrosion-resistant, cast metal, weatherproof outlet wiring boxes, of types, shapes and sizes, including box depths, to suit each respective location and installation.

2. For outlet boxes to be installed flush or recessed in exterior walls, provide galvanized, sheet-steel boxes, with suitable depth and tile, plaster or masonry rings for the wall construction.

3. Provide cast-metal faceplates with spring-hinged, waterproof caps suitably configured for each application, including faceplate gaskets and stainless steel or brass screws or fasteners. Faceplate material shall match the type of box i.e., galvanized steel or aluminum.

D. Junction and Pull Boxes

1. General

a. Unless otherwise shown on the Contract Drawings, provide galvanized, code-gauge, sheet-steel junction and pull boxes and covers for interior locations and cast-metal boxes and covers for exterior locations of types, shapes and sizes to suit each respective location and installation, and equipped with stainless steel hinges, nuts, bolts, screws and washers.

b. Junction or pull boxes having any dimension larger than 36 inches shall contain racks or supports for all cables or conductors.

c. Provide pull boxes with suitable insulating barriers where shown on the Contract Drawings or required by code. Vertical-offset pull boxes shall contain cable supports at turns to prevent cables from resting on corners.

d. Where shown on the Contract Drawings, provide boxes with provisions for padlocking.

e. Special boxes shall be as shown on the Contract Drawings.

f. Where shown on the Contract Drawings, catches or vault handles shall be lockable. Locks shall be keyed alike for the same service, such as power, communications, signal or telephone. Each service type shall be keyed differently.

g. All covers in exposed exterior locations, or other areas as shown on the Contract Drawings, shall be gasketed.

h. For covers heavier than 20 pounds or more than 24 inches in any dimension, provide two replaceable studs, located on each side of the box flange, to support the cover during installation.

i. Boxes containing, or designated for, conductors operating at greater than 600 volts (phase-to-phase) shall be constructed of minimum 12-gauge steel.

2. Interior Junction and Pull Boxes

a. Finished Areas

(1) Junction and pull boxes, located in finished areas and having any dimension larger than 12 inches, shall be furnished with flush-mounting, lockable, hinged covers, similar to adjacent panelboard cabinets. Locks shall be keyed alike for the same service, such as power, communications, signal or telephone. Each service type shall be keyed differently. Hinged covers shall contain catches to keep covers closed. Covers having any dimension larger than 36 inches and all multiple-section doors shall contain 3-point vault handles. Covers shall be furnished shop-primed for field painting, and shall be finished with a color as selected by the Engineer.

(2) Boxes having any cover dimension 12 inches or less shall be furnished with flush-mounting, screw-on covers, unless otherwise shown on the Contract Drawings.

b. Unfinished Areas

Junction and pull boxes, located in electrical or telephone closets or rooms, in mechanical equipment rooms, in areas above hung or accessible ceilings or in areas shown on the Contract Drawings as "unfinished," shall be furnished with screw-on covers for boxes having any cover dimension 24 inches or less, and with either single or multiple-section hinged covers for boxes having any cover dimension larger than 24 inches.

3. Exterior Junction and Pull Boxes

a. Junction and pull boxes, located in sidewalks, decks and in areas shown on the Contract Drawings as "finished", shall be furnished with flush-mounting, screw-on covers.

(1) Boxes having any cover dimension 24 inches or less shall be cast-steel. Boxes shall be furnished with asphaltic paint finish on surfaces to be embedded in earth or concrete.

(2) Covers having any dimension larger than 24 inches shall be cast-steel "sidewalk" frames and covers, suitable for installation on a concrete box or handhole.

b. Unfinished Areas

Junction and pull boxes, located in areas shown on the Contract Drawings as "unfinished", shall be furnished with screw-on covers for boxes having any cover dimension 24 inches or less, and with hinged, bolt-on covers for boxes having any cover dimension larger than 24 inches.

E. Floor Boxes

Provide cast-steel, waterproof, adjustable floor boxes with threaded-conduit entrance hubs, and vertical adjusting rings, gaskets, brass floor plates and flush, screw-on covers. All unused conduit openings shall be closed with appropriate plugs.

F. Conduit Bodies

Provide galvanized, cast-metal, conduit bodies, of types, shapes and sizes to suit each respective location and installation; construct with threaded-conduit entrance hubs, removable covers, and stainless steel or brass screws.

G. Bushings, Locknuts and Knockout Closures

Provide corrosion-resistant knockout closures and conduit locknuts, and insulated, malleable-iron, conduit bushings and offset connectors, of types and sizes to suit each respective use and installation.

H. Supporting Devices

Provide inserts, expansion shield lugs, bolts with nuts and washers, shims or any other type of fastening devices required to secure boxes, in accordance with the Section 16190 entitled "SUPPORTING DEVICES". Unless otherwise shown on the Contract Drawings, all fasteners shall be hot-dipped galvanized and of sizes and types recommended by the equipment manufacturer and as approved by the Engineer.

PART 3. EXECUTION

3.01 INSTALLATION

A. Install boxes and conduit bodies at the locations shown on the Contract Drawings and as required by NFPA 70 at any other location where they are required to facilitate the pulling, supporting or connection of wires and cables.

B. Securely mount all boxes in a manner approved by the Engineer and support the boxes independently of conduits entering them.

C. Install boxes and conduit bodies in classified (hazardous) locations in accordance with their listing or label requirements. Conduit seal fittings shall be packed and filled only after proper operation of equipment and systems has been demonstrated and approved by the Engineer.

D. Paint exteriors of boxes exposed in mechanical equipment rooms or in electrical rooms or closets or spaces shown as "unfinished" on the Contract Drawings, and the exteriors of boxes installed above hung or accessible ceilings, as follows:

1. Emergency: Orange
2. Fire Alarm: Red
3. High Voltage: Red with 1-inch, white block letters reading “HIGH VOLTAGE” on each exposed face and cover.

E. All installations shall conform to NFPA 70.

F. Dissimilar Metals

1. "Dissimilar metals" shall mean those metals which are incompatible with one another in the presence of moisture, as determined from their relative positions in the Electrochemical Series, or from test data.

2. Where dissimilar metals come in contact, paint the joint both inside and out with approved coating to exclude moisture from the joint, or provide a suitable insulating barrier separating the metals.

END OF SECTION

SECTION 16135

BOXES AND FITTINGS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16135A01 Shop drawings
a. Special boxes
b. Boxes lager than 12 inches
c. Ancillary equipment if shown on Contract Drawings

Catalog Cuts

16135B01 All boxes and fittings

END OF APPENDIX "A"

DIVISION 16

SECTION 16190

SUPPORTING DEVICES

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for hangers and supports, sleeves and fasteners used to support electrical raceways and equipment, except as specified in B below.

B. Supporting devices, furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Sections of the Specifications.

1.02 REFERENCE

The supporting devices, specified in this Section shall be constructed, installed and tested in accordance with requirements of the following publications:

	American Institute of Steel Construction Inc. (AISC)
AISC	Manual of Steel Construction
	American Iron and Steel Institute (AISI)
AISI	Specifications for the Design of Cold-Formed Steel Structural Members
	American Society for Testing and Materials (ASTM)
ASTM A 36	Structural Steel
	American Welding Society (AWS)
AWS D1.1	Structural Welding Code, Steel
	National Electrical Contractors Association (NECA)
NECA 5055	Standard of Installation
	National Fire Protection Association (NFPA)
NFPA 70	National Electrical Code

1.03 QUALITY ASSURANCE

Supporting devices, of types and sizes required, shall have been satisfactory used for purposes similar to those intended herein for not less than three years.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's original, unopened, protective packaging.

B. Store materials in a clean, dry space and protect them from weather.

C. Handle in a manner to prevent damage to finished surfaces.

D. Where possible, maintain protective coverings until installation is complete and remove such coverings as part of final cleanup.

E. Touch up damage to finishes to match adjacent surfaces, including re-coating of galvanized or plated surfaces where damaged, cut or drilled.

1.05 SUBMITTALS

See Appendix "A" For Submittal Requirements.

PART 2. PRODUCTS

2.01 MANUFACTURERS

Subject to compliance with requirements of this Section, provide supporting devices of the acceptable manufacturers as shown on Contract Drawings.

2.02 HANGERS AND SUPPORTS

A. General

1. Unless otherwise shown on the Contract Drawings, provide hangers and supports as specified below.
2. Where more than one type of hanger or support is suitable for the intended use, selection is at the Contractor's option, subject to approval by the Engineer.
3. Hangers and supports, for which there are established Underwriters Laboratories Inc. (UL) standards, shall bear the UL label.

B. Raceway Support

1. Clevis Hangers

   For supporting horizontal conduit; galvanized steel; with hole for treaded steel rod.

2. Riser Clamps

   For supporting vertical conduits; galvanized steel; with two or three bolts and nuts, and 4-inch ears.

3. Reducing Couplings

   Steel rod reducing coupling; size as required; galvanized or plated steel

4. C-Clamps

   Black malleable iron or galvanized or plated steel; with hole for threaded rod.

5. I-Beam Clamps

   Galvanized or plated steel, 1-1/4-inch x 3/16-inch stock; 3/8-inch cross bolt; 2-inch flange width

6. Right Angle or Parallel beam Clamps

   Galvanized steel clamps for supporting or fastening conduit up to 2-inch trade size

7. One-Hole Conduit Straps

   For supporting up to 1-inch conduit or electrical metallic tubing (EMT); galvanized steel

8. Two-Hole Conduit straps

   For supporting conduit or EMT larger than 1-inch galvanized steel; 3/4" strap width.

9. Hexagon Nuts: galvanized steel

10. Round Steel Rod: galvanized or plated steel; threaded

11. Trapeze Hangers: Same as Specified in 2.02 C below

12. The following types of hangers and supports shall not be used:

    a. Perforated metal strapping;

    b. Slotted, perforated angles;

    c. Spring pressure or torsion clips, hangers or supports.

C. Equipment Supports

1. U-channel strut system shall be 12-gauge, hot-dipped galvanized steel. Provide with drilled or slotted holes as required for the application and with the following fittings which mate and match with U-channel:

    a. Fixture hangers

    b. Channel hangers

    c. End caps

    d. Beam clamps

    e. Wiring stud

    f. Thin wall conduit clamps

    g. Rigid conduit clamps

    h. Conduit hangers

    i. U-bolts

D. Supporting Steel Sections and Channels

Supporting steel sections and channels shall be fabricated of ASTM A 36 steel in accordance with the appropriate requirements of the AISC, AISI, and AWS publications specified in 1.02, and shall be hot-dipped galvanized after fabrication.

E. Cable Supports

1. Provide cable supports with insulating wedging plug for non-armored type electrical cables in risers. Assembly shall include body of galvanized malleable iron with insulating wedging plug.

2. Provide cable supports for armored type electrical cables in risers. Assembly shall include body and pressure plates of galvanized steel.

2.03 SLEEVES AND SEALS

A. General

1. Unless otherwise shown on the Contract Drawings, provide sleeves and seals as specified below.

2. Where more than one type of sleeve or seal is suitable for the intended use, selection is at the Contractor's option, subject to approval by the Engineer.

3. Sleeves and seals, for which there are established, UL standard, shall bear the UL label.

B. Pipe Sleeves

1. Provide pipe sleeves for conduits penetrating concrete or masonry floor and walls, as follows:

   a. Steel Pipe

      Fabricate from schedule 40, galvanized steel pipe; remove burrs.

   b. Iron Pipe

      Fabricate from cast iron or ductile iron pipe; remove burrs.

   c. Plastic Pipe

      Fabricate from either fiberglass or Schedule 40, PVC plastic pipe; remove burrs. Fiberglass sleeves may be utilized for interior or exterior usages, but PVC sleeves shall be utilized for exterior usage only.

2. Sleeves shall have a minimum inside diameter as shown below, based on the installed raceway diameter.

Raceway Diameter (inches)	Sleeve Inside Diameter (inches)
1 or less	2
1-1/4 to 2	3
2-1/2 to 3	4
3-1/2 to 4	5
5	6
6	7

3. Where a sleeve encloses only one conductor, phase or polarity, or a ground wire or cable, the sleeve shall be non-ferrous.

C. Interlocking Modular Seals

Provide interlocking modular type seals for conduit access located in exterior foundation and pit walls. The seals shall be multi-link, stainless steel bolted connection, high-temperature fittings.

D. Sealing Bushings

Provide sealing bushings for conduit access core-drilled through foundation walls or floors. The bushings shall be molded, one-piece neoprene sealing rings with PVC coated steel or uncoated aluminum pressure plates, stainless steel hex socket head cap screws and flat washers.

E. Fire Seals

Provide UL listed, 3 hour rating, silicone based foam, fire resistive, waterproof joint sealing system to prevent the passage of hot gases and fire.

F. Wall and Floor Seals

Provide watertight and pressure-tight wall and floor seals suitable for sealing around conduit passing through exterior concrete floors and walls. Assembly shall include steel sleeves, galvanized malleable iron body, neoprene sealing grommets and rings, metal pressure rings, membrane clamp were required by foundation design and pressure clamps with type 316 stainless steel hex head cap screws. Seal sizes shall be maximum published size for conduit to be installed therein.

2.04 FASTENERS

A. General

1. Unless otherwise shown on the Contract Drawings, provide fasteners as specified below.
2. Where more than one type of fasteners is suitable for the intended use, selection is at the Contractor's option, subject to approval by the Engineer.

B. Toggle Bolts

Toggle bolts shall be spring head, galvanized or plated steel, 1/4-inch to 1/2-inch sizes, length as required.

C. Expansion Anchors

Expansion anchors shall be metallic expansion anchors or shields, including drop-in anchors, wedge and sleeve anchors, and two-piece and three-piece shields for lag screws or machine screws or bolts.

D. Powder activated Fasteners

Powder activated fasteners shall be steel, pin or stud type, selected for proper length and penetration for the equipment, clamp or strap to be installed, and the base material.

E. Bolts, Nuts, Lockwashers and Washers

1. All hardware shall be galvanized or plated steel, unless otherwise shown on the Contract Drawings.
2. Bolts and nuts, 1/4-inch trade size and larger, shall be hex head or hex socket type, standard American sizes.
3. Lockwashers shall match the finish of the furnished bolts and nuts, and generally be installed one-per-bolt, at the nut end of the assembly.

4. Washers shall be standard or fender type, as required, and sized to match the installed bolts or screws.

F. The following types of fasteners shall not be used:

1. Lead anchors or studs;
2. Wooden plugs or anchors;
3. Plastic anchors;
4. "Nail-in" anchors, either of plastic or metal type.

PART 3. EXECUTION

3.01 EXAMINATION

A. Verify that electrical installations, structural, mechanical and other related Work satisfy the requirements for performance of the Work of this Section in accordance with the Contract Documents.

B. Report immediately to the Engineer any electrical, structural or related construction defects in areas where supporting devices are to be installed, and do not attempt to rectify any defect unless specifically instructed to do so by the Engineer.

3.02 PREPARATION

Before installation the supporting devices, the Contractor shall investigate the site condition to determine, what preparatory work, if any, will be needed.

3.03 INSTALLATION

A. General

1. Install hangers and supports, sleeves and fasteners in accordance with approved printed manufacturer's installation procedures, and as specified.
2. Coordinate all affected trades and all aspects of the electrical work, including installation of raceways and wiring as necessary to interface installation of supporting devices with other work.
3. Install hangers and supports, and attachments to properly support raceways, equipment and accessories from building structure. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze hangers where possible. Install hangers and supports with maximum spacing not to exceed that permitted by NFPA 70 and NECA 5055, as applicable, unless otherwise shown on the Contract Drawings.
4. Secure threaded rod couplings, trapeze hangers or supports or similar horizontal elements, using lock washers and jam nuts to prevent loosening.

B. Conduit and Raceway supports

1. Do not support raceways from hung ceiling supports or members, or metal roof deck.
2. Do not support raceways from mechanical ductwork, ductwork supports, piping or piping supports.

3. Threaded rod for the support of conduits, raceways or trapeze hangers of the given size, shall be not less than the following:

Conduit, Raceway, Hanger Size (inches)	Threaded Rod Size (inches)
2 or less	3/8
2-1/2 to 3-1/2	1/2
4 to 5	5/8
6	3/4

4. Where trapeze hangers are used, bolt or clamp the raceways in place to at least every third hanger and to the first hanger on each side of a bend, fitting, junction or pull box or change in direction.

C. Sleeves

1. Unless otherwise shown on the Contract Drawings, extend sleeves for raceways and risers one inch beyond top of finished floor, curb or building element being penetrated.
2. Install sleeves level and plumb, accurately located and positioned to conform to the requirements of the equipment and in accordance with the approved layout drawings.
3. Install interlocking modular seals in tandem, one at the interior and one at the exterior face of the pipe sleeve.
4. Tighten sleeve seal nuts until sealing grommets have expanded to form watertight seal.

D. Fasteners

1. Wood screws, lag screws, carriage bolts or machine screws shall be utilized for wood or materials of similar fibrous nature.
2. Welded or blazed threaded studs, bolts or machine screws or clamps shall be utilized for structural and miscellaneous steel, iron or other metals.
3. Metallic expansion shields, wedge anchors or drop-in anchors, with lag screws, bolts or machine screws shall be utilized for solid masonry or concrete.
4. Sleeve anchors, drop-in anchors or toggle bolts shall be utilized for concrete masonry units (CMU). Do not use powder-activated fasteners in CMU.

E. Dissimilar Metals

1. "Dissimilar metals" shall mean those metals which are incompatible with one another in the presence of moisture, as determined from their relative positions in the Electrochemical Series, or from test data.
2. Where dissimilar metals come in contact, paint the joint both inside and out with approved coating to exclude moisture from the joint, or provide a suitable insulating barrier separating the metals.

END OF SECTION

SECTION 16190

SUPPORTING DEVICES

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16190A01 Submit layout drawings for dimensioned locations of inserts, sleeves and anchors when required by the Contract Drawings.

Catalog Cuts

16190B01 Catalog cuts
a. Hangers and supports
b. Sleeves
c. Fasteners

Calculations

16190H01 Submit calculations for the following:
a. Supporting steel sections and channels, properly reflecting installed and future loading, including:
1. Safety factors of not less than 4 to 1.
2. Deflection ratio of not greater than 1/240.
b. Special hangers and supports shown on the Contract Drawings
c. Hangers, supports and fasteners when required by but not specifically shown on the Contract Drawings.

END OF APPENDIX "A"

DIVISION 16

SECTION 16450

GROUNDING

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for grounding.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	Administrative Code
	Electrical Code of the City of New York
	American National Standards Institute (ANSI)
ANSI C 2	National Electrical Safety Code
	Institute of Electrical and Electronics Engineers (IEEE)
IEEE Std 142-1991	Recommended Practice for Grounding of Industrial and Commercial Power Systems
IEEE Std 1100-1992	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
	National Fire Protection Agency (NFPA)
NFPA 70	National Electrical Code
	Underwriters Laboratories Inc. (UL)
UL 467	Grounding and Bonding Equipment

1.03 QUALITY ASSURANCE

A. Components and installation shall comply with NFPA 70, "National Electric Code."

B. Provide products specified in this Section that are listed and labeled. The terms "listed" and "labeled" shall be defined as they are in NFPA 70 Article 100.

1.04 SUBMITTALS

See Appendix A for Submittal Requirements.

PART 2. PRODUCTS

2.01 GENERAL

Furnish grounding elements for switchgear, transformers, cabinets panelboards, starters, and miscellaneous electrical equipment, for all non-current-carrying metallic portions of the entire electrical system and for exposed non-electrical systems located in electrical substations or switchgear rooms as required by ANSI C 2, NFPA 70, and building codes which would be applicable, if the Authority were a private corporation.

2.02 MANUFACTURERS

Subject to compliance with the requirements of this Section, provide grounding products of manufacturers as shown on the Contract Drawings.

2.03 GROUND RODS

Ground rods shall be copper clad steel. Unless otherwise shown on the Contract Drawings, the rods shall be 3/4-inch diameter by 10 feet long.

2.04 GROUNDING CONDUCTORS

A. Provide grounding conductors in accordance with the requirements of NFPA 70, Sections entitled "WIRES, CABLES, SPLICES, TERMINATIONS (600 VOLTS OR LESS)," "WIRES, CABLES, SPLICES, TERMINATIONS (MEDIUM VOLTAGE)," and "TAXIWAY/RUNWAY WIRES AND CABLES," as applicable, and as specified on the Contract Drawings.

B. Equipment grounding conductors shall be green insulated.

C. Isolated grounding conductors shall be green insulated with yellow striping.

2.05 ABOVE GRADE CONNECTIONS

Connectors to piping, fencing, and conduit systems shall be listed and labeled as grounding connectors for the materials used.

2.06 BELOW GRADE CONNECTIONS

Buried Cable and ground rod connections shall be exothermic welds. Welded connections shall be provided in kit form and selected for the specific types, sizes, and combinations of conductors shown on the Contract Drawings.

2.07 GROUNDING BUSHINGS

Grounding Bushing shall be insulated type.

2.08 LIGHTNING PROTECTION COMPONENTS

Lightning protection components shall be provided as specified in Section entitled "LIGHTNING PROTECTION SYSTEM."

PART 3. EXECUTION

3.01 INSTALLATION

A. General

Install grounding elements for switchgear, transformers, cabinets, panelboards, starters, and miscellaneous electrical equipment, for all metallic non-current carrying portions of the entire electrical system and for exposed non-electrical systems located in electrical substations or switchgear rooms as required by ANSI C 2, NFPA 70 and building codes which would be applicable, if the Authority were a private corporation.

B. Install grounding as shown on the Contract Drawings.

C. Grounding and bonding equipment for use in connection with interior wiring systems shall conform to UL 467.

D. Install separate insulated equipment grounding conductors with circuit conductors to maintain grounding system at equipotential. Raceway system shall not be utilized as the equipment ground.

E. Connect exposed metallic piping or ductwork of any non-electrical system that is located in an electric substation or switchgear room, to ground in the room. Where the run through the room exceeds 15 feet in length, make ground connections at both the entering and leaving points of the piping or ductwork.

F. Ground all non-current-carrying metallic enclosures of electrical conductors, or exposed non-current-carrying metallic parts of electrical equipment, or of power apparatus.

G. Connections:

1. General

   Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

2. Use electroplated or hot-tin-coated materials to assure high conductivity and make contact points closer in order of galvanic series.

3. Make connections with clean bare metal at points of contact.

4. Make all connections of grounding connector cables to ground rods by exothermic welding method. Welds that are puffed up, or that show convex surfaces indicating improper cleaning are not acceptable.

5. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure-type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically non-continuous conduits at both entrances and exits with grounding bushings and bare grounding conductors.

6. Tighten grounding and bonding conductors and terminals, including screws and bolts, in accordance with manufacturer's published torque-tightening values for connectors and bolts.

7. Where insulated grounding conductors are connected to ground rods, or ground buses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.

H. All sensitive electronic equipment including computers and other components specified on the Contract Drawings, shall be connected to an isolated grounding system. The isolated grounding system shall be installed as specified on the Contract Drawings. The isolated grounding system and the electrical power equipment grounding system must be connected together at a single point, as shown on the Contract Drawings and in accordance with the requirements of NFPA 70, and all applicable local codes. Utilization of a grounding electrode separate from, and not connected to, the electrical power equipment grounding system is not acceptable

I. All ground rods in grounding loops shall have less than 5 ohms resistance to ground. All individual or isolated ground rods shall have a maximum of 25 ohms resistance to ground. The maximum overall grounding system resistance to ground shall be as shown on the Contract Drawings.

3.02 FIELD TESTS

Make ground resistance tests at all ground rods to verify that grounding system is at equipotential and to ensure compliance with the requirements specified in 3.01 I above, in the presence of the Engineer, and prepare all test results in tabulated form indicating location and time of each test and soil resistivity measured. If ground resistance on a grounding resistance test is higher than the value specified in 3.01 I, either increase the length of the rod or add more rods to the grounding system until the required ground resistance is achieved.

END OF SECTION

SECTION 16450

GROUNDING

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Catalog Cuts

16450B01 Catalog Cuts for ground rods, connectors and connection materials, and grounding fittings.

Record Documents

16450M01 Ground Resistance Test Results

END OF APPENDIX "A"

DIVISION 16

SECTION 16452

ELECTRICAL BONDING

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for furnishing, installing and testing an electrical bonding system for corrosion control/stray current mitigation on all underground structures.

1.02 REFERENCES

	American Society for Testing and Materials (ASTM)
ASTM B 3	Soft or Annealed Copper Wire
ASTM B 8	Concentric-Lay Stranded Copper Conductors, Hard, Medium-Hard, or Soft
	Military Specifications (MIL)
MIL A-18001	Anode, Corrosion Preventative Zinc, Slab, Disk and Rod Shapes
	National Association of Corrosion Engineers (NACE)
NACE RP 0169	Control of External Erosion on Underground or Submerged Metallic Pipe Systems

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

The Electrical Bonding System shall be designed, manufactured and installed in accordance with the latest revision of applicable standards ASTM, MIL and NACE. In case of conflict between various standards, the more stringent requirement shall apply.

1.04 QUALITY ASSURANCE

A. The Contractor shall provide the Electrical Bonding System design, certified by a NACE accredited Corrosion Engineer, licensed as a Professional Engineer in the state in which the work is to be performed, and experienced in corrosion control procedures. Submit the qualifications of the Corrosion Specialist, for review by the Engineer.

B. Electrical bonding devices, of type and sizes required, shall have been satisfactory used for the purposes similar to those herein, for not less than three years.

1.05 DELIVERY, STORAGE AND HANDLING

A. Store materials in original packaging in a manner to prevent soiling, damage, wetting or corrosion prior to installation.

B. Handle in a manner to prevent damage to finished surfaces.

C. Where possible, maintain protective coverings until installation is complete and remove such covers as part of final cleanup.

1.06 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MANUFACTURERS

Subject to compliance with requirements of this Section, provide electrical bonding materials and equipment of the manufacturers listed on the Contract Drawings.

2.02 MATERIALS

A. Electrical Bonding Devices

Unless otherwise shown on the Contract Drawings, furnish materials and products in accordance with the following requirements:

1. Cables shall be stranded copper, #8 AWG minimum, conforming to ASTM B 3 and B 8, insulated with 0.11 inches of high molecular weight polyethylene.

2. Zinc Reference Electrode shall conform to the requirements of MIL A-18001, 1-1/4 inches by 1-1/4 inches by 9 inches long, 5 pound, 1/4" dia. steel core package electrode, and in accordance with the following requirements:

   a. Lead wire shall comply with 2.02.A.1, and shall be factory connected to the anode center with the connection sealed in cast epoxy resin encapsulation.

   b. Electrode shall be packaged in a permeable package cloth sack, total weight as recommended by the manufacturer, containing compacted backfill of mixture with the following requirements:

Material	Percent
Hydrated Gypsum	50
Bentonite	50

   c. Epoxy resin encapsulation shall be two-piece, snap-together molded bodies, sized for cable, with two-part low viscosity polyurethane insulating and sealing compound, rated for 600 volts.

B. Buried cable and ground rod connection shall be exothermic welded.

C. Junction boxes shall be in accordance with Section 16135, entitled "BOXES AND FITTINGS".

PART 3. EXECUTION

3.01 EXAMINATION

A. Verify that electrical installations, structural, mechanical and other related work satisfy the requirements for performance of the work for this Section in accordance with the Contract Documents.

B. Report immediately to the Engineer any electrical, structural or related construction defects in areas where bonding devices are to be installed, and do not attempt to rectify any defect unless specifically instructed to do so by the Engineer.

C. Provide control and inspection of all exothermic bonding connections before casting them in concrete and for proper electrical connections of all underground structural members.

3.02 PREPARATION

Before installation of electrical bonding devices, the Contractor shall investigate the site condition to determine, what preparatory work, if any, will be needed.

3.03 INSTALLATION

A. General

1. Install electrical bonding devices in accordance with approved printed manufacturer's installation procedures, and as specified.
2. Coordinate with other trades, to electrically bond all structural steel and reinforcing bars, embedded in the concrete below grade. Bonding shall be completed in closed circuit to minimize corrosion activity, and shall conform to the Corrosion Specialist design.

B. Bonding Connections

1. Bond bare or uncoated reinforcing steel using single insulated conductors or straps, exothermically welded to steel beams.
2. Cross bond all bare or reinforcing steel, using exothermic welds.
3. Make welds in accordance with manufacturer's requirements.

C. Conductors

1. Use continuous, insulated conductors, without splices, between welded connections.
2. At the end of line of bonded steel beams, connect the insulated header cable, using exothermic welds, and terminate this cable inside the test junction box as shown on Contract Drawings. Where structural beams or steel members are coated, clean and coat with coal tar epoxy after completion and cooling of welded area.

D. Test Electrode Wells and Junction Boxes

1. Bury electrodes of type and at locations shown on the Contract Drawings. Excavate and backfill holes in accordance with the manufacturer's written instructions and in accordance with the following requirements:

   a. Wet packaged electrode thoroughly before backfilling the hole.

   b. Use fine clay soil, free from stones and bricks, for backfilling.

2. Install header cables of size, and at location shown on the Contract Drawings.

3. Install test junction box of type, and at locations, shown on the Contract Drawings in accordance with Section 16135 entitled "BOXES AND FITTINGS".

4. Run electrode lead wires to test junction boxes as shown on the Contract Drawings.

5. Install size and type of conduit shown on the Contract Drawings, in accordance with the requirements of Section 16110 entitled "RACEWAYS".

6. Install cable, leaving slack in test junction boxes.

7. Use exothermic welds, sealed with cast epoxy resin encapsulation, for splices made in direct buried cable.

E. Identification

Identify all cables, in each test junction box, using fiber tags (1/16 inch thick and 3/4 inches wide) intended with letters and numbers 5/16 inch high, fastened to cables with #14 AWG weatherproof copper wire.

F. Field Tests

Test that materials are installed and connected as shown on the Contract Drawings, and as required by the Corrosion Specialist's certified design.

1. Test the complete Electrical Bonding System to ensure electrical continuity. The tests must show that the elements of the structure are electrically bonded and prepared for connection to the test box.

2. Testing shall be in accordance with NACE RP 0169 requirements.

3. All test data shall be included in a final report, prepared by the Corrosion Specialist, indicating the initial conditions, with a listing of further recommendations pertaining to the maintenance and periodic testing of the system(s).

4. The Contractor shall correct any deficiencies discovered during the tests.

END OF SECTION

SECTION 16452

BONDING

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16452A01 Shop Drawings
a. Details of bonding of structural steel and reinforcing bars encased in concrete below grade
b. Steel and concrete shop drawings, including all required welds, bonding connections and recoating or patching of protective coatings
c. Layout drawings of test electrodes, cabling and test junction boxes

Certificates

16452E01 The Electrical Bonding System design, certified by a NACE accredited Corrosion Specialist, licensed as a Professional Engineer in the state in which the work to be performed.

END OF APPENDIX "A"

DIVISION 16

SECTION 16470

PANELBOARDS

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for electrical panelboards and cabinets.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	National Electrical Manufacturers Association (NEMA)
NEMA PB 1	Panelboard
NEMA PB 1.1	General instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less
NEMA PB 250	Enclosures for Electrical Equipment (1000 Volts maximum)
NEMA AB 1	Molded Case Circuit Breakers and Molded Case Switches
NEMA AB 3	Molded case Circuit Breakers and Their Application
NEMA 280	Application Guide for Ground Fault Circuit Interrupters
NEMA AB 4	Guidelines for Inspection and Preventive Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Applications
NEMA Z535.4	Product Safety Signs and Labels
	National Fire Protection Association (NFPA)
NFPA 70	National Electric Code
	Underwriters Laboratories Inc. (UL)
ANSI/UL 67	Panelboards
ANSI/ UL 50	Cabinets and Boxes
UL 1059	Electrical Terminal Blocks
ANSI/UL 65	Electric Wired Cabinets
ANSI/ UL 486E	Equipment Wiring Terminals for Use With Aluminum and/or Copper Conductors
ANSI/UL 486A	Wire Connectors and Soldering Lugs for Use With Copper Conductors

ANSI/UL 969	Marking and Labeling systems
ANSI/UL 467	Electrical Grounding and Bonding Equipment
ANSI/UL 437	Key Locks

Federal Specifications

Panelboards, W-P-115a,c

Type 1 - Circuit Breaker Equipped

Class 1- Panelboards

Class 2 - Load Centers

Molded Case Circuit Breakers, W-C-375a,b

Fusible Switches, W-S-865c

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Panelboards shall be designed in accordance with applicable standards of ANSI, NEMA, NFPA and UL. A list of acceptable manufacturers is shown on the Contract Drawings.

B. Unless otherwise shown on the Contract Drawings, Panelboard cabinets shall meet the following environmental requirements:

1. Cabinets located in heated areas shall be NEMA Type 1.
2. Cabinets located in unheated areas or in areas subject to dust or oil, shall be NEMA Type 12.
3. Cabinets located in exterior areas or locations subject to rain, dripping liquid, or hosing shall be NEMA Type 4X, stainless steel.

C. ANSI design test shall have been made on a prototype of each type of panelboard.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Panelboards shall be delivered to the construction site complete. All circuit breakers, other electrical devices, and accessories, shall be in place and wired.

B. Panelboards and accessories shall be packaged to prevent damage due to vibration, jarring and the like during transportation and handling.

C. If any electrical devices or accessories must be shipped loose they shall be delivered in the manufacturer's original unopened protective packaging and shall be identified with suitable non-corrosive tag.

D. Store components and devices in clean and dry space, protected from weather.

E. Where possible, maintain protective covering until installation is complete and remove such covering as part of final cleanup.

F. Touch up any damage to finishes to match adjacent surfaces.

1.05 SPARE PARTS AND TOOLS

A. One set of all special tools and wrenches required for assembly or disassembly of the panelboard and the installation of breakers shall be furnished.

B. Furnish a list of recommended spare parts for each panelboard. This list shall contain the prices and availability of the spare parts recommended.

1.06 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 GENERAL

A. List of acceptable manufacturers is shown on contract drawings.

B. The size, rating, and number of circuit breaker in the panelboard shall be as shown on the Contract Drawings.

C. All panelboards, for which there are established UL standards, shall bear the UL label.

D. Location of panelboards and their approximate dimensions shall be as shown on the Contract Drawings.

E. Each panelboard shall be factory assembled, tested and shipped as a single complete unit, with all circuit breakers and buses installed, unless written permission is given by the Engineer to disassemble any parts for shipment.

2.02 CONSTRUCTION FEATURES

A. Panelboard interior

1. Panelboard interiors shall be designed and assembled so that individual breakers may be added, removed, or replaced without disturbing adjacent units and without removing main bus or brunch circuit connectors.

2. All parts shall be readily accessible and like parts shall be interchangeable insofar as possible.

3. Modifications and optional features such as silver plated copper bus, subfeed lugs, shunt trips, meters, etc., shall be as shown on the Contract Drawings.

B. Panelboard Enclosures (Cabinets)

1. The panelboard assembly shall be mounted in a galvanized steel or stainless steel enclosure (cabinets) as shown on the Contract Drawings. Cabinets and trims shall be surface-mounted or recessed installation as shown on the Contract Drawings.

2. Cabinets shall be arranged to provide side gutters 6 inches wide. Cabinets shall be provided with top and bottom gutters not less than 6 inches wide. For 400A or 600A mains, top and bottom gutters shall be 8 inches. Where feeder cables supplying the mains of a panelboard are carried through its box to other panelboards, the cabinet shall be provided with adequate additional side gutters space for the riser cable and taps.

3. The cabinet shall have a galvanized sheet-steel one-piece frame with a hinged door.

4. Recessed or flush-mounted cover frames shall extend 3/4 inch beyond each side of the cabinets and shall be set with their backs flush with the finished wall. Covers shall have adjustable trim clamps to compensate for misalignment and shall be completely concealed when door is closed.

5. Surface-mounted cover frames shall be sized to match the overall dimensions of the cabinet or flanged around to cover the edge of the cabinet.

6. Breakers and interior bus shall be covered by a removable framed trim, mounted inside the cabinet.

7. Doors shall close against a rabbet placed all around the inside edge of the frame, with a close-fitting joint between the door and frame

8. Doors shall be fitted with concealed, continuous, flush piano hinges.

9. Fastening screws on front panel shall be stainless steel and shall be of the captive, tamper proof type. Front panels shall not be removable with door in locked position.

10. Provide a metal frame with clear impact resistant plastic cover, mounted inside of each panelboard door to hold circuit directory.

C. Overcurrent protective devices and buses

1. Overcurrent protective devices shall be circuit breakers, fully rated, bolt on, thermal magnetic, inverse time delay, molded case. Breakers shall be 1, 2 or 3 pole with an integral crossbar or an internal common trip element, to assure simultaneous opening of all poles of a multi-pole circuit breaker. All circuit breakers shall meet requirements specified in the section of these Specifications entitled "OVERCURRENT PROTECTIVE DEVICES"

2. Connections of the branch circuits to the main bus shall be of the phase sequence type, that is, adjacent poles shall be of unlike polarity and rotated in sequence. This shall allow complete flexibility of circuit arrangement (1, 2 or 3 poles) to evenly balance the electrical load on each phase.

3. Main bus bars, including full capacity isolated neutral, shall have an ampere rating not less than that of the main breaker or lugs, and shall be braced for a momentary short circuit as specified on the Contract Drawings. The minimum short circuit rating shall be equal or be greater than the rating of the panelboard integrated equipment.

4. Buses shall be designed in such a manner that no machining, drilling, or tapping shall be required to change circuits or add new breakers.

5. All main and branch circuit bus shall be copper with a 1000 Amperes per square inch current density, and contact surfaces shall be silver plated and shall have no more than 200 Amperes per square inch current density.

6. A copper ground bus shall be furnished and installed by the panelboard manufacturer for equipment grounding. When shown on the Contract Drawings the Manufacturer shall install an isolated type grounding bus.

7. Main lugs shall be solderless, mechanical type and shall be secured in line with UL standards to prevent lugs from turning or loosening when incoming cables are installed.

8. Where circuit breakers with ground fault protection are shown on Contract Drawings, they shall be UL class A type and shall be identified on the panelboard.

9. Lighting fixture circuits controlled only by a circuit breaker shall each be identified by a 1 inch long by 3/4-inch high black laminated plastic nameplate with white letters.

10. Circuit breakers used for switching fluorescent lighting shall be rated and identified with a SWD tag.

2.03 ACCESSORIES

A. Nameplates

1. Provide approved nameplates on the front cover of each cabinet, indicating the panel name and number.

2. Unless otherwise shown on the Contract Drawings, fabricate nameplates from an approved type of lamacoid plastic with letters engraved on the plate in white on black background. Where letter sizes are not shown on the Contract drawings, use 1/2-inch high letters. Nomenclature shall comply with a schedule approved by the Engineer.

3. Secure nameplates on equipment with brass or stainless steel screws with locking hardware.

B. Panelboard cabinet locks

Each locked cabinet shall be furnished with a combination catch and flat lock with spring loaded type door pull. Locks shall be fitted to separate keying for each system. Furnish one key for each cabinet installed and a maximum of 20 keys per system.

C. Provide a typewritten directory identifying each brunch circuit as to the load which it serves, and install the directory in metal frame inside the panelboard door.

2.04 PAINTING

A. Surfaces to be painted shall be prepared by the removal of all grease, oil, rust, scale or other foreign material.

B. A prime coat of zinc chromate paint and two (2) finish coats of enamel paint conforming to ANSI Z 55.1 shall be applied. The gray prime and finish paints shall be a compatible finish system. In public areas the cabinets shall be painted as above, unless otherwise shown on Contract Drawings.

C. Furnish a can of touch-up paint for use after equipment is positioned.

D. Stainless steel panels shall not be painted. Galvanized panels shall be painted if shown on the Contract Drawings.

2.05 SHOP TESTS

A. Shop tests shall be in accordance with NEMA, ANSI and IEEE specifications.

B. During the period of shop drawing submission complete information outlining the test methods and procedures to be followed shall be submitted to the Engineer for approval. A copy of test forms and a set of sample computations to be used shall be furnished at the time.

C. The Engineer shall be permitted to inspect any equipment, material or work to be furnished under this specification and shall have the right to reject any parts considered defective, unsuitable for the purposes or not in accordance with these specifications.

D. The Engineer shall be notified at least two weeks before testing. This notification shall list type and number of units to be tested. The Engineer reserves the right to require additional testing or to waive factory inspection or witnessing of tests.

E. Five (5) certified copies of all test results shall be furnished to the Engineer. Certification shall be by a Professional Engineer licensed in the State in which the tests are performed, and stamped.

F. Circuit breakers shall be tested individually in the following sequence:

1. Calibration test
2. Overload performance test
3. Continuous current test
4. Endurance performance test
5. Calibration test (repeated)
6. Determination of interrupting rating
7. Dielectric test

Results of tests on prototype circuit breakers of each size and type will be acceptable.

G. Panelboards shall be marked with their maximum short circuit rating at the supply voltage. The short circuit rating of each panelboard shall be determined after complete assembly. The short circuit tests on the breakers and panelboard structure shall be made simultaneously by connecting the fault to each overcurrent device with the panelboard connected to its rated voltage source. The method of testing shall be in accordance with UL 67. The source shall be capable of supplying specified panelboard short circuit current or grater.

H. Release of equipment shall not relieve the Contractor of the responsibility of furnishing equipment conforming to all specification requirements.

PART 3. EXECUTION

3.01 EXAMINATION

A. Verify that electrical installations, structural, mechanical and other related Work satisfy the requirements for performance of the work of this Section in accordance with the Contract Documents.

B. Before delivering the equipment to the site, the Contractor shall investigate the site conditions to determine the best method of shipment, what preparatory work, if any, will be needed to bring the equipment onto the site, and what will be the best and quickest method of unloading the equipment and setting it in place.

C. Report immediately to the Engineer any electrical, structural or related construction defects in areas where control panels or cabinets are to be installed, and do not attempt to rectify any defect unless specifically instructed to do so by the Engineer.

D. Before unloading the equipment it shall be inspected for damage during shipment. Any damage shall immediately be brought to the attention of the Engineer for resolution.

3.02 PREPARATION

A. Install any channels, angles or other supports that are required to support or mount the panelboards.

B. Use supports and fasteners as specified in the Section of the Specifications entitled "SUPPORTING DEVICES" or as shown on the Contract Drawings.

3.03 INSTALLATION

A. Surface and flush mounted panelboards shall be installed with tops 6 feet-6 inches above the floor, unless otherwise shown on the Contract Drawings.

B. Panelboards shall be installed true and plumb on supporting struts and shall not be mounted directly on concrete, concrete block walls, or any other walls subject to moisture. Leave a minimum gap of 1/2 inch between the back of the enclosure/cabinet and the wall, using stainless steel hardware.

C. Where mounting directly on the wall is unavoidable the back of the enclosure shall be painted with two coats, minimum, of a bituminous paint.

D. Cables shall be neatly racked and bundled with nonflammable nylon ties, routed and supported within the enclosures/cabinets or gutters. Minimum bending radii as recommended by cable manufacturers shall not be reduced.

E. After conduits and cables are installed, the enclosures/cabinets shall be inspected for foreign materials and shall be vacuumed clean. Prior to energization the panels shall be tested as described below.

F. A typewritten directory shall be furnished and installed in the frame inside the panelboard.

3.04 FIELD TESTS

A. Visually inspect each breaker in the panelboard and operate manually.

B. Check all connections for tightness

C. Check current rating of all circuit breakers. To each pole of the circuit breakers apply current 3 times its rating, recording currents and breaker trip times. Apply rapidly increasing currents and record the value that consistently causes instantaneous tripping of the breaker. Compare these recorded times with manufacturer's time current curves.

D. Perform megger and hi-pot test on each pole.

E. All discrepancies found by the contractor shall be brought to the attention of the Engineer

F. All testing shall be performed in the presence of and as directed by the Engineer. The Contractor shall notify the Engineer when the equipment is installed and ready for testing.

END OF SECTION

SECTION 16470

PANELBOARDS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16470A01 Shop Drawings for each enclosure/cabinet shall include:

a. Data sheet for each panelboard with the following information
1. Job name
2. Item number
3. Panelboard nameplate(s) in accordance with the design drawings
4. Quantity of this panelboard configuration
5. Phase, wire and voltage
6. Main and neutral Bus material, continuous current, current density, and momentary capacity.
7. Short- circuit rating
8. Main connection information:
(1) Circuit Breaker - rating, interrupting rating, number of poles, type, manufacturer, and catalog number
(2) Lugs per phase, Cables per phase, Cable size range
(3) Location (top, bottom)
9. Thru feed lugs, subfeed
10. Ground bar with main lug on frame
11. Branch connection information:
(1) Circuit breakers rating, number of poles, type, manufacturer, and catalog number
(2) Lugs and cables per phase, Cable size range
12. Panelboard circuits breaker's arrangement for left and right side-top to bottom.
13. Panelboard overall dimensions H x W x D
14. Panelboard NEMA rating

b. Panelboard dimensional drawing. Indicate conduit entrance space at the top and bottom, knockout diagram and mounting details

c. Panelboard directory

Catalog Cuts

16470B01 Catalog Cuts

a. Panelboards and Cabinets

b. Circuit breakers

c. Family of time current characteristic curves for all types

Record Documents

16470M01 As-built Documentation acceptable to the Engineer, with typewritten copy of completed panelboard directories.

END OF APPENDIX "A"

DIVISION 16

SECTION 16475

OVERCURRENT PROTECTIVE DEVICES (600 VOLTS OR LESS)

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for overcurrent protective devices.

B. The types of overcurrent protective devices specified in this Section are:

1. Low Voltage Power Air Circuit Breakers
2. Molded Case Circuit Breakers
3. Safety Switches
4. Fuses

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American National Standards Institute (ANSI)
ANSI C 37.13	Low Voltage AC Power Circuit Breakers used in enclosures
ANSI C 37.16	Related Requirements and application recommendation for Low Voltage Power Circuit Breakers
ANSI C 37.50	Test Procedures for Low Voltage AC Power Circuit Breakers
ANSI C 97.1	Low Voltage Cartridge Fuses 600 Volts or Less
	National Electrical Manufacturers Association (NEMA)
NEMA AB-1	Molded Case Circuit Breakers and Molded Case Switches
NEMA KS-1	Enclosed Switches
	National Fire Protection Association (NFPA)
NFPA 70	National Electrical Code
	Underwriters Laboratories Inc. (UL)
UL 98	Enclosed and Dead Front Switches
UL 198	Safety Standard for Fuses
UL 489	Molded Case Circuit Breakers and Circuit Breaker Enclosures
UL 943	Standard for Ground Fault Circuit Interrupters

Federal Specifications (FS)

W-C-375B/Gen	Circuit Breakers, Molded Case; Branch Circuit and Service
FSW –S-865	Covers Surface-mounted, Air-break, Box or Enclosed Switches for Ratings through 500 Volts, 1200 Amperes and 50 Horsepower

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

The overcurrent protective devices and associated materials shall conform to all applicable standards, and shall also conform to the requirements specified herein and shown on the Contract Drawings.

1.04 QUALITY ASSURANCE

Overcurrent protective devices of types and ratings required, shall have been satisfactorily used for purposes similar to those intended herein for not less than three years.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Overcurrent protective devices to be installed in an assembly, as shown on the Contract Drawings, shall be mounted in the assembly and delivered in accordance with the manufacturer's specifications for such assembly.

B. Overcurrent protective devices to be installed in their own enclosures, as shown on the Contract Drawings, shall conform to the following requirements:

1. Enclosures shall be packaged with material to prevent damage to components due to vibration, jarring and the like during transportation and handling.

2. Enclosures shall be delivered in the manufacturer's original, unopened, protective packaging and shall be identified with suitable non-corrosive tags.

C. Where possible, maintain protective coverings until installation is complete and remove such coverings as part of the final cleanup.

1.06 SUBMITTALS

See Appendix "A" for submittal requirements.

1.07 SPARE PARTS

Furnish a minimum of three but not less than 10% spare fuses of each type and rating required and shown on the Contract Drawings.

PART 2. PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with the requirements of this Section, provide low voltage power circuit breakers, molded case circuit breakers, safety switches and fuses of one of the manufacturers specified on the Contract Drawings.

2.02 MATERIALS

A. General

1. Location, types, sizes, ratings and enclosures for overcurrent protective devices are shown on the Contract Drawings.

2. Overcurrent protective devices mounted in their own enclosures as shown on the Contract Drawings shall conform to the requirements of NEMA, UL, and NFPA. Enclosures shall be as specified in the Section of these Specifications entitled "PANELBOARDS ".

3. Overcurrent protective devices, to be installed as part of an assembly unit, shall be installed in accordance with the manufacturer's requirements for the specified assembly or as shown on the Contract Drawings.

4. Overcurrent protective devices and enclosures for which there are established UL standards, shall bear the UL label.

B. Low Voltage Power Air Circuit Breakers

1. General

a. All circuit breakers shall be 3 pole, single throw, 600V AC class, 60 Hz, trip free, with stored energy closing. Controls shall be as shown on the Contract Drawings.

b. Circuit breakers shall be of the draw-out type with self-aligning fingers to engage the line and load primary terminals.

c. The draw-out mechanism shall firmly support the breaker from the fully connected to the fully disconnected positions and shall be so designed as to permit racking the breaker without opening the door in all three positions: connected, test, and disconnected.

d. Interlocks shall be provided to prevent racking the breaker from the connected position to the test or disconnected position, or moving the breaker into the connected position while the breaker is closed.

e. Required circuit breaker sizes and ratings shall be as shown on the Contract Drawings.

f. In addition to all contract requirements to achieve the operation indicated on the Contract Drawings and specifications, provide the following spare contacts rated 125 VDC, 20 amperes continuous.

(1) A minimum of two normally open and two normally closed contacts, which shall operate when the breaker is in the fully connected position.

(2) A minimum of one normally open and one normally closed contacts, which shall operate when the breaker is withdrawn from the fully connected position. Contacts shall be rated 125V DC, 20 amperes continuous.

g. Provide a position indicator visible from the front of the switchgear for each breaker to indicate whether the breaker is open, tripped or closed.

h. Tripping shall be through integrally mounted solid state overcurrent and short circuit trip units with adjustable settings for long time, short time and instantaneous trip unless otherwise shown on the Contract Drawings.

2. Manually Operated Breakers

a. Provide manually operated circuit breakers with a front mounted handle to manually charge the stored energy closing mechanism.

b. Breakers shall be mechanically trip free and shall be furnished with provisions for the future addition of a control solenoid for remote closing.

c. Provide a mechanical trip and close button on the front of each breaker.

d. Provide a maintenance handle for slow closing during contact adjustment.

3. Electrically Operated Breakers

a. Provide electrically operated breakers with a motor- operated, stored-energy, closing mechanism. Motor voltage shall be as shown on the Contract Drawings.

b. Breakers shall be electrically and mechanically trip-free and each shall be provided with an electrically operated spring release to close the breaker.

c. Provide a mechanical trip button on the front of each breaker.

d. Provided an electrical close button or control switch on the front of each breaker.

e. Provide a maintenance handle for slow closing during contact adjustment.

f. Provide breakers with a shunt trip device for remote operation, arranged for both local and remote control of the closing and tripping functions.

4. Fused Circuit Breakers

a. Where shown on the Contract Drawings, fused circuit breakers shall be provided.

b. The fuses shall be current limiting type and shall be integrally or separately mounted units coordinated with overcurrent trip devices so as to avoid unnecessary blowing of the fuses.

c. Fused breakers shall have a blown fuse indicator and lockout device. The lockout device shall trip all phases upon blowing and prevent the breaker from being closed with any fuse element blown. Operation of the breaker shall not be permitted by this device until the fuse is replaced and the lockout reset.

d. The blown fuse indicator shall be visible from the front of the breaker and shall indicate which fuse has blown.

e. When a Protective Device Coordination Study is performed, the fuse rating shall be in accordance with the requirements of the protective study.

C. Molded Case Circuit Breakers

1. General

a. Molded case circuit breakers for panel or individual mounting shall be molded-case type, quick-make and quick-break on manual or automatic operation. The handle mechanism shall be trip-free to prevent holding contacts closed on a fault. Tripping shall be indicated by the handle automatically assuming a position between the manual "off" and "on" positions.

b. Molded case circuit breaker contacts shall be of the high-pressure type and shall be made of a silver composition material. Arc shields shall be provided to confine, cool, and quench the arc drawn at interruption.

c. Continuous ampere ratings and number of poles shall be as shown on the Contract Drawings.

d. Molded case circuit breakers shall be bolt-on type. Unless otherwise shown on the Contract Drawings or as required by the system interrupting rating, all 120V or 208V circuit breakers shall have a minimum short circuit interrupting rating of not less than 10,000 amperes (RMS symmetrical) and all 277V or 480V breakers shall have a minimum short circuit interrupting rating of not less than 18,000 amperes (RMS symmetrical).

e. All molded case circuit breakers feeding 120V or 277V lighting circuits that are not controlled by local wall switches shall be UL approved type "SWD" circuit breakers.

f. Each molded case circuit breaker shall be suitable for the circuit on which it is applied and the load that it controls.

g. Accessories including, but not limited to, auxiliary switches, shunt trips, undervoltage trips, ground fault sensing and tripping shall be as shown on the Contract Drawings.

2. Thermal-Magnetic Circuit Breakers

a. Circuit breakers up to, but not including 400 amperes shall be thermal magnetic trip. Electronic trip circuit breakers rated 100 amperes or higher may be provided in lieu of thermal magnetic type.

b. Automatic operation of the molded case circuit breaker shall be obtained by means of calibrated thermal and magnetic tripping devices for each pole of the breaker. The thermal device shall provide time-delay tripping on overloads, and the magnetic device shall provide instantaneous tripping on short circuits. The instantaneous magnetic trip shall be adjustable and accessible from the front of the breaker on frame sizes above 100 amperes.

3. Electronic Trip Circuit Breakers

a. Circuit breakers rated 400 amperes and higher shall be electronic trip.

b. The integral trip system shall be independent of any external power source and shall contain industrial grade electronic components as a minimum.

c. Circuit breakers shall be equipped with back-up thermal magnetic trip system unless otherwise indicated on the Contract Drawings.

d. Circuit breaker trip system shall be a microprocessor based true rms sensing design.

e. The sensor size rating plug and adjustment positions shall be clearly marked on the face of the circuit breaker.

f. The following time/current adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent of all other adjustments.

Long time pick up
Long time delay
Short time pick up
Short time delay
Instantaneous pick up
Ground fault pick up
Ground fault delay

g. A means to seal the trip unit adjustments in accordance with NEC shall be provided.

h. Local visual trip indication for overload short circuit and ground fault trip occurrences shall be provided.

D. Safety Switches

1. Safety switches shall conform to NEMA KS-1, UL 98 and FSW-S-865.

2. Safety switches shall conform to the NEMA classification and shall be rated, as shown on the Contract Drawings.

3. Safety switches utilized for service entrance shall include a groundable insulated neutral.

4. Safety switches shall be of the quick-make, quick-break type with terminals suitable for copper conductors, shall be padlockable in the "off" position and shall be equipped with defeatable door interlocks.

E. Fuses

1. Fuses shall be of the class, size and ratings (current, voltage, interrupting capacity, type, NEMA class) as shown on the Contract Drawings.

2. Fuses shall conform to UL 198 and ANSI C97.1 for low voltage fuses.

3. Unless otherwise shown on the Contract Drawings, fuses used in conjunction with motor protection shall be current limiting, dual element, time-delay type.

PART 3. EXECUTION

3.01 INSTALLATION

A. General

Unless otherwise shown on the Contract Drawings, overcurrent protective devices shall be installed in conformance with NFPA 70, and UL 98, in accordance with the manufacturer's instructions and in accordance with the requirements of this Section.

B. Fuses

1. All fuses rendered inoperative during the Work shall be replaced before the issuance of the Certificate of Final Completion.

2. All replacement fuses shall be provided in addition to the spare fuses specified in 1.07 herein.

END OF SECTION

SECTION 16475

OVERCURRENT PROTECTIVE DEVICES (600 VOLTS OR LESS)

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16475A02 Circuit breakers; time-current curves.

Catalog Cuts

16475B01 Low Voltage Power Air Circuit Breakers.

16475B02 Molded case circuit breakers.

END OF APPENDIX "A"

DIVISION 16

SECTION 16477

PROTECTIVE DEVICE COORDINATION STUDY

PART 1. GENERAL

1.01 REFERENCES

The following is a listing of publications referenced in this Section.

	American National Standards Institute (ANSI)
ANSI C 37.91	Protective Relay Applications of Power Transformers
	Institute of Electrical and Electronics Engineers Inc. (IEEE)
IEEE 242	Protection and Coordination of Industrial and Commercial Power Systems
	National Fire Protection Association (NFPA)
NFPA 70	National Electrical Code

1.02 QUALITY ASSURANCE

A. The PDCS shall be certified by a Professional Engineer licensed in the State where the installation will take place. The qualifications of the Professional Engineer shall be submitted for review and approval by the Engineer.

B. Entities performing the Work of this Section shall have experience on at least two projects involving complexities similar to those required under this Contract.

1.03 SUBMITTALS

For submittals see Appendix "A".

PART 2. PRODUCTS

2.01 COORDINATION STUDY

Unless otherwise shown on the Contract Drawings, the PDCS shall start from the designated connection point and shall include all protective devices and circuit elements shown on the Contract Drawings. In general, such devices and elements shall include, but not be limited to conductors, high voltage fuses or circuit breakers, transformers, low voltage switch-gear, fuses, circuit breakers, panel boards, motor control centers, transfer switches, and all or switching devices within the distribution system. This requirement shall apply to both AC and DC systems. The PDCS shall conform to the requirements of ANSI C37.91, IEEE 242, NFPA 70, and this Section.

A. Short Circuit Analysis

The Short Circuit Study will be considered a part of the PDCS. The Short Circuit Study shall be performed by using a computer software DAPPER or A_FAULT by SKM Systems Analysis. Results of such a study shall be provided on hard copy as well as on a floppy disk.

1. The short circuit analysis shall study the distribution protective and switching devices and conductors, for both continuous and fault current capabilities. This shall include the ability of the devices and conductors to withstand fault current until the protective devices operate.
2. The short -circuit analysis shall analyze the electrical system, to identify the maximum short circuit values available at each protective device and on the conductors within the system.
3. The short circuit analysis shall be based on the characteristics of the equipment, conductors, raceways and routings actually used in the construction.
4. The short circuit analysis shall be based on the actual available short circuit from the utility at the designated connection point.

B. Protective Device Coordination Analysis

The Protective Device Coordination Analysis shall be performed by using the latest version of the computer software called CAPTOR by SKM Systems Analysis. Results of such a study shall be provided on hard copy as well as on a floppy disk.

1. The analysis shall clearly define the proposed coordination among the devices which include, circuit breakers, overcurrent relays, fuses, transformers, motor sand cable damage curves, magnetizing inrush currents, fault currents and currents related to each device's proposed ratings and settings.
2. The analysis shall establish the settings necessary to selectively isolate faults or failures from the remainder of the electrical system with minimum power interruption.

C. Coordination Plots

The coordination plots shall graphically demonstrate the proposed coordination for the electrical system, plotted on ANSI standard, full-sized, log-log forms such as Time-Current Characteristic forms by Keuffel & Esser Co. The coordination plots shall be plotted on a plotter. No hand drawn plots shall be accepted.

1. The plots shall define the types of protective devices selected, together with the CT ratio selected, proposed taps, time-dial and instantaneous settings.

2. All the coordination plots shall be submitted on hard copies as described above, as well as on computer floppy disks suitable for the approved protective device coordination software as defined section "B" above. In addition, the individual Time-Current Characteristic curves of all the protective devices used in the study shall be provided on a computer floppy disk in the proper format as well as original manufacturer's curves for future reference by the Authority.

3. The coordination plots shall include complete titles, representative one-line diagrams, associated system characteristics, complete parameters for transformers and complete operating bands for distribution circuit breaker trip devices and fuses.

   a. The long-time region of the plots shall designate the pickups required for the circuit breakers.

   b. The short -time region shall indicate the magnetizing inrush, and ANSI transformer withstand parameters, the circuit breaker ground -fault, short -time and instantaneous trip settings, fuse minimum melting and total clearing time, tolerance bands and symmetrical fault currents.

   c. Molded case circuit breakers shall be separated from each other and the associated upstream and downstream protective devices by a current or time margin for coordination and protection in the event of secondary faults.

   d. The protective device characteristics or operating bands shall be suitably terminated to reflect the actual symmetrical fault currents sensed by the device.

   e. Each primary protective device required for delta-to-wye connected transformers shall be selected so that the characteristics or operating bands are within the transformer parameters, which shall include a parameter equivalent to 58 percent of the withstand point to afford protection for secondary line -to-ground faults. The transformer damage curve shall be included for the transformer when the selected protective device is not within the associated parameters.

   f. The coordination plots shall include the damage curves for the transformers, cables and rectifiers. Actual curves provided by the manufacturers of the respective equipment shall be where ever possible.

4. The Authority will furnish settings and fault impedances up to the first level of the upstream protective devices owned by the Authority.

5. The PDCS shall take into account the general characteristics and requirements for the wires, cables, motors, transformers, circuit breakers, rectifiers and any other high and low voltage equipment.

6. All specific equipment characteristics shall be determined in accordance with the results of the PDCS. Report to the Engineer any conditions within the Work, or within equipment not installed under this Contract, where the study recommendations, as approved by the Engineer, require equipment types or sizes other than the requirements of the Specifications, or as shown on the Contract Drawings. The Contractor's compensation for completing such changes, at the direction of the Engineer, will be determined in accordance with the clause of the Contract providing compensation for Extra Work.

7. The study shall include verification of equipment ratings and settings. The results of the study shall be coordinated with the shop drawings required by various other Sections of the Specifications. The Contractor shall maintain the PDCS up-to-date with any Contract changes that affect the study recommendations, and shall submit the revised PDCS for approval by the Engineer.

END OF SECTION

SECTION 16477

PROTECTIVE DEVICE COORDINATION STUDY

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Qualifications

16477K01 Submit in advance, to the Engineer, for approval, the qualifications of the Professional Engineer specified in 1.02 A.

Record Documents

16477M01 Submit six bound copies of an initial protective device coordination analysis and short circuit study. Submit revised copies of the study in accordance with the requirements of 2.01.

END OF APPENDIX "A"

DIVISION 16

SECTION 16541

AIRPORT ELEVATED RETROREFLECTIVE TAXIWAY EDGE MARKERS

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for airport elevated retroreflective taxiway edge markers.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

Federal Aviation Administration, Advisory Circular (FAA-AC)

FAA-AC 150/5345-39	Runway and Taxiway Retroreflective Markers FAA Specification (L-853).

1.03 QUALITY ASSURANCE

A. Entities performing the Work of this Section shall have experience on at least two projects involving complexities similar to those required under this Contract.

B. Before markers are installed, they shall meet the requirement of a successful one-year test installation at an Authority airport.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, protective packaging.

B. Store materials in original packaging in a manner to prevent soiling and physical damage, prior to installation.

C. Handle in a manner to prevent damage to finished surfaces.

D. Where possible, maintain protective coverings until installation is complete and remove such coverings as part of final cleanup.

1.05 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 CONSTRUCTION FEATURES

A. Elevated Retroreflective Taxiway Edge Markers

1. Elevated retroreflective taxiway edge markers shall consist of a cylindrical plastic tube, 30 inches long by 2-3/4 inches in diameter and shall be equipped with four plastic, reflective bands, 4 inches high, spaced at 1-1/2-inch intervals beginning 1-1/2 inches from the top end of the tube. The marker shall comply with FAA-AC 150/5345-39 and shall be approved under FAA Specification L-853. Edge markers shall be the following types, as shown on the Contract Drawings.

   a. Type 'A': For socket mounting in a 3 inch core drilled hole or pipe.

   b. Type 'B': For flange mounting, by nailing or adhesive bonding to paved surfaces.

2. Elevated retroreflective taxiway edge markers shall consist of blue colored tubes with yellow bands, unless otherwise shown on the Contract Drawings.

B. Vinyl tape shall be 1-1/2 inches wide, 8.5-mils thick, black polyvinyl chloride, Scotch (3M) No. 88, or approved equal.

2.02 SHOP TESTS

Qualification tests shall be run on markers in accordance with the requirements of FAA-AC 150/5345-39.

PART 3. EXECUTION

3.01 INSTALLATION

A. Employ the services of a Land Surveyor licensed in the State where the Work is to be performed to establish the exact locations of the markers whose general locations are shown on the Contract Drawings.

B. Install markers in accordance with FAA-AC 150/5345-39, and manufacturer's installation procedures and as shown on the Contract Drawings.

1. Type 'A' markers shall be installed in core-drilled holes or pipes, of the depth and diameter shown on the Contract Drawings. Apply vinyl tape around the marker at the base and force-fit into the hole or pipe to prevent entrance of water and to support markers in a straight and upright position.

2. Type 'B' markers shall be nailed-down or glued-down, using fasteners or adhesive approved by the Engineer.

END OF SECTION

SECTION 16541

AIRPORT ELEVATED RETROREFLECTIVE TAXIWAY EDGE MARKERS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16541A01 Installation procedures for elevated retroreflective taxiway edge markers.

Catalog Cuts

16541B01 Catalog cuts
a. Elevated retroreflective taxiway edge markers
b. Vinyl tape
c. Fasteners
d. Adhesives

END OF APPENDIX "A"

SECTION 16542

TAXIWAY / RUNWAY LIGHT FIXTURES

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies requirements for light fixtures, light bases and accessories for Taxiway and Runway Lighting Systems.

1.02 DESIGN AND PERFORMANCE REQUIREMENTS

A. Taxiway and Runway Lighting Systems shall be furnished and installed in accordance with this Section, and as indicated on the Contract Drawings.

B. Components of the taxiway / runway lighting systems shall also be manufactured and installed to meet all of the applicable requirements of FAA Advisory Circulars and all local codes.

1.03 RELATED SECTIONS

A. Section 16450 – Grounding

1.04 REFERENCES

A. ASTM International (ASTM)

1. A123 / A123 M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2. A572 / A572 M – Standard Specifications for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Sheet
3. D6000 - Standard Specification for Joint Sealants, Hot Applied, for Concrete and Asphalt Pavements

B. Federal Aviation Administration, Advisory Circular (FAA-AC)

1. 150/5340-30 – Design and Installation Details for Airport Visual Aids
2. 150/5345-26 – Specification for Plug and Receptacle Cable Connectors (FAA Specification L-823)
3. 150/5345-42 – Specification for Airport Light Base and Transformer Housings, Junction Boxes, and Accessories
4. 150/5345-46 – Specification for Runway and Taxiway Light Fixtures
5. 150/5345-47 – Specification for Series to Series Isolation Transformers for Airport Lighting Systems
6. 150/5370-10 – Standards for Specifying Construction of Airports

C. Federal Specifications (FS)

1. SS-S-1401 – Sealing Compound, Hot Applied for Concrete and Asphalt Pavements

D. Insulated Cable Engineers Association (ICEA)

1. S-68-516 – Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

E. Institute of Electrical and Electronics Engineers (IEEE)

1. 383 – Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations

F. National Fire Protection Association (NFPA)

1. 70 – National Electrical Code

G. Underwriters Laboratories Inc. (UL)

1. 44 - Thermoset-Insulated Wires and Cables
2. 83 – Standard for Thermoplastic-Insulated Wires and Cables

1.05 SUSTAINABLE DESIGN REQUIREMENTS

A. Not Applicable

1.06 QUALITY ASSURANCE

A. Entities performing the Work of this Section shall have experience on at least two projects involving complexities similar to those required under this Contract.

B. Before any light fixture type is installed in a permanent installation, it shall meet the requirement of a successful one-year test installation at an Authority airport.

1.07 SUBMITTALS

A. See Appendix "A" for submittal requirements

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturers' original, unopened, protective packaging.

B. Store material in a clean, dry space and protect it from the weather.

C. Handle in a manner to prevent damage to finished surfaces.

D. Where possible, maintain protective coverings until installation is complete and remove such coverings as part of final cleanup.

PART 2. PRODUCTS

2.01 LIGHT FIXTURES

A. General

1. Quantity, type location, beam direction (unidirectional, bidirectional or omni-directional), and other requirements of light fixtures shall be as shown on the contract drawings.
2. Lamp type, wattage, and filter color shall be as shown on Contract Drawings.
3. Light fixtures and components for which there are established UL standards, shall be UL listed and shall bear the Underwriters Laboratories Inc. (UL) label.
4. Light fixtures shall be furnished completely, assembled and, unless otherwise shown on the Contract Drawings, shall be furnished with tow 40-inch leads terminated in an FAA Specification L-823 two pole plug, and one color-coded green ground wire.
5. Light fixtures shall comply with environmental, photometric, dimensional and other requirements specified in the latest edition of FAA-AC 150/5345-46.

B. Runway In-pavement Light Fixtures

1. General

a. Runway in-pavement fixtures shall have a light assembly that produces a beam with color and photometric distribution as specified in FAA-AC 150/5345-46. Unless otherwise noted on the Contract Drawings, the casting that houses the light assembly shall be high strength Nickel-Molybdenum alloy. The casting shall be a single piece construction or an inset type with an adapter ring.

b. Runway in-pavement fixtures shall be connected to the light bases by means of six threaded bolts (3/8" – 16 Stainless Steel Grade 304 (18-8)) length as required unless otherwise noted on Contract Drawings. Studs or other spacers are not permitted for the runway fixtures.

2. Runway Centerline Light Fixtures; L-850A

a. Each such fixture shall have a light assembly that produces a narrow bidirectional beam and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings. The lamp life shall be rated at minimum of 5000 hours if operated at brightness Step III.

3. Runway Touchdown Zone Light Fixtures; L-850B

a. Each such fixture shall have a light assembly that produces a narrow bidirectional beam and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings. The lamp life shall be rated at a minimum of 5000 hours if operated at brightness Step III. Each casting shall have a directional 4° toe-in arrow stamped in window area that denotes a location of the runway centerline.

4. Runway Edge Light Fixtures; L-850C

a. Each such fixture shall have a light assembly that produces a bidirectional narrow beam and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings.

5. Runway Threshold / End Light Fixtures; L-850D

a. Each such light fixture shall have light assembly that produces a narrow unidirectional or bidirectional beam and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings. The beam shall be toed-in 32° towards the runway centerline.

6. Approach Threshold Light Fixture; L-850E

a. Each such fixture shall have a light assembly that produces a wide unidirectional beam and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings.

C. Taxiway In-pavement Light Fixtures

1. General

a. Taxiway in-pavement fixture shall have a light assembly that produces a beam with color and photometric distribution as specified in FAA-AC 150/5345-46. Unless otherwise noted on the Contract Drawings, the casting that houses the light assembly shall be high strength Nickel-Molybdenum alloy. The casting shall be a single piece construction or an inset type with an adapter ring.

2. Taxiway Centerline Light Fixtures, narrow beam fixtures; straight sections; L-852A & L-852C

   a. Each such fixture shall be Style III and shall have a light assembly that produces a narrow beam, is uni/bi-directional and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings.

3. Taxiway Centerline Light Fixtures, wide beam fixtures; curved sections; L-852B & L-852D

   a. Each such fixture shall be Style III and shall have a light assembly that produces a wide beam, is uni/bi-directional and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings.

4. Omni-Directional Fixtures; L-852E

   a. Each such fixture shall have a light assembly that produces an omni-directional light and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings. The casting that houses the assembly shall be totally flush.

5. Omni-Directional Fixtures; L-852F

   a. Each such fixture shall have a light assembly that produces an omni-directional light and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings. The casting that houses the assembly shall be totally flush.

6. Runway Guard Fixtures; L-852G

   a. Each such fixture shall have a light assembly that produces an unidirectional, alternately flashing light and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings.

7. Omni-Directional Taxiway Edge Light Fixtures; L-852T

   a. Each such fixture shall have a light assembly that produces an omni-directional light and utilizes a quartz halogen lamp rated at 6.6 amperes or otherwise indicated on Contract Drawings. The casting that houses the assembly shall be totally flush.

D. Elevated Light Fixtures

1. Elevated Runway Guard Light Fixtures; L-804

   a. Each such fixture shall be furnished with breakable couplings and stems to provide for an overall height of 24 inches, or otherwise indicated on Contract Drawings. The light source shall be two alternately flashing 100-watt quartz halogen lamps or otherwise indicated on Contract Drawings. Fixture shall be supplied with external ON/OFF switch, tether, and anti-rotation locking plate, or otherwise indicated on Contact Drawings.

2. Elevated Runway / Taxiway Light Fixtures; L-861

a. Each such fixture shall be furnished with breakable couplings and stems to provide for an overall height of 24 inches, or otherwise indicated on Contract Drawings. The light source shall be a 45-watt quartz halogen lamp or otherwise indicated on Contract Drawings; housed in a glass globe with 360 degree, internal blue filter or otherwise indicated on Contact Drawings.

3. High Intensity Runway Edge Light Fixtures; L-862

a. Each such fixture shall be furnished with breakable couplings and stems to provide an overall height of 12 inches above the surface or otherwise indicated on Contract Drawings. The light source shall be a 120-watt quartz halogen lamp or otherwise indicated on Contract Drawings; housed in a glass globe with internal lens assembly 180/360 degree internal color filters.

4. Runway End / Threshold Light Fixtures; L-862E

a. Each such fixture shall be furnished with breakable couplings and stems to provide for an overall height of 12 inches above the surface. The light source shall be a 200-watt quartz halogen lamp or otherwise indicated on Contract Drawings; housed in a glass glove with internal lens assembly and 180/360 degree internal color filters.

E. Accessories

1. Isolation Transformers; L-830

a. Isolation transformers shall be rubber encapsulated, 5000-volt rated, series to series, with primary ampere rating as shown on the Contract Drawings, and a 6.6-ampere secondary. The wattage rating shall be as shown on the Contract Drawings. The flanged receptacle on the secondary cable shall conform to FAA Specification L-823, Type II, Class A, and Style 8. Transformers shall comply with FAA-AC 150/5345-47 and shall conform to FAA Specification L-830.

2. Ground Rods

a. Ground rods shall be copper bonded with diameters and lengths as specified in Specification Section 16450 or otherwise shown on Contract Drawings.

3. Single Pole Plug and Receptacle Connectors; L-823

a. Single pole plug and receptacle connectors for 5000-volt series lighting cable shall comply with FAA-AC 150/5345-26 and shall conform to FAA Specification L-823, Type I, Class B, Style 3 or Style 10.

4. Double Pole Plug and Receptacle Connectors; L-823

a. Double pole plug and receptacle connectors for 600-volt secondary system shall comply with FAA-AC 150/5345-26 and shall conform to FAA Specification L-823, Type II, Class B, Style 4 or Style 11.

2.02 LIGHT BASES

A. General

1. Quantity, type, location and other requirements of light bases shall be as shown on the Contract Drawings.
2. All electrical materials and equipment for which there are established UL Standards, shall bear the UL label.

B. Base Cans and Extensions for In-pavement Light Fixtures; L-868

1. Base Cans
   a. Base cans shall be 12-1/2 inches in outside diameter, of ASTM A 123 / A 123M hot-dipped galvanized steel, with 1/4-thick bottom plate protruding a minimum of 3/16 of an inch outward from the outside face of the cylindrical wall with six, 5/8-inch long, 3/8-inch deep steel ribs welded radially on its underside, or as otherwise shown on Contact Drawings.
   b. A ground lug shall be provided to accept a # 6 AWG grounding cable as shown on the Contract Drawings.
   c. The base can overall depth shall be as shown on Contract Drawings and shall be provided with grommet openings for conduit entrance as shown on the Contract Drawings.
   d. The top flange shall have twelve, 3/8-inch diameter tapped holes, equally spaced on an 11-1/4-inch bolt circle to accept the mounting of top section base can. The base can shall comply with FAA0AC 150/5345-42 and shall conform to FAA Specification L-868.

2. Base Can Extensions
   a. Base can extensions shall be 12-1/2-inches in outside diameter, of ASTM A 123 / A 123M hot-dipped galvanized steel, with provision on the top flange for twelve, 3/8-inch diameter tapped holes, equally spaced on a 11-1/4-inch bolt circle, to accept a taxiway centerline fixture mounting. Or as otherwise shown on Contract Drawings.
   b. The bottom of the can shall be provided with six, 7/16-inch diameter holes equally spaced on a 11-1/4-inch bolt circle and six 3/8-inch with 16 threads per inch (TPI), grade 304 stainless steel bolts (18-8), and two piece 304 stainless steel (18-8) anti-rotational Nord-Lock washers. Bolt shall be of proper length for mounting to the top of the bottom section base can. The exact depth of the top section base can shall be determined from field measurements. Minimum depth shall be 2 inches. The base can shall comply with FAA-AC 150/5345-42 and shall conform to FAA Specification L-868.

C. Base Cans for Elevated Edge Light Fixtures; L-867

1. Base cans shall be 12-1/2-inches in outside diameter, of ASTM A123 / A 123M hot-dipped galvanized steel, with a minimum 1/8-inchthick bottom plate protruding a minimum of 3/16 inches outward from the outside face of the cylindrical wall with six, 5/8-inch long, 3/8-inch deep steel ribs welded radially on its underside.
2. A 3/8-inch by 2-inch bar shall be welded around the circumference at the top of the can. The top flange shall be provided with six, 3/8-inch diameter tapped holes, equally spaced on a 10-1/4-inch bolt circle for mounting of the base plate.
3. The bas can overall depth shall be shown on the Contract Drawings and shall be complete with grommet openings for conduit entrance as shown on the Contract Drawings.

4. A ground lug shall be provided to accept a # 6 AWG ground cable. Additional requirements shall be as shown Contract Drawings.
5. The base can shall comply with FAA-AC 150/5345-42 and shall conform to FAA Specification L-867.

D. Type I Marker Light Boxes; L-867

1. Type I boxes shall be of reinforced concrete construction and shall be 15 inches wide by 36 inches long (inside dimensions) with a depth as shown on Contract Drawings.
2. The steel cover shall be capable of accepting a bas plate for an elevated taxiway, edge light fixture.
3. All ancillary equipment and additional requirements shall be as shown on the Contract Drawings. Precast boxes may be substituted for those shown on the Contract Drawings subject to approval of the Engineer. All precast boxes shall meet the same requirements as specified herein and as shown on the Contract Drawings.

E. Type III Marker Light Boxes; L-867

1. Type III boxes shall be concrete encased ASTM A 123 / A 123M hot-dipped galvanized steel base cans 17-1/4-inches in diameter by 20 inches deep. A 3/8-inch by 2-inch bar shall be welded around the circumference at the top of the can.
2. Boxes shall be provided with 2-inch couplings at 180 degrees at the bottom of the box.
3. A ground lug shall be welded on the inside wall of the box and a1-3/8-inch diameter hole shall be provided at the bottom of the base for the installation of a ground rod. The hole shall be plugged with a solid neoprene plug.
4. Requirements shall be as shown on the Contract Drawings. Boxes shall comply with FAA-AC 150/5345-42 and shall conform to FAA Specification L-867.

F. Base Plates for Elevated Edge Light Fixtures

1. Base plates shall be ASTM A 572 / A 572M, Grade 50 Steel, 12 inches in diameter and 1/2-inch thick, complete with 1-1/2 or 2-inches threaded conduit hub, gasket, 304 Grade Stainless steel bolts (18-8), and a connector clamp capable of supporting an FAA Specification L-823 flanged secondary receptacle.
2. Base plates shall have six, 7/16-inch holes on a 10-1/4-inch bolt circle, except for Type III marker box, which shall have 14-1/4-inch bolt circle.

G. Flanged Secondary Receptacles; L-823

1. Flanged secondary receptacles shall be clamped to the underside of the taxiway edge light base plate, where required, and have two #14 AWG, 15-inch long pigtails molded, under one jacket, to the receptacle body.
2. Receptacles shall comply with FAA-AC 150/5345-26 and shall conform to FAA Specification L-823, Type II, Class A, and Style 8.

H. Flange Rings for L-868 Cans

1. Flange rings shall be composed of a 12-1/8-inch by ¾-inch thick ASTM A 123 / A 123M zinc plated steel ring containing six, 7/16-inch diameter holes equally spaced at 60-degree intervals on an a11-1/4-inch bolt circle.
2. Flange rings shall have an indented 'O' ring gasket shall be furnished with the flange ring to render the unit weatherproof.

3. An 1/8-inch thick ASTM A 123 / A 123M zinc plated steel ring shall be continuously welded to the outside edge of the flange ring providing an overall height of 1-1/8-inches and an overall outside diameter of 12-3/8-inches.

I. Temporary Mud Covers for L-867 and L-868 Cans

1. Temporary mud covers shall be 12-3/8 inches in outside diameter containing six, 7/16-inch diameter holes on an 11-1/4-inch bolt circle for L-868 cans and 10-1/4-inch bolt circle for L-867 cans.
2. Mud covers shall be made of a 1/8-inch thick, hot-dipped galvanized steel plate with three raised concentric rings, two one-inch thick knockouts about the center, and an indented center point mounted on a 5/8-inch thick exterior grade plywood cover.

J. Spacer Rings for L-868 Cans

1. Spacer rings shall be 12 inches in outside diameter, 1/8-inch thick zinc coated steel or 1/4-thick hot-dipped galvanized steel, or other sizes as required or otherwise indicated on Contract Drawings.
2. Spacer rings shall have a 10-inch diameter hole and six, 7/16-inch diameter holes equally spaced on an 11-1/4-inch bolt circle.

K. Blank Cover Plates for L-867 and L-868 Cans

1. Blank cover plates for FAA L-867 and L-868 cans shall be 12 inches in outside diameter and of ½-inch thick ASTM A 572 / A 572M, Grade 50 hot-dipped galvanized steel with six, 7/16-inch diameter holes on a 10-1/4-inch bolt circle for L-867 cans and 11-1/4-inch bolt circle for L-868 cans.

2.03 MISCELLANEOUS MATERIALS

A. Flexible Non-Metallic Conduit

1. Flexible non-metallic conduit shall be made up of polyvinyl chloride smooth inner core, a reinforcing nylon mesh and polyurethane outer jacket.
2. Fittings shall be of a type designated to provide a liquid tight continuation of the conduit system as per manufacturer's recommendations.

B. Hot Rubberized Asphalt Sealer

1. Hot rubberized asphalt sealer shall conform to Federal Specification SS-S-1401C (1) and ASTM D 6690.

C. Adhesive Sealant

1. Adhesive sealant shall be as shown on the Contract Drawings.

D. Cement Compound

1. Cement compound shall be a two-component adhesive compound and shall comply with the requirements of FAA-AC 150/5370-10, P-606

E. Concrete and Grouting

1. Concrete and grouting shall be in accordance with applicable Section(s) of the Specifications or as shown on the Contract Drawings.

F. Mildew and Rot-Proof Rope

1. Rope shall be 1/2-inch in outside diameter, of mildew and rot-proof hemp rope.

G. Special Materials

1. Special materials, required for proper installations of the Work, shall be as shown on the Contract Drawings.

PART 3. EXECUTION

3.01 INSTALLATION

A. General

1. Employ the services of a Land Surveyor licensed in the state where the Work is performed to establish the proposed locations of lighting fixtures whose general locations are shown on the Contract Drawings.
2. Mark the proposed locations and alignment for each base can or box. The Engineer shall approve these locations and alignments prior to installation.

B. Fixtures that have been installed shall be made operational prior to the end of Work period.

C. Provide a sufficient quantity of waterproof tarpaulins or employ other approved means of preventing blown sand, water and other foreign materials from entering the kerfs and cored holes.

D. Rubberized Asphalt Sealer Preparation and Application

1. Heat rubberized asphalt sealer compound in a double boiler, indirect-fired kettle. The space between the inner and outer shells shall be filled with suitable heat transfer oil having a flash point of not less than 550 degrees F.
2. The kettle shall be equipped with satisfactory means of agitating the sealer at all times without excessive incorporation of air.
3. High temperature shall not be necessary to melt the sealer.
4. The kettle shall be equipped with thermostatic control for automatic regulation of the temperature of the oil bath and sealer and shall have a recording thermometer of the sealer temperature.
5. A hose shall be directly connected to the melting kettle in such a manner as to permit pumping the melted sealer through the hose to a shoe-type applicator that shall direct and control the filling of the joints.

E. All work shall be in conformance with NFPA 70 requirements.

F. Heat Shrink and Tape Wrap

1. All electrical connections shall be covered with heat shrink tubing. The heat shrink shall cover a minimum of 3" of cable on both sides of the connection. Or otherwise as shown on Contract Drawings.
2. All connections, after application of heat shrink wrapping shall apply tape Scotch (3M) No. 88, conforming to ASTM D3005 (Type II), or approved equal; over the heat shrink wrap starting 1" prior to the edge of the heat shrink wrapping, overlapping the tape wrappings to the opposite side of the heat shrink wrap, going beyond the opposite by 1". The tape wrap shall have three layers or as otherwise shown on Contract Drawings.

G. Flush Runway and Taxiway Light Fixtures

1. Installation of flush taxiway centerline light fixtures shall comply with FAA-AC 150/5340-30 and be done in accordance with fixture manufacturer's installation procedures and as specified herein.

2. Longitudinal and Transverse Spacing
   a. Space light fixtures longitudinally as shown on the Contract Drawings with a tolerance of plus or minus 10 percent.
   b. Locate light fixtures laterally not less than one foot from the designated centerline of taxiing paths.
   c. Displace lights a maximum of two feet from the designated centerline where necessary to avoid undesirable changes in guidance, i.e. no "zigzagging" from one side to the other side of the centerline.

3. Orientation of Light Beam
   a. On runways and on all straight portions of taxiway centerlines, orient the axis of the centerline light beam parallel to the centerline of the runway or taxiway path, respectively.
   b. On curved portions of taxiways, excluding long radius exit taxiways, orient the axis of the two beams of bidirectional taxiway centerline lights parallel to the tangent of the nearest point of the curve designated as the true centerline of the taxiway path.
   c. Orient the axis of a unidirectional light beam so that it is "toed-in" to intersect the centerline at a point approximately equal to four times the spacing of the lights of the lights on the curved portion and such spacing shall be measured along the chord of the curve.
   d. On runways, orient the edge light beam as specified in FAA-AC 150/5340-30.

H. Installation of Elevated Runway and Taxiway Edge Light Fixtures
   1. Installation shall comply with FAA-AC 150/5340-30 and shall be done in accordance with fixture manufacturer's installations procedures.

I. Installation of Semi-Flush Runway Touchdown Zone Light Fixtures (TDZ)
   1. Installation shall comply with FAA-AC 150/5340-30 and shall be done in accordance with fixture manufacturer's installation procedures.

J. Light base manufacturer representative shall be present on site on the first day of installing light bases.

3.02 FIELD TESTS

A. General
   1. Provide all labor and materials for functional and operational test required and furnish the power for the functional tests. The Authority will furnish power for the operational tests.
   2. Should the tests reveal any defects in Taxiway and Runway Lighting System Equipment installed under this Contract promptly correct such defects and rerun the tests until the entire installation is satisfactory to the Engineer in all aspects.
   3. Report immediately to the Engineer any defect found in portions of the Taxiway and Runway Lighting System not installed under this Contract. Do not attempt to rectify any defect found in a component of the system not installed under this Contract unless specifically instructed to do so by the Engineer.

4. The Contractor's compensation for the rectifying of such defects at the direction of the Engineer will be determined in accordance with the clause of the Contract providing compensation for Extra Work.

B. Functional Tests

1. Perform functional test, in the presence of the Engineer, to demonstrate the reliability of the electrical installation for the following:
   a. Runway and taxiway edge lighting system in accordance with the requirements of FAA-AC 150/5340-30
   b. Taxiway centerline lighting system in accordance with the requirements of FAA-AC 150/5340-30
   c. Runway centerline and touchdown zone lighting systems in accordance with the requirements of FAA-AC 150/5340-30.
2. Operational Tests
   a. After the functional tests have been completed, operate, in the presence of the Engineer, all electrical equipment for a period of twenty-four hours.

END OF SECTION

SECTION 16542

RUNWAY/TAXIWAY LIGHT FIXTURES

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Catalog Cuts

16542B01 Submit Catalog Cuts for the following in accordance with the requirements of "Shop Drawings, Catalog Cuts, and Samples" of Division 1 - GENERAL PROVISIONS:
Catalog Cuts
a. Station layout for taxiway and runway light fixtures
b. All light fixtures
c. c. Light fixture accessories, including isolation transformers, ground rods, fastener bolts, anti-rotational lock washers, lock-nuts when indicated on Contract Drawings, ground rods and plug connectors
d. Light bases, including base cans, light boxes, base plates, flange rings, mud covers, spacer rings, cover plates
e. Setting fixture (jig) and installation method description
f. Miscellaneous materials, including sealants and the special materials shown on the Contract Drawings

Construction and Installation Procedures

16542G01 Prior to any installation operations at the construction site, submit a listing of the proposed equipment and methods to be used to install base cans and/or boxes in the pavement subject to the approval of the Engineer

Record Documents

16542M01 Submit field test reports, including AMegger" readings, with an outline of the method used.

Spare Parts List

16542N01 Submit an itemized list of spare parts, as recommended by the manufacturer, for the electrical equipment to be supplied under this Contract. The list should include quantities required, current unit prices and sources of supply. The Authority is not obligated to purchase any item on such a list.

END OF APPENDIX "A"

DIVISION 16

SECTION 16549

AIRPORT CONSTANT CURRENT REGULATORS

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for constant current regulators for airport Taxiway and Runway Lighting Systems.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

Federal Aviation Administration, Advisory Circular (FAA-AC)

FAA-AC 150/5345-10E	Constant Current Regulators and Regulator Monitors (FAA Specification L-828 and L-829).
FAA-AC 150/5340-19	Taxiway Centerline Lighting System.
FAA-AC 150/5340-24	Runway and Taxiway Edge Lighting System.

1.03 QUALITY ASSURANCE

Before regulators are installed, they shall meet the requirement of a successful one-year test installation at a Port Authority airport.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver constant current regulators and accessories in manufacturer's original, unopened, protective packaging.

B. Store constant current regulators and accessories in a clean, dry space and protect them from weather.

C. Handle in a manner to prevent damage to finished surfaces.

D. Where possible, maintain protective coverings until installation is complete and remove such coverings as part of final cleanup.

E. Touch up any damage to finishes to match adjacent surfaces.

1.05 SPARE PARTS

Furnish a spare printed circuit board of each type, for each constant current regulator furnished.

1.06 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 CONSTRUCTION FEATURES

A. Constant Current Regulators; L-828 and L-829

1. Location, type, primary voltage and output current and KW rating of constant current regulators shall be as shown on the Contract Drawings.

2. Regulators shall be constant current, stepped brightness controlled, with a 6.6-ampere (Class 1) or 20-ampere (Class 2) output current at the highest step. Control circuitry shall be solid state, mounted on printed circuit boards.

3. Regulators shall have a barrier to separate the high voltage and low voltage compartments. Each compartment shall have a separate door. The high voltage compartment door shall have an internal screen and provision for padlocking.

4. Regulators shall have a non-vacuum, 5 KV internal primary switch with control power provided from an external source. Key interlock the internal primary switch with the external 5 KV fused disconnect so that access to the fused disconnect cannot occur without de-energizing the regulator. The key interlock shall be Kirk Key Interlocks as manufactured by the Railway and Industrial Engineering Company. No substitutions will be permitted.

5. Output Monitors

   a. FAA Specification L-828 regulators shall be furnished with factory installed output current "on/off" monitor, to indicate status of regulator output circuit. The monitor circuitry shall be modular, and shall be completely equipped with all accessories to permit field modification from FAA Specification L-828 to L-829.

   b. FAA Specification L-829 regulators shall be furnished with factory installed monitoring in conformance to FAA-AC 150/5345-10E. Furnish auxiliary alarm relays, with SPDT contacts rated 2-amperes (resistive) at 120 volts ac, individually annunciating the five fault conditions required by FAA Specification L-829, and the "regulator-on" status condition.

6. For wet type regulators, an oil-sampling valve shall be provided with a threaded pipe outlet. The oil level holes shall be equipped with petcocks or eye-level sight gauge.

7. Unless otherwise shown on the Contract Drawings, dry type regulators shall be wall-mounted and wet type regulators shall be pad-mounted. The pad-mounted regulators shall be provided with two I-beams, welded to the base of the regulator case to provide 8 inches of clearance between concrete pad and base of regulator case. Steel surfaces in contact with concrete shall be coated with two coats of asphaltic paint.

8. Regulators shall comply with FAA-AC 150/5345-10E and shall conform to FAA Specification L-828 or L-829.

9. Regulators 10 KW and smaller shall be dry type, Crouse-Hinds Co. Series 31360, or approved equal.

10. Regulators larger than 10 KW shall be wet type, Crouse-Hinds Co. Series 31060, or approved equal.

B. Series Circuit Absolute Cutouts

Series circuit absolute cutouts shown on the Contract Drawings shall be Type S-1 at 5 KV and shall be Crouse-Hinds No. 30196, or approved equal.

C. Concrete and Grouting

Concrete and grouting shall be in accordance with applicable Section(s) of the Specifications or as shown on the Contract Drawings.

2.02 SHOP TESTS

Perform all factory (shop) tests required to ensure compliance with the requirements of FAA-AC 150/5345-10E.

PART 3. EXECUTION

3.01 INSTALLATION

A. Construct a concrete pad for each pad-mounted regulator as shown on the Contract Drawings.

B. Install supporting struts or channels for each wall-mounted regulator as shown on the Contract Drawings.

C. Install each regulator and make all input, output and control connections as shown on the Contract Drawings.

D. Install the series circuit absolute cutout in the output circuit of each regulator as shown on the Contract Drawings.

3.02 FIELD TESTS

A. General

1. Provide all labor and materials for functional and operational tests required and furnish the power for the functional tests. Power for the operational tests will be furnished by the Authority.

2. Should the tests reveal any defects in Taxiway and Runway Lighting System Equipment installed under this Contract, promptly correct such defects and rerun the tests until the entire installation is satisfactory to the Engineer in all respects.

3. Report immediately to the Engineer any defect found in portions of the Taxiway and Runway Lighting System not installed under this Contract. Do not attempt to rectify any defect found in a component of the system not installed under this Contract unless specifically instructed to do so by the Engineer. The Contractor's compensation for the rectifying of such defects at the direction of the Engineer will be determined in accordance with the clause of the Contract providing compensation for Extra Work.

B. Functional Tests

For each regulator, perform functional tests, in the presence of the Engineer, to demonstrate the reliability of the electrical installation of the regulators in accordance with the requirements of FAA-AC 150/5345-10E.

C. Operational Tests

For each regulator, perform operational tests for a 24-hour period, in the presence of the Engineer, on a runway and taxiway lighting load furnished by the Engineer. Such operational tests shall be in accordance with the requirements of FAA-AC 150/5340-19 and FAA-AC 150/5340-24.

END OF SECTION

SECTION 16549

AIRPORT CONSTANT CURRENT REGULATORS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16549A01 Schematic diagrams for constant current regulator control system, including connections and interconnections.

Catalog Cuts

16549B01 Catalog cuts
a. Constant current regulators.
b. Series circuit absolute cutouts.

Manufacturer Test Reports

16549F01 Submit certified factory (shop) test reports on constant current regulators.

END OF APPENDIX "A"

DIVISION 16

SECTION 16561

TAXIWAY AND RUNWAY GUIDANCE SIGNS

PART 1. GENERAL

1.01 SUMMARY

This Section specifies requirements for taxiway and runway guidance signs.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	American Association of State Highway and Transportation Officials (AASHTO)
AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.
	American Society for Testing and Materials (ASTM)
ASTM A 153	Specification for Zinc Coating for Hot Dip on Iron and Steel Hardware.
ASTM D 4956	Specification for Retroreflective Sheeting for Traffic Control.
	Federal Aviation Administration (FAA) Advisory Circulars
AC 150/5340-18C	Standards for Airport Sign Systems.
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors.
AC 150/5345-42	Specification for Airport Light Base and Transformer Housings, Junction Boxes, and Accessories.
AC 150/5345-44G	Specification for Taxiway and Runway Signs.
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems.
	National Fire Protection Association (NFPA)
NFPA 70	National Electrical Code.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. General

Taxiway and runway guidance signs, hereinafter referred to as "Signs," shall be retroreflective and shall be the internally illuminated, non-fiber optics type, and shall conform to AC 150/5345-44G or it's latest edition, other referenced publications, and to the requirements of this Section. In the event of conflict, the more stringent of these shall apply.

B. Design Requirements

1. Types

   a. Type L-858YDirection, Destination, and Boundary Signs: Sign faces shall contain a black legend on yellow background.

   b. Type L-858RMandatory Instruction Signs: Sign faces shall contain a white legend on a red background.

   c. Type L-858LTaxiway and Runway Location Signs: Sign faces shall contain a yellow legend and border on a black background.

   d. Type L-858BRunway Distance Remaining Signs: Sign faces shall contain a white legend on a black background.

2. Size

   a. Types L-858Y, L-858R, and L-858L signs shall be Size 3, as defined in AC 150/5345-44G.

   b. Type L-858B shall be Size 4, as defined in AC 150/5345-44G.

3. Style

   a. Unless otherwise indicated on the Contract Drawings, all Signs shall operate from either a Style 3, 5-step series lighting circuit, or a Style 5, single-step series lighting circuit, as defined in AC 150/5345-44G, and shall be energizeable and operable at any incoming current value of the series lighting circuit between 2.8 and 6.6 Amperes without flickering.

   b. The Signs operating on a Style 3 series lighting circuit shall have an internal current regulator maintaining required secondary current through the lamp at all current values of the series lighting circuit between 2.8 and 6.6 Amperes. Signs operating on a Style 5 series lighting circuit shall operate without the use of an internal current regulator. The illumination level and uniformity shall be maintained across all brightness steps.

4. Class: Signs shall operate in Class 1 conditions, as defined in AC 150/5345-44G.

5. Sign Legend: The dimensions of the sign legend characters, numerals and graphics shall be in accordance with AC 150/5340-18C and AC 150/5345-44G.

6. Structural Criteria

   a. Legend panels, panel supports, and mounting legs shall conform to the requirements of Article 3.3.2 of AC 150/5345-44G.

   b. The allowable design stress for all items other than the frangible points and tether shall be 125% of the allowable stresses specified in AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals".

   c. A high-strength, galvanized steel tether shall be furnished and attached to each mounting leg at the breakaway section and its foundation. Each tether and its connections shall be designed to withstand its proportional static load of 1.3 psi acting normal to the sign panel with a factor of safety of 4.0. The length of the tether shall be as shown on the Contract Drawings and shall not allow for sign to snap in case of the sign failure.

C. Performance Requirements

1. Sign Operation

a. The luminance level and uniformity of the Sign shall be maintained across all series lighting circuit current values, as measured from the primary side of the isolation transformer.

b. Power input from the series lighting circuit shall be made through isolation transformers, properly rated, and conforming to AC 150/5345-47.

2. Sign Face

a. The sign legend shall consist of a polycarbonate material with the sign message bonded to it. The background color shall be a retroreflective material bonded to the polycarbonate material behind the sign message. The color and luminance factor of the retroreflective panels shall be in accordance with ASTM D 4956 for Type I sheeting. The manufacturer shall guarantee the bonding of the retroreflective material against peeling for 2 years.

3. Sign Luminance

a. The internally illuminated background of the Type L-858Y Signs and the legend of the Type L-858L Signs shall have an average luminance from 50 to 150 cd/m^2 (15 to 44 footlamberts). The background luminance of the Type L-858R Sign shall have an average luminance of 10 to 30 cd/m^2 (2.9 to 8.7 footlamberts). The legend of the Types L-858R and L-858B Signs shall have an average luminance from 100 to 300 cd/m^2 (29 to 87 footlamberts). The luminance ratio between red and white elements of the Type L-858R Signs shall not exceed 1:10. The message of all Signs shall be clearly visible and legible from a distance of 800 feet. These luminance levels shall be maintained across all brightness steps.

b. The luminance uniformity of the Sign background shall not exceed a maximum to minimum ratio of 5 to 1. The luminance uniformity of the Sign legend shall not exceed a maximum to minimum ratio of 5 to 1. The luminance uniformity shall be maintained across all brightness steps.

1.04 QUALITY ASSURANCE

A. Entities performing the Work of this Section shall have the following qualifications:

1. The sign manufacturer shall have been manufacturing runway/taxiway guidance signs and aeronautical lighting products as a major product line for a minimum of three (3) years.

2. Installation Experience: The installer shall have three (3) years prior experience and technical expertise in the installation of aeronautical series lighting and signage technologies. The Contractor shall have installed, and have satisfactorily operational, a minimum of three (3) installations, preferably located in the United States. These installations shall be of a similar size, type and complexity as described herein. These installations shall be in satisfactory operation for a minimum of one year.

B. Product

1. The Runway/Taxiway guidance signs shall be fully certified to be in compliance with all aspects of FAA Advisory Circular and 150/5345-44G.

2. The Sign shall be internally illuminated by high output (HO) fluorescent lamps operated by cold temperature ballast.

3. Identical lamps and ballasts shall be used in all sizes and types of Signs supplied for ease of maintenance. Lamps and ballasts shall be manufactured in the United States and shall be readily available from commercial electrical supply dealers within the Port Authority District.

4. The electrical and mechanical components or subassemblies shall be available to be purchased as spare parts from a minimum of one (1) source of supply.

5. The minimum power factor of each sign, for all brightness steps, as measured from the primary side of the isolation transformer shall be 0.85. The maximum VA load on each sign, at the highest brightness step, as measured from the primary side of the isolation transformer, shall be as follows:

   a. Single face

      (1) Four-foot Sign: 80 Volt-Amperes.

      (2) Six-foot Sign: 80 Volt-Amperes.

      (3) Eight-foot Sign: 165 Volt-Amperes.

      (4) Ten-foot Sign: 165 Volt-Amperes.

      (5) Twelve-foot Sign: 165 Volt-Amperes.

   b. Double face

      (1) Four-foot Sign: 80 Volt-Amperes.

      (2) Six-foot Sign: 165 Volt-Amperes.

      (3) Eight-foot Sign: 165 Volt-Amperes.

      (4) Ten-foot Sign: 165 Volt-Amperes.

      (5) Twelve-foot Sign: 225 Volt-Amperes.

6. The luminance of each sign shall comply with FAA AC 150/5345-44G and the requirements of this Section.

7. The rated life of the lamp(s) used to illuminate the Sign shall be no less than 9000 hours, at rated voltage and rated current.

8. The tether shall be constructed of high-strength steel cable, and its connections shall be hot dip galvanized as per ASTM A 153.

1.05 DELIVERY, STORAGE, AND HANDLING

A. The Signs shall be wrapped for protection during delivery, storage and handling. Wet or damp wrapping shall be removed, and disposed of, to prevent staining finish.

B. Deliver materials in manufacturer's original, unopened, protective packaging.

C. Store materials in original packaging in a manner to prevent soiling and physical damage, prior to installation.

D. Handle in a manner to prevent damage to finished surfaces.

E. Where possible, maintain protective covering until installation is complete and remove such coverings as part of final cleanup.

1.06 MANUALS

Twenty (20) instruction booklets shall be included with each order of signs that shall include installation instructions, maintenance procedures, troubleshooting procedures (including operating voltage and point readings), and a complete parts list. It shall also describe the lamp wattage or current needed to maintain the luminance levels specified herein.

1.07 SUBMITTALS

See Appendix "A" for submittal requirements.

PART 2. PRODUCTS

2.01 MATERIALS

A. Each sign shall include mounting legs and hardware; electrical disconnects; any required series circuit adapter units for Style 3 signs; and instruction booklets. Materials used shall not deteriorate or rust. Separators shall be used to avoid contact between dissimilar materials.

2.02 CONSTRUCTION FEATURES

A. Sign Construction

1. The Signs shall be constructed of lightweight, non-ferrous materials and shall be designed for installation on a concrete pad. No sign shall present a target for ground radar sweeps. All required mounting hardware, except anchor bolts, shall be supplied with each sign.

2. Each multiple lamp Sign shall be equipped with a lamp bypass circuit that shall maintain a reduced illumination level upon failure of one lamp.

3. Signs shall consist of legends mounted on one or both sides, as required by the Contract Drawings or the requirements of this Contract. The Sign legends shall have retroreflective material that shall meet the color and reflectivity requirements of ASTM D 4956 Type I sheeting.

4. The exterior color of the sign enclosure shall be black. Reflective material tags shall be applied to the back and sides of the sign such that the sign shall be visible to vehicles during hours of darkness.

5. The sign face assembly shall have gasketing between the Sign material and the housing so that the interior of the Sign enclosure shall remain free from dirt, sand and dust.

6. Sign Numbering: The manufacturer shall affix white, reflectorized, 4" high, stick-on numerals on the side of each Sign enclosure. The number shall correspond to the Sign number shown in the Sign Legend on the Contract Drawings.

B. Mounting Legs: Mounting legs for each Sign shall be equipped with frangible couplings with breakaway points located no more than two inches above the concrete pad. The frangible couplings shall withstand wind loads of 200 miles per hour, and shall break before reaching an applied static load of 1.3 psi. Each frangible coupling shall be permanently marked with the manufacturer's name and size of the Sign for which the coupling is intended.

C. Tether: Each Sign shall be supplied with tethers, each of which shall be secured to one of the mounting legs at the breakaway section. The tethers shall remain attached to the mounting leg and sign foundation.

D. Nameplate: The nameplate shall be mounted to the exterior of the sign enclosure at the topside of the sign. The nameplate data shall include the maximum VA load from the primary side of the transformer.

E. Electrical Features

1. Ballasts and all other electrical components shall be easily accessible in an enclosure mounted to the exterior of the sign structure.

2. The Signs shall be relampable without the use of tools. Loose parts shall be tethered to, or otherwise prevented from blowing away from, the installed Sign enclosure. All screws or latches shall be the captive type, and shall be easy to open and close.

3. Power input from the lighting circuit shall be made through an isolation transformer conforming to AC 150/5345-47.

4. The length of the power input leads shall be field adjustable and shall allow for lead termination in a Type I, Class A, Style 9 receptacle, conforming to AC 150/5345-26.

5. The minimum power factor and maximum load, in Volt Amperes, of each Sign, for all brightness steps, as measured from the primary side of the isolation transformer, shall be as specified in Article 1.04 of these Specifications.

6. Electrical Disconnect: An external electrical disconnect switch shall be included in each sign assembly. This switch, when activated, shall de-energize the Sign for relamping purposes while maintaining continuity of the series lighting circuit. The switch shall be a make-before-break type.

7. All wiring shall conform to the requirements of NFPA 70. All wiring shall be color-coded, and shall be clearly labeled. There shall be no exposed wiring, except for the power cord.

8. All electrical materials and equipment for which there is a nationally recognized standard shall bear the conformance labeling of the third party inspection authority, such as Underwriters Laboratories, Inc., Factory Mutual, ETL, or approved equal.

F. Environmental Requirements

1. Temperature: Each Sign shall operate in an ambient temperature range of -20 degrees Celsius to +55 degrees Celsius.

2. Wind: Each Sign shall withstand exposure to wind velocities that will produce an applied static load over the legend panel of 1.3 psi.

3. Precipitation: Each Sign shall operate while exposed to fog, wind-driven rain, snow, sleet or other normally encountered ambient humidity conditions.

PART 3. EXECUTION

3.01 INSTALLATION

A. Employ the services of a Land Surveyor licensed in the state where the Work is to be performed to establish the proposed locations of taxiway/runway signs whose general locations are shown on the Contract Drawings.

B. Install the Signs on concrete foundations as shown on the Contract Drawings.

C. Place the mounting flanges over the threaded studs in the mounting pad and securely fasten. Attach tethers to ½ inch anchor bolts.

D. Make electrical connections as shown on the Contract Drawings. Adjust length of the power cord to remove excessive external cord slag. Adjust jumper for lamp bypass circuit to use with a series or shunt regulator.

E. All Signs installed end to end shall be oriented with the ballast housings facing outward. Signs shall be at least 2 inches apart.

3.02 FIELD TESTS

A. Provide all labor and materials for functional and operational tests required and furnish the power for the functional tests. Power for the operational tests will be furnished by the Authority.

B. Should the tests reveal any defects in Taxiway and Runway Sign Equipment installed under this Contract, promptly correct such defects and rerun the tests until the entire installation is satisfactory to the Engineer in all respects.

C. Report immediately to the Engineer any defect found in portions of the Taxiway and Runway Sign Equipment not installed under this Contract. Do not attempt to rectify any defect found in a component of the system not installed under this Contract unless specifically instructed to do so by the Engineer. The Contractor's compensation for the rectifying of such defects at the direction of the Engineer will be determined in accordance with the clause of the Contract providing compensation for Extra Work.

D. Furnish the Engineer with a copy of the "Megger" readings, together with an outline of the method used. If, in the opinion of the Engineer, any reading is lower than the values required by the FAA-AC specifications, promptly replace the fixtures and accessories involved, or by other means raise the readings to acceptable values.

E. After the functional tests have been completed, operate, in the presence of the Engineer, all electrical equipment for a period of twenty-four hours.

END OF SECTION

SECTION 16561

TAXIWAY AND RUNWAY GUIDANCE SIGNS

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16561A01 Shop Drawings
a. Sign assembly, including all fabrication, assembly methods, isolation transformer and transformer base, internal and external wiring diagrams.
b. Internal bracing of each Sign type, including all bolting and/or welding details.
c. Tether assembly, including all its connections.
d. Ballast compartment details, including mounting of all components.

Catalog Cuts

16561B01 Taxiway and Runway Guidance Sign and Base, which shall show the following:
a. Features and Accessories
b. Installation Details
c. Material Specifications

Certificates

16561E01 FAA Certification documentation demonstrating that the Signs comply with the requirements of AC 150/5345-44H.

Manufacturer Test Reports

16561F01 Testing
a. Results of tests performed by an independent laboratory testing source in accordance with AC 150/5345-44H. These results shall address the following areas:
1. Visual Examination
2. Wind Load and Frangibility Test: Assembly shall include tethers and their connections
3. Photometric Test results, including luminance maps
4. Rain and Emission Test
5. Low and High Temperature Test
6. Production Test
b. Load and power factor data for all brightness steps, as measured from the primary side of the isolation transformer.
c. Sampling tests for frangible points shall be required. The test procedure shall be

submitted to the Authority for approval. The number of samples required for testing shall conform to MIL Std 105D, Inspection Level 1.

Calculations

16561H01 Calculations
a. Submit design calculations for the entire sign assembly including tethers and their connections for the Authority's approval.
b. Calculations shall be signed and sealed by a Professional Engineer licensed in the state where the installation will take place.

Schedules

16561J01 List of electrical and mechanical components or subassemblies for the Sign, indicating the source of supply for each.

END OF APPENDIX "A"

DIVISION 16

SECTION 16670

LIGHTNING PROTECTION SYSTEM

PART 1. GENERAL

1.01 SUMMARY

A. This Section specifies the requirements for a complete lightning protection system.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

	Lighting Protection Institute (LPI)
LPI 175	Lightning Protectors Installation Code
LPI 176	Material Standard
LPI 176	Inspection Guide
	National Fire Protection Association (NFPA)
NFPA 70	National Electrical Code
NFPA 780	Lightning Protection Code
NFPA 781	Lightning Protection Early Streamer Emission Air Terminals Code (Proposed)
	Underwriters Laboratories
UL 96	Lightning Protection Components
UL 96 A	Installation Requirements for Lightning Protection Systems

1.03 DESIGN REQUIREMENTS

A. Unless otherwise specified on the Contract Drawings or in this Section, the Lightning Protection System shall be manufactured, supplied, and installed in conformance with the requirements of all local codes, and the Publications referenced in Article 1.02 herein.

B. The Lightning Protection System shall be composed of all items of hardware, cables and grounding electrodes necessary to dissipate the lightning current into the mass of the earth. In general, the system shall consist of readily available listed components that fully comply with the requirements of this Section and the Contract Drawings.

C. The Lightning Protection system shall be designed to prevent damage to building structures and property, injury to occupants, and protection of electrical systems including electronic equipment.

D. The Lightning Protection system shall include but not be limited to the following:

1. The entire roof system, gutters, leaders ventilators, and all other metal appurtenances shall be made electrically continuous and shall be grounded to the grounding grid or in the case of structural steel frame construction directly to the building steel with approved fasteners at intervals averaging not more than 100 feet around the perimeter of the structure.

2. All metallic objects inside the building within 6 feet of the Lightning Protection System or metal connected to it shall be bonded to the system with approved fittings and conductors.

3. Air terminals shall be no more than 20 feet apart with the end terminals no more than 2 feet from the ends of the building.

4. Lightning protection conductors shall interconnect all metallic objects on the protected structure, and shall be installed to provide a two way path to ground from each air terminal, and shall be bonded to the steel framework at each roof beam and a minimum of every 60 feet along the ridge beam.

5. Down conductors shall be installed at all four (4) corners of the building, at columns near the center of the north and south building walls and at other locations as required by the referenced codes and good design. They shall be installed as directly as possible to ground.

6. The design of the Lightning Protection System, including the down conductors, shall be compatible with the architectural features of the building or structure, as approved by the Engineer.

1.04 QUALITY ASSURANCE

A. The Contractor shall engage the services of a UL certified lightning protection installer, who shall have designed and installed Lightning Protection Systems that have been in satisfactory use for not less than three years in a minimum of 20 installations for purposes similar to those intended herein.

B. The lightning protection system design and installation shall conform to the requirements of LPI 175, LPI 176, NFPA 70, NFPA 780, NFPA 781, UL 96, and UL 96 A.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, protective packaging. Protective caps shall be removed immediately prior to installation of conduit.

B. Store materials in a clean, dry space and protect them from weather.

C. Handle in a manner to prevent damage to finished surfaces.

1.06 SUBMITTALS

See Appendix "A" for submittal requirements.

1.07 SPARE PARTS

A. The Contractor, or his authorized representative, shall confirm that there are a minimum of three (3) established agencies within the Port Authority District, which stock a full inventory of spare parts for the system supplied. In the event that there are not three (3) sources of supply, the contractor warrants that all system components will be made available by the Contractor for a period of ten (10) years from the date of acceptance of the system.

PART 2. PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with the requirements of this Section, provide a lightning protection system of one of the manufacturers specified on the Contract Drawings.

2.02 MATERIAL

A. General

1. All electrical materials and equipment, shall be labeled or listed by UL for use in Master Labeled Lightning Protection systems. Materials shall be sized in accordance with the materials requirements of NFPA 780 and UL 96A.

2. Generally all materials shall be copper, or copper-bronze (in locations where system components are mounted on aluminum surfaces, aluminum materials shall be used) as specified herein and of the size, weight and construction to suit the application shown on the Contract Drawings and shall be used in accordance with UL and LPI and NFPA code requirements, for class II structures and as per manufacturers recommendations.

B. Conductors

1. Conductors shall be sized in accordance with material requirements above. Down conductors shall be copper.

C. Connections, Splices, and Fasteners

1. Connectors, splicers, fasteners, and cable clamps shall be heavy-duty bronze, approved for lightning protection systems.

2. Bonding plates shall be heavy-duty bronze with a minimum bonding surface of 8 square inches.

3. Fittings for connections to metal tracks, gutters, ventilators, etc., shall be of an approved type and shall be made tight by compression under bolt heads or equivalent.

4. Screws, bolts, nuts, washers and nails shall be stainless steel. Galvanized or plated materials are not acceptable.

D. Roof Penetrations

1. The roof penetrations required for down conductors or for connections to structural steel framework shall be made using thru-roof assemblies.

2. Through the roof connectors shall be bronze, right-angle, thru-roof connectors with clamp type top cable connector, 4 inches square roof flashing plate, 1/2 inches diameter by 15 inches long threaded stem, hex nut and washer, and adjustable bottom cable clamp.

3. Roof flashing shall be compatible with the roofing system.

E. Air Terminals

1. The air terminals shall be as follows:

a. Ridge Type

(1) Air terminal shall be pointed, solid, round, heavy duty, bronze rod for concealed in place installation.

(2) Air terminal shall be 1/2 inches in diameter with a 10-inch nickel tipped point and 15-inch long solid copper stem.

(3) Each air terminal shall be furnished with lead washers, a support bracket for attachment to the ridge member, and an adjustable thru-roof clamp type cable connector.

b. Parapet Type

(1) Pointed, solid, round, heavy duty, bronze rod with 5/8 inches inside threaded adapter for mounting on a point support.

(2) 1/2 inches in diameter with a nickel tipped point and a 24-inch long solid copper stem.

(3) Each terminal shall be furnished with an offset point support and a point extension.

(4) Each offset point support shall be bronze with a 5/8 inch outside thread.

(5) Each point extension shall be bronze, 3 inches long, with a 5/8 inches outside top thread and a 5/8 inches inside bottom thread.

F. Ground Terminations

1. The ground terminations shall be as follows:

a. 5/8" x 10'-0" (minimum) copper-clad rod.

b. Bronze clamp (connecting ground rod and down conductor) having at least 1-1/2" of contact between rod and conductor, or by an exothermic welded connection.

c. Conductors from the ground connections to the ground terminations shall be class II copper lightning conductors.

PART 3. EXECUTION

3.01 INSTALLATION

A. The installation shall be in accordance with LPI 175, LPI 76 and UL 96A.

B. The installation shall he completed by an experienced installer who is a certified Master Installer of the LPI or working under the direct supervision of an LPI manufacturer or his authorized LPI certified Master Installer representative.

C. Terminals shall be installed and all openings sealed in accordance with the Contract Drawings and manufacturers recommendations.

D. Connections to steel framework shall be with bonding plates as described above.

E. Conductors shall be held in place with approved fasteners. Spacing of fasteners shall not exceed 3-foot centers on both horizontal and vertical runs.

F. Approved connectors and splicers as described above shall be used for joining conductors. When attached to conductors they shall be sufficiently tight to withstand a tensile force of two hundred (200) pounds.

G. Down conductors shall be connected to building grounding system with approved fittings. Common grounding of all ground mediums entering the structure shall be ensured by interconnecting to the Lightning Protection System using main size conductors and fittings.

H. The offset point supports for the parapet air terminals shall be shimmed to clear the coping.

I. Conductors for the parapet air terminals shall interconnect all the terminals on the parapet and shall be fastened to the parapet with approved fasteners forming a closed loop around the building. Conductors shall be connected to the down conductors via the thru-roof connector described above.

J. Ground rods shall be located two feet below grade, preferably two feet from foundation walls.

K. Ground rods shall extend a minimum of ten feet vertically into the earth.

L. Grounded metal bodies located within the required bonding distance as determined by NFPA 780 shall be bonded to the Lightning Protection System using bonding connections and fittings.

3.02 COORDINATION

A. The Contractor shall insure a correct, neat and unobtrusive installation.

B. The Contractor shall insure a solid mechanical and electrical connection to the building ground system.

3.03 INSPECTION, TESTING, COMPLETION AND APPROVAL

A. The Contractor shall secure and deliver the LPI System certification to the Engineer upon completion of the installation.

B. The Contractor shall also submit copies of as-built shop drawings with LPI Forms 175A, B and C along with the LPI Certificate System Application.

C. Underwriters' Laboratories Master Label shall be furnished as evidence that the installation complies with the UL 96A requirements.

D. If protected structure is an addition to, or is attached to an existing structure the Contractor shall advise the Engineer of any additional work required on the existing Lightning Protection System or structure with current UL requirements.

END OF SECTION

SECTION 16670

LIGHTNING PROTECTION SYSTEM

APPENDIX "A"

SUBMITTALS

Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts and Samples" of Division 1 - GENERAL PROVISIONS:

Shop Drawings

16670A01 Shop Drawings –
1. Connection Diagrams
2. Layout drawing, including type, size and location of the following:
   a. All equipment
   b. Cable routing
   c. Ground rods
3. Any special equipment that must be manufactured or fabricated.

Catalog Cuts

16670B01 Catalog Cuts –
1. Wire and cable
2. Air terminals and other equipment
3. Supports, fasteners and hardware

END OF APPENDIX "A"

APPENDIX A

FEDERAL AVIATION ADMINISTRATION

AIRPORT IMPROVEMENT PROGRAM

NOTICES TO CONTRACTORS

REQUIRED SUBMISSIONS TO FAA

CERTIFICATION OF NONSEGREGATED FACILITIES

TITLE VI CIVIL RIGHTS ACT OF 1964 COMPLIANCE COMMITMENT

SCHEDULES OF MINIMUM WAGE RATES

I. NOTICE TO CONTRACTORS:

A. The successful bidder on this Contract (if the Contract price is $50,000 or more and the successful bidder has 50 or more employees) and each subcontractor (if the subcontract price is 50,000 or more and the subcontractor has 50 or more employees) shall, within 120 days from Contract commencement, develop and maintain a written affirmative action compliance program for each of its establishments.

B. The successful bidder shall submit to the Authority a Certification of Nonsegregated Facilities prior to award of the Contract (if the Contract price exceeds $10,000 and the Contract is not exempt from the provisions of the equal opportunity clause) and shall notify prospective subcontractors for supplies and construction Contracts of the requirement for such a certification (if the subcontract price exceeds $10,000 and the subcontract is not exempt from the provisions of the Equal Protection Clause). Samples of the certification and the notice to subcontractors are contained in this Appendix A.

II. REQUIRED SUBMISSIONS TO FAA.

A. Compliance Reports. Within 30 days after award of this Contract, the Contractor (if the Contract price is $50,000 or more and it has 50 or more employees) shall file a compliance report on Standard Form 100, Employee Information Report, EEO-1 (SF 100) with the Joint Reporting committee if:

1.) The Contractor has not submitted a complete compliance report within 12 months preceding the date of award, and

2.) The Contractor is within the definition of "employer" in paragraph 2e(3) of the instructions included in SF 100.

B. The Contractor shall require the subcontractor on any first tier subcontracts, irrespective of dollar amount, to file SF 100 within 30 days after award of the subcontract if the above two conditions apply. SF 100 is normally furnished contractors annually, based on a mailing list currently maintained by the Joint Reporting Committee. In the event a contractor has not received the form, he may obtain it by writing to the following address:

Joint Reporting Committee
P.O. Box 2236

Norfolk, Virginia 20501

C. The Contractor shall after commencement of Contract work submit the monthly Utilization Report (CC 257) to the OFCCP regional office, at the appropriate address listed below, on or before the fifth working day of each month, reporting activity of the previous month. If no Work was accomplished, the form should be submitted stating that fact. A form is to be submitted for the last month of activity stating the Work has been completed.

For downstate New York and New Jersey:

Mr. Harold M. Busch
District Director, OFCCP/ESA
U.S. Department of Labor
26 Federal Plaza, Rm. 36-116
New York, N.Y. 10278

For Upstate New York:

Mr. Garland Sweeney
District Director, OFCCP/ESA
U.S. Department of Labor
Jackson Building, Rm. 609
220 Delaware Avenue
Buffalo, N.Y. 14202

III. NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATION ON NONSEGREGATED FACILITIES.

A. A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause.

B. Contractors receiving subcontract awards exceeding $10,000 which are not exempt from the provisions of the equal opportunity clause will be required to provide for the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C 1001.

IV. CERTIFICATION OF NONSEGREGATED FACILITIES.

All bidders will be required to submit with their bids a Certification of Nonsegregated Employee Facilities, including an agreement to get a similar certification from proposed subcontractors. These certifications will be required prior to award of the Contract.

The Contractor certifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The Contractor certifies further that it will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The Contractor agrees that a breach of this Certification is a violation of the equal opportunity clause in this Contract. As used in this Certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or any other reason. The Contractor agrees that (except where it has obtained identical Certifications from proposed subcontractors for specific time periods) he will obtain identical Certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause, and that it will retain such Certifications in its files.

Certification - The information above is true and complete to the best of my knowledge and belief.

James M. Laing, Senior Vice President

Name and Title of Signer (Please Print)

James M. Laing

Signature

Feb. 4, 2013

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

IV. CERTIFICATION OF NONSEGREGATED FACILITIES.

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Certification - The information above is true and complete to the best of my knowledge and belief.

Frank C. Lizza, Jr., General Manager

Name and Title of Signer (Please Print)

Frank C. Lizza

Signature

Feb. 4, 2013

Date

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Certification - The information above is true and complete to the best of my knowledge and belief.

James M. Laing, Senior Vice President

Name and Title of Signer (Please Print)

James M. Laing

Signature

Feb. 4, 2013

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV

V. TITLE VI CIVIL RIGHTS ACT OF 1964 COMPLIANCE COMMITMENT

All bidders will be required to submit with their bids the Title VI Civil Rights Act of 1964 Compliance Commitment form, including an agreement to get similar compliance commitment from proposed subcontractors. This compliance commitment will be required prior to award of the Contract.

Reference: Contract Number and Title: SWF-164.039 Rehabilitation of Runway 9-27 and Runway 16-34

The Tutor Perini Corporation (Company) having submitted a bid for the referenced Contract, advises that contingent upon award of the Contract to our company, we will comply with Title VI Civil Rights Act of 1964 by not discriminating on the basis of age, race, sex, color, national origin or disability in its hiring and employment practices, or in admission to, access to, or operation of its programs, services, and activities. We will forward a copy of our commitment to comply with Title VI Civil Rights Act of 1964 to all vendors and subcontractors utilized for the referenced Contract, as listed below and inform them of their obligation to comply.

Subcontractors:

1) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

2) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

3) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

James M. Laing

James M. Laing, Senior Vice President

(SIGNATURE OF BIDDER)

DATE: Feb. 4, 2013

V. TITLE VI CIVIL RIGHTS ACT OF 1964 COMPLIANCE COMMITMENT

All bidders will be required to submit with their bids the Title VI Civil Rights Act of 1964 Compliance Commitment form, including an agreement to get similar compliance commitment from proposed subcontractors. This compliance commitment will be required prior to award of the Contract.

Reference: Contract Number and Title: SWF-164.039 Rehabilitation of Runway 9-27 and Runway 16-34

The Intercounty Paving Associates, LLC (Company) having submitted a bid for the referenced Contract, advises that contingent upon award of the Contract to our company, we will comply with Title VI Civil Rights Act of 1964 by not discriminating on the basis of age, race, sex, color, national origin or disability in its hiring and employment practices, or in admission to, access to, or operation of its programs, services, and activities. We will forward a copy of our commitment to comply with Title VI Civil Rights Act of 1964 to all vendors and subcontractors utilized for the referenced Contract, as listed below and inform them of their obligation to comply.

Subcontractors:

1) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

2) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

3) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

Frank C. Lizza, Jr.

(SIGNATURE OF BIDDER) Frank C. Lizza, Jr., General Manager

DATE: Feb. 4, 2013

V. TITLE VI CIVIL RIGHTS ACT OF 1964 COMPLIANCE COMMITMENT

All bidders will be required to submit with their bids the Title VI Civil Rights Act of 1964 Compliance Commitment form, including an agreement to get similar compliance commitment from proposed subcontractors. This compliance commitment will be required prior to award of the Contract.

Reference: Contract Number and Title: SWF-164.039 Rehabilitation of Runway 9-27 and Runway 16-34

The Tutor Perini Corporation / Intercounty Paving Associates, LLC JV (Company) having submitted a bid for the referenced Contract, advises that contingent upon award of the Contract to our company, we will comply with Title VI Civil Rights Act of 1964 by not discriminating on the basis of age, race, sex, color, national origin or disability in its hiring and employment practices, or in admission to, access to, or operation of its programs, services, and activities. We will forward a copy of our commitment to comply with Title VI Civil Rights Act of 1964 to all vendors and subcontractors utilized for the referenced Contract, as listed below and inform them of their obligation to comply.

Subcontractors:

1) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

2) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

3) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

James M. Laing

James M. Laing, Attorney-in-Fact

(SIGNATURE OF BIDDER)

DATE: Feb. 4, 2013

VI. SCHEDULES OF MINIMUM WAGE RATES

The following are the minimum wage rates required by the Secretary of Labor. The classification may be supplemented and the rates for each classification may be changed from time to time in accordance with the revised rates and classifications issued by the Secretary of Labor.

General Decision Number: NY130007 01/25/2013 NY7

Superseded General Decision Number: NY20120007

State: New York

Construction Types: Building, Heavy and Highway

Counties: Dutchess, Orange, Sullivan and Ulster Counties in New York.

BUILDING CONSTRUCTION PROJECTS FOR ALL COUNTIES EXCEPT SULLIVAN (does not include single family homes and apartment up to and including 4 stories), HEAVY AND HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/04/2013
1	01/18/2013
2	01/25/2013

ASBE0040-003 05/01/2012

SULLIVAN AND ULSTER COUNTIES

	Rates	Fringes
HAZARDOUS MATERIAL HANDLER Duties limited to preparation wetting; stripping; removal; scrapping; vacuuming; bagging; and disposing of all insulation materials whether they contain asbestos or not from mechanical systems.....	$ 17.37	9.95
Insulator/asbestos worker (includes application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems).....	$ 29.64	18.93

ASBE0091-002 05/28/2012

DUTCHESS AND ORANGE COUNTIES

	Rates	Fringes
HAZARDOUS MATERIAL HANDLER Duties limited to preparation, wetting, stripping, removal		

scrapping, vacuuming,
bagging and disposing of
all insulation materials;
whether they contain
asbestos or not from
mechancial systems.....$ 24.55 9.95

Insulator/asbestos worker
(Includes application of
all insulating materials,
protective coverings,
coatings, and finishes to
all types of mechanical
systems).....$ 35.40 32.19

BOIL0005-001 01/01/2012

	Rates	Fringes
BOILERMAKER.....	$ 47.98	32%+21.75+a

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Thanksgiving Day, Memorial Day, Independence Day, Labor Day and Good Friday, Friday after Thanksgiving, Christmas Eve Day and New Year's Eve

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BRNY0005-001 08/01/2011

	Rates	Fringes
CONSTRUCTION WORKER (BUILDING CONSTRUCTION)		
DUTCHESS, ORANGE (Excluding the town of Tuxedo) and ULSTER COUNTIES		
Bricklayers, Cement Masons, Plasterers, Stone Masons.....	$ 37.50	25.20
ORANGE COUNTY (Town of Tuxedo)		
Bricklayers, Cement Masons, Plasterers, Stone Masons.....	$ 37.50	25.20
CONSTRUCTION WORKER (HEAVY & HIGHWAY CONSTRUCTION)		
ORANGE COUNTY (Town of Tuxedo)		
Bricklayers, Cement Masons, Plasterers, Stone Masons.....	$ 38.00	25.20
CONSTRUCTION WORKER (HIGHWAY CONSTRUCTION)		
DUTCHESS, ORANGE (Excluding the town of Tuxedo), SULLIVAN and ULSTER COUNTIES		
Bricklayers, Cement		

Masons, Plasterers, Stone
Masons.....$ 38.00 25.20

CARP0279-005 07/01/2011

	Rates	Fringes
Carpenters:		
BUILDING CONSTRUCTION		
Carpenters, Millwrights, Pile Drivers	$ 27.77	23.50
HEAVY & HIGHWAY CONSTRUCTION		
Carpenters, Millwrights, Pile Drivers	$ 27.77	23.50

CARP0740-002 07/01/2010

DUTCHESS AND ORANGE COUNTIES

	Rates	Fringes
MILLWRIGHT	$ 36.62	32.98

CARP1456-003 10/01/2010

DUTCHESS AND ORANGE COUNTIES

	Rates	Fringes
Diver Tender	$ 42.10	42.37
Diver	$ 58.95	42.37
Dock Builder & Piledrivermen		
DOCKBUILDER	$ 46.74	42.37

ELEC0363-001 04/01/2012

	Rates	Fringes
ELECTRICIAN		
DUTCHESS (Remaining Townships), ULSTER AND SULLIVAN COUNTIES	$ 37.00	6%+22.10+a
ORANGE and DUTCHESS (Townships of Fishkill, East Fishkill and Beacon) COUNTIES	$ 41.00	6%+22.10+a

FOOTNOTE:
a. Paid Holidays: New Year's Day, President's Day, Memorial Day, Fourth of July, Labor Day, Presidential Election Day, Veteran's Day, Thanksgiving Day, Day after Thanksgiving, Christmas Day

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* ELEC1249-002 05/07/2012

	Rates	Fringes

LINE CONSTRUCTION: Lineman
LIGHTING AND TRAFFIC
SIGNAL INCLUDING ANY AND
ALL FIBER OPTIC CABLE
NECESSARY FOR THE TRAFFIC
SIGNAL SYSTEMS, AND
TRAFFIC MONITORING
SYSTEMS, ROAD WEATHER
INFORMATION SYSTEMS

Flagman	$ 23.70	7%+18.25
Groundman Digging Machine Operator	$ 35.55	7%+18.25
Groundman Truck Driver (Tractor Trailer Unit)	$ 33.58	7%+18.25
Groundman Truck Driver	$ 31.60	7%+18.25
Lineman and Technician	$ 39.50	7%+18.25
Mechanic	$ 31.60	7%+18.25

PAID HOLIDAYS:

a. Memorial Day, New Year's Day, President's Day, Good Friday, Decoration Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, and Election Day for the President of the United States and Election Day for the Governor of New York State, provided the employee works two days before or two days after the holiday.

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* ELEC1249-004 05/07/2012

	Rates	Fringes
Line Construction: Overhead and underground distribution and maintenance work and all overhead and underground transmission line work including any and all fiber optic ground wire, fiber optic shield wire or any other like product by any other name manufactured for the dual purpose of ground fault protection and fiber optic capabilities (where no other trades are or have been involved):		
Flagman	$ 25.63	7.5%+18.25+a
Groundman digging machine operator	$ 38.45	7.5%+18.25+a
Groundman truck driver (tractor trailer unit)	$ 36.31	7.5%+18.25+a
Groundman Truck driver	$ 34.18	7.5%+18.25+a
Lineman and Technician	$ 42.72	7.5%+18.25+a
Mechanic	$ 34.18	7.5%+18.25+a

Overhead transmission line work (where other trades are or have been involved):		
Flagman	$ 26.29	15.00+6.5%+a
Groundman digging machine operator	$ 39.44	15.00+6.5%+a
Groundman truck driver (tractor trailer unit)	$ 37.25	15.00+6.5%+a
Groundman truck driver	$ 35.06	15.00+6.5%+a
Lineman and Technician	$ 43.82	15.00+6.5%+a
Mechanic	$ 35.06	15.00+6.5%+a
Substation:		
Cable Splicer	$ 46.99	7.5%+18.25+a
Flagman	$ 25.63	7.5%+18.25+a
Ground man truck driver	$ 34.18	7.5%+18.25+a
Groundman digging machine operator	$ 38.45	7.5%+18.25+a
Groundman truck driver (tractor trailer unit)	$ 36.31	7.5%+18.25+a
Lineman & Technician	$ 42.72	7.5%+18.25+a
Mechanic	$ 34.18	7.5%+18.25+a
Switching structures; railroad catenary installation and maintenance, third rail type underground fluid or gas filled transmission conduit and cable installations (including any and all fiber optic ground product by any other name manufactured for the dual purpose of ground fault protection and fiber optic capabilities), pipetype cable installation and maintenance jobs or projects, and maintenance bonding of rails; Pipetype cable installation		
Cable Splicer	$ 46.99	7.5%+18.25+a
Flagman	$ 25.57	15.00+6.5%+a
Groundman Digging Machine Operator	$ 38.35	15.00+6.5%+a
Groundman Truck Driver (tractor-trailer unit)	$ 36.22	15.00+6.5%+a
Groundman Truck Driver	$ 34.09	15.00+6.5%+a
Lineman & Technician	$ 42.61	15.00+6.5%+a
Mechanic	$ 34.09	15.00+6.5%+a
TELEPHONE, CATV FIBEROPTICS CABLE AND EQUIPMENT		
Cable splicer	$ 27.99	4.43 + 3%
Groundman	$ 12.48	4.43 + 3%
Installer Repairman-Teledata		

Lineman/Tecnician-Equipment Operator	$ 26.57	4.43 + 3%
Tree Trimmer	$ 21.64	7.36+3%

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, Good Friday, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, and Election Day for the President of the United States and Election Day for the Governor of New York State, provided the employee works two days before or two days after the holiday.

b. New Years Day, Washington's Birthday, Good Friday, Decoration Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, Day after Thanksgiving Day and Christmas Day.

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* ELEC1249-005 05/07/2012

SULLIVAN COUNTY

	Rates	Fringes
Line Construction LIGHTING AND TRAFFIC SIGNAL LINEMAN INCLUDING ANY AND ALL FIBER OPTIC CABLE NECESSARY FOR THE TRAFFIC SIGNAL SYSTEM, TRAFFIC MONITORING SYSTEMS AND ROAD WEATHER INFORMATION SYSTEMS..		
Flagman	$ 23.70	7%+18.25
Groundman Digging Machine Operator	$ 35.55	7%+18.25
Groundman Truck Driver (tractor trailer unit)	$ 33.58	7%+18.25
Groundman Truck Driver	$ 31.60	7%+18.25
Lineman & Technician	$ 39.50	7%+18.25
Mechanic	$ 31.60	7%+18.25

FOOTNOTE:

a. New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, plus President's Day, Good Friday, Decoration Day, Election Day for the President of the United States and Election Day for the Governor of the State of New York, provided the employee works the day before or the day after the holiday.

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* ELEV0138-001 01/01/2013

	Rates	Fringes
ELEVATOR MECHANIC	$ 50.68	25.185+a+b

FOOTNOTE:

a. 8 PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

b. PAID VACATION: Employer contributes 8% of regular basic hourly rate as vacation pay for employees with more than 5 years of service, and 6% for employees with less than 5 years of service.

ENGI0106-004 07/01/2012

NORTHERN PART OF DUTCHESS (To The Northern Boundary line of the City of Poughkeepsie)

	Rates	Fringes
Power Equipment Operator		
HEAVY & HIGHWAY		
GROUP 1	$ 34.71	21.75+a
GROUP 2	$ 33.80	21.75+a
GROUP 3	$ 31.23	21.75+a
GROUP 4	$ 38.71	21.75+a
GROUP 5	$ 37.71	21.75+a
GROUP 6	$ 36.71	21.75+a
GROUP 7	$ 36.32	21.75+a

POWER EQUIPMENT OPERATORS HEAVY & HIGHWAY CLASSIFICATIONS

GROUP 1: Asphalt Curb Machine, Self Propelled, Slipform, Automated Concrete Spreader (CMI Type), Automatic Fine Grader, Backhoe (Except Tractor Mounted, Rubber Tired), Backhoe Excavator Full Swing (CAT 212 or similar type), Back Filling Machine, Belt Placer (CMI Type), Blacktop Plant (Automated), Boom truck , Cableway, Caisson Auger, Central Mix Concrete Plant (Automated), Concrete Curb Machine, Self Propelled, Slipform, Concrete Pump, Crane, Cherry Picker, Derricks (steel erection), Dragline, Overhead Crane (Gantry or Straddle type), Pile Driver, Truck Crane, Directional Drilling Machine, Dredge, Dual Drum Paver, Excavator (All Purpose Hydraulically Operated) (Gradall or Similar), Front End Loader (4 cu. yd. and Over), Head Tower (Sauerman or Equal), Hoist (Two or Three Drum), Holland Loader, Maintenance Engineer, Mine Hoist, Mucking Machine or Mole Pavement Breaker(SP) Wertgen; PB-4 and similar type, Power Grader, Profiler (over 105 H.P.) Quad 9, Quarry Master (or equivalent), Scraper, Fireman, Fork Lift, Form Tamper, Grout Pump, Gunite Machine, Hammers (Hydraulic self-propelled), Hydra-Spiker, ride-on, Hydraulic Pump (jacking system), Hydro-Blaster (Water), Mulching Machine, Oiler, Parapet Concrete or Pavement, Shovel, Side Boom, Slip Form Paver, Tractor Drawn, BeltType Loader, Truck or Trailer Mounted Log , Chipper (Self Feeder), Tug Operator (Manned Rented Equipment Excluded), Tunnel Shovel

GROUP 2: Asphalt Paver, Backhoe (Tractor Mounted, Rubber Tired), Bituminous Recycler Machine, Bituminous Spreader and Mixer, Blacktop Plant (NonAutomated), Blast or Rotary Drill (Truck or Tractor Mounted), Boring Machine, Cage Hoist, Central Mix Plant (NonAutomated) and All Concrete Batching Plants, Cherry Picker (5 tons capacity and under), Concrete Paver (Over 16S), Crawler Drill, Self-contained, Crusher, Diesel Power Unit, Drill Rigs, Tractor Mounted, Front End Loader (Under 4 cu. yd.), Greaseman/Lubrication Engineer, HiPressure Boiler (15 lbs. and over), Hoist (One Drum), Hydro-Axe, Kolman Plant Loader and Similar Type Loaders, L.C.M. Work Boat Operator, Locomotive Mixer (for stabilized base selfpropelled), Monorail Machine, Plant Engineer, Profiler (105 H.P. and under), Grinder, Post Hole Digger and Post Driver, Power Broom (towed), Power Heaterman, Power Sweeper, Revinius Widener, Roller (Grade and Fill), Scarifier, ride-on, Shell Winder, Skid steer loader (Bobcat or similar), Span-Saw, ride-on, Steam Cleaner, Pug Mill, Pump Crete Ready Mix Concrete Plant Refrigeration Equipment (for soil stabilization)Road Widener, Roller (all above subgrade), Sea Mule, Self-contained Ride-on Rock Drill, Excluding Air-Track Type Drill, Skidder, Tractor with Dozer and/or Pusher, Trencher. Tugger Hoist, Vermeer saw (ride on, any size or type), Winch, Winch Cat

GROUP 3: A Frame Winch Hoist on Truck , Articulated Heavy Hauler, Aggregate Plant, Asphalt or Concrete Grooving, Machine (ride on), Ballast Regulator, Ride-on Boiler (used in conjunction with production), Bituminous Heater, self-propelled, Boat (powered), Cement and Bin Operator, Compressors, Dust Collectors, Generators, Pumps, Welding Machines, Light Plants, Heaters (hands-off equipment), Concrete Pavement Spreader and Finisher, Concrete Paver or Mixer (16S and under), Concrete Saw (self-propelled), Conveyor, Deck Hand, Directional Drill Machine Locator, Drill, (Core), Drill, (Well,) Farm Tractor with accessories, Fine Grade Machine, Tamper, ride-on, Tie Extractor, ride-on, Tie Handler, ride-on, Tie Inserter, ride-on, Tie Spacer, ride-on, Tire Repair, Track Liner, ride-on, Tractor, Tractor (with towed accessories), Vibratory Compactor, Vibro Tamp, Well Point

GROUP 4: Tower Cranes

GROUP 5: Cranes 50 tons and over

GROUP 6: Cranes 49 tons and below

GROUP 7: Master Mechanic

FOOTNOTES:

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, provided the employee works the day before and the day after the

holiday.

ENGI0106-008 07/01/2012

NORTHERN PART OF DUTCHESS (TO THE NORTHEN BOUNDARY LINE OF THE CITY OF POUGHKEEPSIE) BUILDING CONSTRUCTION

	Rates	Fringes
Power equipment operators:		
GROUP A(1)	$ 35.20	21.50+a
1	$ 36.20	21.50+a
2	$ 37.20	21.50+a
GROUP A	$ 34.76	21.50+a
GROUP B	$ 33.85	21.50+a
GROUP C	$ 31.28	21.50+a

Hazardous work - Anytime Operating Engineers are involved with level C or above, $2.50 per hour over regular rate.

FOOTNOTE:
a. Paid Holiday: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP A(1): Crane, hydraulic cranes, tower crane, locomotive crane, piledriver, cableway, derricks, whirlies, dragline, boom truck (over 5 tons)

GROUP A(1): Crane Premiums

1 over 150' :add $1.00
2 over 200': add $2.00

GROUP A: Shovel, All excavator (except tractor mounted rubber tired John Deere 510 or smaller), gradalls, power road grader, all CMI equipment, front-end rubber tire loader, tractor-mounted drill (quarry master), mucking machine, concrete central mix plant, concrete pump, Belcrete system, automated asphalt concrete plant and tractor road paver, boom truck (5 tons and under).

GROUP B: Backhoe, (tractor mounted rubber tired equivalent to John Deere 510 or less), bulldozer, pushcat, tractor, traxcavator, scraper, LeTourneau grader, form fine grader, road roller, blacktop roller, blacktop spreader, power brooms, sweepers, trenching machine, Barber Green loader, side booms, hydrohammer, concrete spreader, concrete finishing machine, one drum hoist, power hosting (single drum), hoist - two drum or more, three drum engine, power hoisting (two drum and over), two drum and swinging engine, three drum swinging engine, hod hoist, A-L frame winches, cord and well drillers (one drum), post hole digger, model CHB Vibro-Tamp or similar machine, batch bin and plant

operator, dinkey locomotive, skid steer loader, track excavator 5/8 cu. yd. or smaller.

GROUP C: Fork lift, high lift, lull, Oiler, fireman and heavy- duty greaser, boilers, and steam generators, pump, vibrator, motor mixer, air compressor, dust collector, welding machine, well point, mechanical heater, generators, temporary light plants, concrete pumps, electric submersible pump 4" and over, murphy type diesel generator, conveyor, elevators, concrete mixer and belcrete power pack (belcrete system), seeding, and mulching machines, pumps.

ENGI0137-001 03/05/2012

DUTCHESS COUNTY (POUGHKEEPSIE AND SOUTH THEREOF)

BUILDING CONSTRUCTION

	Rates	Fringes
Power Equipment Operator		
GROUP 1A	$ 46.92	25.14+a
GROUP 1B	$ 43.21	25.14+a
GROUP 2A	$ 45.26	25.14+a
GROUP 3A	$ 43.58	25.14+a
GROUP 3B	$ 41.47	25.14+a
GROUP 4A	$ 43.14	25.14+a
GROUP 4B	$ 36.41	25.14+a
GROUP 5	$ 39.29	25.41+a
GROUP 5A	$ 49.25	25.14+a
GROUP 5B	$ 37.25	25.14+a
GROUP 6	$ 39.07	25.14+a

NOTES: Hazmat: 20% above regular rate
Pumping operation Premium .50

Crane Operators (100-149 ft) 2.00

Crane Operators (149 ft +) 3.00

Loader Operators (over 5 cu y) .50
Shovel Operators (over 4 cu yd) 1.00

FOOTNOTE:
a. New Years Day, Memorial Day, Independence Day, Labor Day Thanksgiving Day, Christmas Day, plus Lincoln's Birthday, Washington's Birthday, Good Friday, Columbus Day, November Election Day, Veteran's Day.

POWER EQUIPMENT OPERATORS CLASSIFICATION

GROUP 1-A: Carrier- trailer horse; concret-portable hoist; crane & hoist engineer-steel (concrete, material, super structure sub- structure); derrick (stone-steel); elevator & cage; hoist- single/double or triple drum; hoist-portable mobile unit; hoist engineer-concert (crane-derrick-mine

hoist); hoist engineer- material; overhead crane; power house plant; telephies (cableway); whirly; maintenance engineer; Lull hilift or similar; hydraulic crane 25 ton and over; cherry picker 25 tons and over; backhoe Oliver 88; fordson; dynahoe; dual purpose and similar machines; Barber Green Loader-euclid loader or similar type; conway or similar mucking macking machines; dragline; gradall; shovel; backhoe etc. (crawler or truck); front end loaders; hydraulic boom; jersey spreader; lift slab console; letournequ or tounapull (scrapers over 20 yds struck); mucking machines; pavement breaker (air ram); paver (concrete); road boring machine; road mix machines; ross carrier and similar machines; post hole digger; shovel (tunnels); side boom; spreader (asphalt); scoopmobile-tractor-shovel over 1 1/2 yds. trenching machines vermeer concrete saw trencher and similar; tractor type demolition equipment; winch truck (a frame); hydraulic crane over 10 ton up to 25 ton); cherry picker over 10 ton up to 25 ton)

GROUP 1-B: Compressor (steel erection); pulse meter and push button buzz box; elevator; mechanic (outside) all types; welder; scrapers 20 yds struck and under; machine pulling sheep's foot roller; vibratory rollers; roller 4 tons and over.

GROUP 2-A: Compactor self-propelled; grader; bulldoze D7 and similar tractors with a draw bar horsepower of 100 or over; bulldozer D6 and under; welder; scraper 20 yds struck and under; machine pulling sheep's foot roller; vibratory rollers.

GROUP 3-A: Asphalt plant; boiler (high pressure); concrete mixing plants; concrete pump; firemen; forklift; forklift (electric); joy drill or similar tractor drilling machine; loader - 1 1/2 yards and under; locomotive (all sizes); mixer concrete - 21E and over; portable asphalt plant; portable batch plant; portable crusher; quarry master; stone crusher; well drilling machine and well point system; cherry picker under 10 tons; hydraulic crane under 10 tons; concert buffy; one yard an up ride on dumper (benford or similar).

GROUP 3-B: Compressor over 125 cu. feet; conveyor belt machine regardless of size; lighting unit (portable & generator); welding machine (steel erection and excavation); and compressor plant; stud machine; ladder hoist.

GROUP 4-A: Air tractor drill; batch plant; bending machine; concrete breaker; concrete spreader; curb cutter machine; farm tractor (all types); finishing machine-concrete; hepavac clean air machine (all similar types: removal of asbestos etc.); material hopper-sand-stone-cement; mixer-concrete-under 21E; mulching grass spreader; pump-gypsum, etc., pump-plaster-grout -fireproofing; shop mechanic (not employed on job site); roller under 4 ton;

spreading and fine grading machine; steel cutting machine; syphon pump-air-steam; tar joint machine; turbo jet burner or similar equipment; vibrator (1 to 5); fine grading machine; roof hoist (tugger hoist); television cameras-water- sewer-gas-etc.

GROUP 4-B: Compressor to 125 feet; dust; dust collector; heater all types; pump; pump station (water and sewer); steam jenny; sweeper; chipper; mulcher.

GROUP 5: Motorized roller (walk behind)

GROUP 5-A: Master Mechanic

GROUP 5-B: Utility Man

GROUP 6: Warehouse Man

ENGI0137-007 03/05/2012

Poughkeepsie and South thereof

	Rates	Fringes
Power Equipment Operator (HEAVY & HIGHWAY)		
GROUP 1	$ 52.23	25.14+a
GROUP 1-A	$ 46.17	25.14+a
GROUP 1-B	$ 48.19	25.14+a
GROUP 2-A	$ 44.26	25.14+a
GROUP 2-B	$ 45.61	25.14+a
GROUP 3	$ 43.50	25.14+a
GROUP 4-A	$ 39.64	25.14+a
GROUP 4-B	$ 34.19	25.14+a
GROUP 5-A-1	$ 48.83	25.14+a
GROUP 5-A-2	$ 48.83	25.14+a
GROUP 5-A-3	$ 56.68	25.14+a
GROUP 5-A-4	$ 53.17	25.14+a
GROUP 5-A-5	$ 44.85	25.14+a
GROUP 5-B-1	$ 37.25	25.14+a
GROUP 5-B-2	$ 43.50	25.14+a
GROUP 5-B-3	$ 45.61	25.14+a

POWER EQUIPMENT OPERATORS CLASSIFICATIONS (HEAVY & HIGHWAY)

GROUP 1: Boom Truck; Cherry Picker; Clamshell; Crane, (Crawler, Truck); Dragline; Rough Terrain Crane

GROUP 1-A: Auger; Auto Grader; Dynahoe and Dual purpose and similar machines; Boat Captain; Boring Machine (all types); Bull Dozer-all sizes; Central Mix Plant Operator; Chipper-all types; Close circuit t.v.; Compactor with Blade; Concrete Portable Hoist; C.M.I. or similar; Conway or similar mucking machines; Gradall, Shovel Backhoe, etc. Grader; Derrick, (Stone- Steel; Elevator & cage, materials or passengers; Front end loaders over 1 1/2 yds.; Hoist Single, Double, Triple Drum, Hoist Portable Mobile Unit;

Hoist Engineer-Concrete (Crane-Derrick-Mine Hoist); Hoist Engineer-Material, Hydraulic Boom; Letourneau or Tournapull (Scrapers over 20 yds. struck); Log Skidder; Movable Concrete Barrier Transfer & Transport Vehicle; mucking machines; overhead crane; paver (conccrete); pulsemeter; push button (buzz box) elevator; road mix machines; Robot Hammer (brock or similar), Ross carrier and similar machines; shovels (tunnels); side boom; Slip Form Machine; spreader (asphalt); scoopmobile-tractor-shovel over 1 1/2 yards; trenching machines; telephies- vermeer concrete saw trencher and/or similar; tractor-type demolition equipment, Whirly

GROUP 1-B: Road Paver, Asphalt

GROUP 2-A: Ballast Regulators; Compactor self-propelled; Cow Tracks; Fusion Machine; Rail Anchor Machines; Roller 4 ton and over; Scrapers - 20 yards struck; Switch Tampers; Vibratory roller, etc.

GROUP 2-B: Mechanic (outside) all types

GROUP 3-A: Air tractor drill; asphalt plant; batch plant; boiler (high pressure; concrete breaker; concrete pump concrete spreader; curb cutter machine; farm tractor (all types); finishing machine (concrete); fine grading machine; fireman; forklift; forklift (electric); joy drill or similar tractor drilling machine; loader - 1 1/2 yards and under; locomotive (all sizes), maintenance engineer; machine pulling sheeps foot roller; material hopper; mixer concrete - 21-E and over; mulching grass spreader; portable asphalt plant, portable batch plant, portable crusher; powerhouse plant; quarry master; roller under 4 ton; spreading and fine grading machine; steel cutting machine; stone crusher; sweeper; turbojet burner or similar; well drilling machine ; winch truck "A" frame. John Henry Drill or similar.

GROUP 4-A: Service men (fuel or grease truck).

GROUP 4-B: Oiler; Compressor - compressor plant; paint compressor-steel erection; conveyor belt machine; lighting unit (portable & generator); oiler; pumps - pump station-water-sewer- gypsum- plaster, etc.; roller-motorized (walk-behind); welding machine (steel erection excavation); well point system; bending machine; dust collector; mixer - concrete under 21-E; heater all types; steam jenny; syphon pump-air-steam; tar joint machine; vibrator (1 to 5); Compressor Truck Mounted (2-6)

GROUP 5-A-1: Master Mechanic

GROUP 5-A-2: Engineer - all tower cranes, all climbing cranes and all cranes of 100 ton capacity or greater (3900 Manitowac or similar) irrespective of manufacturer and regardless of how the same is rigged (except for pile rigs).

GROUP 5-A-3: Engineer-- Pile Driver

GROUP 5-A-4: Hoist Engineer- Steel -Sub Structure

GROUP 5-A-5: Jersey-spreader, pavement breaker (air ram); Post Hole Digger

GROUP 5-B-1: Utility Man

GROUP 5-B-2: Concrete Saw

GROUP 5-B-3; Oiler

NOTES:

Loader Operator (over 5 cu yds)	.50
Shoval Operators (over 4 cu yd)	1.00
Hazmat premium over regular rate	20%

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day; Lincoln's Birthday; Good Friday; Memorial Day; Independence Day; Labor Day; Veterans Day; Columbus Day; November Election Day; Thanksgiving Day; and Christmas Day

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ENGI0825-007 01/01/2013

ORANGE, ULSTER AND SULLIVAN COUNTIES

	Rates	Fringes
Power Equipment Operator		
BUILDING, HEAVY & HIGHWAY		
GROUP 1	$ 41.02	27.75
GROUP 2	$ 39.43	27.75
GROUP 3	$ 37.52	27.75
GROUP 4	$ 35.89	27.75
GROUP 5	$ 34.18	27.75
GROUP 6	$ 42.84	27.75

NOTES:

Hazmat Premium	20%
Hydrographic Premium	.50

POWER EQUIPMENT OPERATORS CLASSIFICATIONS (BLDG, HEAVY & HWY)

GROUP 1: Autograde-Pavement-Profiler (CMI and Similar Type); utograde-Pavement-Profiler (CMI and Similar Types);Autograde Slipform Paver (CMI and Similar Types); Backhoe; Central Power Plants (all types); Concrete Paving Machine (s-240 and Similar Types); Cranes (All Types, Including Overhead and Straddle Traveling Type); Cranes, Gantry; Derricks (Land, Floating or Chicago Boom Type); Drillmaster/Quartmaster (Down the Hole Drill) Rotary Drill; Self-Propelled, Hydraulic Drill, Self-Powered Drill Draglines, Elevator Graders, Front End Loaders (5 yds. and over), Gradalls, Grader: Rago, Helicopters (Copilot),

Helicopters, (Communication Engineer), Locomotive (large), Mucking Machines, Pavement and Concrete Breaker (Superhammer, Hoe Ram, Brokk 250 and Similar Types), Pile Driver (length of boom including length of leads shall determine premium rate applicable), Roadway Surface Grinder Scooper (loader and shovel), Shovels, Tree Chooper with Boom, Trench Machines, Tunnel Boring Machines.

GROUP 2: "A" Frame; Backhoe (Combination); Boom Attachment on Loaders (Rate based on size of bucket) not applicable to Pipehook) Boring and Drilling Machines, Brush Chopper, Shredder and Tree Shredder Tree Shearer, Cableways, Carry-alls, Concrete Pump, Concrete Pumping System, Pumpcrete and Similar Types, Conveyors, 125 ft and over; Drill Doctor (duties include dust collector, maintenance), Front End Loader (22 yds. but less than 2 yds.), Graders (Finish); Groove Cutting Machine (ride on type), Heater Planer; Hoists: (all type hoists, Shall Also Include Steam, Gas, Diesel, Electric, Air Hydraulic, Single and Double Drum, Concrete, Brick Shaft, Caisson, Snorkel Roof, and or any other similar type Hoisting Machines, Portable or Stationary, Except Chicago Boom Type). Long Boom Rate to Be Applied if Hoist is "outside material lower hoist"; Hydraulic Cranes-10tons and Under; Hydro-Axe; Hydro-Blaster; Jacket (Screw Air Hydraulic Power Operated Unit or Console Type: Not Hand Jack or Pile Load Test Type), Log Skidder; Pans, Pavers (all) Concrete; Plate and Frame Filter Press; Pumpcrete Machines; Squeeze Crete and Concrete Pumping (regardless of size); Scrapers; Sidebooms; Straddle Carrier, Ross and Similar Types; Vacuum Truck; Whip Hammer; Winch Trucks (Hoisting).

GROUP 3: Asphalt Curbing Machine, Asphalt Plant Engineer, Asphalt Spreader; Autograde Tube Finisher & Texturing Machine (CMI and Similar types) Autograde Curecrete Machine (CMI and Similar Types); Bar Bending Machines (power), Batchers, Batching Plant and Crusher on-site; Belt Conveyor Systems; Boom Type Skimmer Machines; Bridge Deck Finisher; Bulldozers (all); Car Dumpers (A:road); Chief of Party; Compressor and Blower Type Units (used) Independenty or Mounted On Dual Purpose Trucks, On Job Site or In Conduction with Job Site, In Loading and Unloading of Concrete, Cement, Fly Ash, Instantcrete, or Similar Type Materials); Compressor 92 or 3 in Battery); Concrete Finishing Machines; Concrete Saws and Cutters (ride on type); Concrete Spreaders, Hetzel, Rexomatic and Similar types; Concrete Vibrators; Conveyors, Under 125 ft), Crushing Machines, Ditching Machine, Small (ditchwitch, Vermeer or Similar type); Dope Dots (mechanical with or without pump), dumpsters; Elevator; Fireman; Forklifts (economobile, lull, and similar types of equipment); Front End Loaders (1 yd. and over but less than 2 yds.); Generators (2 or 3 in Battery/ within 100 ft); Giraffe Grinders, Graders and Motor Patrols; Grout Pump; Gunnite Machines (excluding nozzle); Hammer Vibratory (in conduction with generators); Hoists (Roof, Tuggeraerial Platfrom Hoist and House Cars), Hoppers, Hoppers Doors

(power operated); Hydro-Blaster (where required); Ladders (Motorized); Laddervator; Locomotive, Dinky type; Maintenance, Utility Man; Mechanics; Mixers (Excepting Paving Mixers); Motor Patrols and Graders; Pavement Breakers, Small, Self-Propelled ride on type (also maintains compressor or hydraulic unit); Pavement Breaker, Truck Mounted; Pipe Bending Machine (power); Pitch Pump; Plaster Pump (regardless of size); Post Hole Digger (post pounder and auger); Rod Bending Machines (power); Roller, Black Top; Scales, (power); Seaman Pulverizing Mixer; Shoulder Widener; Silos; Skimmer Machines (Boom Type); Steel Cutting Machine, Services and Maintains; Tamrock Drill; Tractors; Tug Captain; Vibrating Plants (used in conduction with unloading); welder and Repair Machines. Concrete cleaning/decontamination machine operator; Directional boring machine; Heavy equipment robotics operator; Master environmental maintenance operator; Ultra high pressure waterjet cutting tool system operator; maintenance operator; Vacuum blasting machine operator

GROUP 4: Brooms and Sweepers; Chippers; Compressors (single); Concrete Spreaders (small type); Conveyor Loaders (not including Elevator Graders); Engines, Large Diesel (1620 h.p.) and Staging Pump; Farm Tractors; Fertilizing Equipment (Operator and Maintenance of); Fine Grade Machine (small type); Form Line Graders (small type); Front End Loader (under 1 yd); Generator (single); Grease, Gas, Fuel and Oil Supply Trucks; Heaters (Nelson or Other Type Including Propane, Natural Gas or Flowtype Units); Lights, Portable Generating Light Plants; Mixers, Concrete Small; Mulching Equipment (Operation and Maintenance of); Pumps (2 of Less Than 4 Inch Suction); Pumps 94 Inch Suction and Over Including Submersible Pumps); Pumps (Diesel Engine and Hydraulic); Immaterial of Power; Road Finishing Machines (Small Type); Rollers, Grade, Full Or Stone Base; Seeding Equipment (Operation and maintence of); Sprinkler and Water Pump Trucks (Used on job Site or in conduction with Job Site); Steam Jennies and Boilers, Irrespective of Use; Stone Spreader; Tamping Machines, Vibrating Ride On; Temporary Heating Plant (nelson or Other Type, Including Propane, Natural Gas or Flow Type Units); Water and Sprinkler Trucks (Used On Job Site In Conduction with Job Site); Welding Machines-Within 100 ft (Gas, and /or Electric Converters of any type, single, tow or three in a battery). welding system, multiple (rectifier transformer type) well point systems (including installation by bull gang and maintenance of); Off Road back dumps.

GROUP 5: Oiler

GROUP 6: Helicopter Pilot

a. PAID HOLIDAYS: New Years Day, Washington's Birthday Memorial Day, July 4th, Labor Day, Veteran's Day, Election Day, Thanksgiving Day, and Christmas Day, provided the employee works one day during the calendar week in which

the holiday occurs.

ENGI0825-008 01/01/2013

ORANGE, ULSTER AND SULLIVAN COUNTIES

	Rates	Fringes
Power equipment operators:		
BUILDING CONSTRUCTION		
STEEL ERECTION		
GROUP 1	$ 45.04	27.75
GROUP 2	$ 43.38	27.75
GROUP 3	$ 40.59	27.75
GROUP 4	$ 37.93	27.75
GROUP 5	$ 36.40	27.75
GROUP 6	$ 42.21	27.75
GROUP 7	$ 44.65	27.75
BUILDING CONSTRUCTION TANK ERECTION		
GROUP 1	$ 45.81	27.75
GROUP 2	$ 43.97	27.75
GROUP 3	$ 46.45	27.75
GROUP 4	$ 40.58	27.75
GROUP 5	$ 35.37	27.75
OILOSTATIC MAINLINES AND TRANSPORTATION PIPE LINES		
GROIUP 6	$ 45.88	27.75
GROUP 1	$ 43.95	27.75
GROUP 2	$ 42.30	27.75
GROUP 3	$ 42.30	27.75
GROUP 4	$ 38.66	27.75
GROUP 5	$ 44.73	27.75
GROUP 6	$ 44.58	22.50+a

NOTES:

Hydrographic Premium	50
Hazmat Premium	20%
Tunnel Premium	.75

STEEL ERECTION CLASSIFICATIONS

GROUP 1: Cranes (All Cranes, Land or Floating with Booms Including Jib 140 ft and over, Above Ground); Derricks, Land, Floating or Chicago Boom Type with Booms including Jib 140 ft and over above ground).

GROUP 2: Cranes (All Cranes, Land or Floating with Booms Including Jib Less Than 140 ft Above Ground); Derricks, Land, Floating or Chicago Boom Type with Booms Including Jib Less Than 140 ft above Ground).

GROUP 3: "A" Frame, Cherry Pickers 10 tons and under, Hoists Shall Also Include Steam, Gas, Desel, Electric, Air Hydraulic, Single and Double Drum Concrete, Brick Shaft Caisson, or Any Other Similar Type Hoisting Machines, Portable or Stationary, Except Chicago Boom Type; Jacks:

Screw Air Hydraulic Power Operated unit or Console Type (not hand Jack or Pile Load Test Type); Side Booms.

GROUP 4: Aerial Platform used as Hoist; Compressor: 2 or 3 in Battery; Elevators or House Cars; Conveyors and Tugger Hosits; Chief of Party; Firemanp; Forklift; Generators (2 or 3); Maintenance (Utility Man); Rod Bending Machine (power); Welding Machines (Gas or Electric, 2 or 3 in Battery, Including Diesels); Captain: Power Boats: Tug Master: Power Boats.

GROUP 5: Compressor, Single; Welding Machine, Single, Gas, Diesel, and Electric Converters of any Type: Welding System Multple (Rectifier Transformer Type); Generator, Single.

GROUP 6: Oiler

GROUP 7: Helicopter Pilot .

FOOTNOTE: a. PAID HOLIDAYS: New Years Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Election Day, Thanksgiving Day, and Christmas Day, provided the employee works one day in the calendar week during which the holiday occurs.

For BUILDING CONSTRUCTION TANK ERECTION CLASSIFICATIONS

NOTES: Tunnel Premium	.75
Hazmat Premium	20%
Hydrographic Premium	.50

TANK ERECTION CLASSIFICATIONS

GROUP 1: Operating Engineers on all Cranes, Derricks, ets with Booms Including Jib 140 ft or More Above Ground.

GROUP 2: Operating Engineer on all Equipment, Including Cranes, Derricks, ets with Booms Including Jib, Less Than 140 ft above the ground.

GROUP 3: Helicopter Pilot Engineer.

GROUP 4: Air Compressors, Welding Machines and Generators are Covered and are Defined as Cover: Gas, Diesel, or Electric Driven Equipment and Sources of Power from a Permanent Plant: ie: Staem, Comgressed Air, Hydraulic or Other Power, For The Operating of any Machine or Automatic Tools, Used In The Erection, Alteration, Repair and Dismantling of Tanks and Any and All "Dual Purpose" Trucks Used On The Construction Job Site, or in the Loading and Unloading of Materials, at the Construction Job Sited or in Conjuction with the Job Site.

GROUP 5: Oiler

FOOTNOTE:

a. PAID HOLIDAYS: New Years Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Election Day, Thanksgiving Day, and Christmas Day provided the Employee works one day in the calendar week during which the holiday occurs

For OILOSTATIC MAINLINES AND TRANSPORTATION PIPE LINE CLASSIFICATIONS

NOTES:

Hydrographic Premium	.50
Hazmat Premium	20%
Tunnel Premium	.75

OILSTATIC MAINLINES AND TRANSPORTATION PIPE LINES CLASSIFICATIONS

GROUP 1: Backhoe; Cranes (all types); Draglines, Front End Loaders (5yds. and over), Gradalls, Helicopters (co-pilot), Helicopters (Communication Engineer); Scooper (Loader and Shovel) Koehring; Trench Machines.

GROUP 2: "A" Frame; Backhoe (Combination Hoe Loader); Boring and Drilling Machines; Ditching Machines, Small, Ditchwitch, Vermeer or Similar type; Forklifts; Front End Loaders 92 yds. and over but less than 5 yds.); Graders, Finish (fine); Hydraulic Cranes 10 tons and under (over 10 tons) Cranes Rate Applies); Side Booms: Winch Trucks (Hoisting).

GROUP 3: Backfiller; Brooms and Sweepers; Bulldozers; Compressor (2 or 3 in battery); Chief of Party; Front End Loaders (under 2 yds); Generators; Giraffe Grinders; Graders and Motor Patrols; Machnic; Pipe Bending Machine (power);Tractors; Water and Sprinkler Trucks used on Job Site or in Conduction with Job Site); Welder and Repair Mechanic; Captain (power boats); Tug Master (power boats).

GROUP 4: Compressor (single); Dope Pots (Mechanical with or without Pump); Dust Collectors; Pumps (4 inch suction and over); Pumps (2 of less than 4 inche suction); Pumps, Diesel Engine and Hydraulic (immaterial of power); Welding Machines, Gas or Electric Converters of any type- 2 or 3 in Battery Multple Welders; Well Point Systems (including installation and Maintenance); Fram Tractors.

GROUP 5: Oiler, grease, gas, fuel and oil supply trucks; Tire repair and maintenance

GROUP 6: Helicopter Pilot

FOOTNOTE:

a. Paid Holidays: New Years Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Election Day, Thanksgiving Day and Christmas Day provided the Employee works one day in calendar week during which the holidays occurs.

IRON0417-001 07/01/2012

	Rates	Fringes
IRONWORKER	$ 36.70	35.30+a

a) Paid Holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Day after Thanksgiving (unpaid), Christmas Day.

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* LABO0017-002 07/01/2012

	Rates	Fringes
Laborers:		
DUTCHESS COUNTY (Asbestos, lead, toxic and hazardous waste abatement and any other environmental related work): (BUILDING CONSTRUCTION)		
GROUP 1	$ 29.35	20.65+a
GROUP 2	$ 33.70	20.65+a
DUTCHESS COUNTY (Asbestos, lead, toxic and hazardous waste abatement and any other environmental related work): (HEAVY & HIGHWAY:)		
GROUP 2	$ 37.60	20.65+a
GROUP 3	$ 37.60	20.65+a
ORANGE AND ULSTER COUNTIES (BUILDING CONSTRUCTION:)		
GROUP 1	$ 29.35	20.65+a
GROUP 2	$ 33.70	20.65+a
GROUP 3	$ 37.60	20.65+a
ORANGE, ULSTER, AND SULLIVAN COUNTIES (HEAVY & HIGHWAY)		
GROUP 1	$ 29.35	20.65+a
GROUP 2	$ 33.70	20.65+a
GROUP 3	$ 37.60	20.65+a
GROUP 4	$ 40.40	20.65+a
TUNNEL, SHAFT & CAISSON WORK		
GROUP 1	$ 29.35	20.65+a

LABORERS BUILDING CLASSIFICATIONS

GROUP 1: Custodial work, flag person, portable generator tender,portable pump tender, pitman and dumpman, firewatch,

temporary heat tender, temporary light tender, traffic control, tool room tender; Artificial turf, air chipping hammer acoustic pump and mixer, carpenter tender, concrete, concrete curb and sidewalk form setter, concrete form stripping, concrete sealing, concrete curing, concrete finisher, concrete vibrator, compressor, clean up after trades, dismantling demolition, excavation, fireproofing, foundation and building piping, pump and mixer, gunite, general clean up, grade checker, grading and backfilling, hoists, hod carrier, landscaping, mason tender, multi building trades tender, jackhammer, pavement breaker, poured gypsum roof work, power tampers, power walk behind roller, pressure blasting, power mixer, scaffolding, snow removal, signal person, sandblasting, styrofoam and similar installation, radio control equipment including but not limited to radio control tampers and rollers, radio control excavator, all erecting and dismantling of scaffold for masonry regardless of height, walking and riding power buggies, temporary weather protection, wrecking, waterproofing, stone and tile tendersr, radio controlled hammers and breakers, unloading of trucks, air track, assembling and placing gabion baskets, asphalt, blaster, bob cat type machine for demo and clean up, chain link fence, chain saw, chipping hammer, concrete conveyor belt, saw, core drill, corrugated pipe, construction specialist, cleaning machine, concrete form setter, conduit layer, cutting torch, discharge pipe, drill chuck tender, duct bank layer, explosive handler, hydraulic splitter, granite or stone curbing, handler, joy and jib drill, IngersollRand heavy duty crawler master type HCMZ drill machines or equivalent, laser level, nonmetallic pipe layer, metallic pipe layer, LeRoi hydraulic drill or similar, mega mixer, power fork lift, prestressed and precast concrete, power brush cutter, pump crete machine, retaining walls, rip rap, retention and toxic and hazardous waste liners, setting of block, setting of block, setting of brick, setting of stone, sound barriers, transit under laborers jurisdiction, tow behind concrete or grout pump, traffic and pedestrian stripping, surface planner, manufactured curb, walk behind durface planner, wagon drill, welding; * asbestos abatement work, lead abatement work, toxic and hazardous waste related work; when protective equipment and clothing are not required.

GROUP 2: Forklift for masonry purposes

GROUP 3: Asbestos Abatement work, toxic and hazardous abatement, lead abatement work, environmental work.

BUILDING CLASSIFICATIONS

GROUP 1: Asbestos abatement work, lead abatement work, toxic and hazardous waste related work; when protective equipment and clothing are not required.

GROUP 2: Asbestos abatement work, toxic and hazardous abatement, lead abatement work, environmental work.

FOOTNOTE:

a. PAID HOLIDAYS: New Years Day, President's Day, Memorial Day, Independence Day, Labor Day, Election Day, Veterans Day, Thanksgiving Day, Christmas Day

LABORERS HEAVY AND HIGHWAY CLASSIFICATIONS

GROUP 1: Flagperson, gateperson

GROUP 2: General laborers, chuck tender, handling and distributing drinking water, distributing all tools and supplies of laborers, nipper, powder carrier, magazine tender, warehouse laborers, concrete man, vibrator man, mason tender, mortar man, spraying, brushing and covering of concrete for curing and preservative purposes, traffic striper, scaffold builder, concrete crub and sidewalk from setter; permanent traffic striping and reflective devices, placing and maintenance of all flares, cones, lights, signs, barricades, traffic patterns, and all temporary reflective type materials for traffic control, custodial work, traffic directors, temporary heat or light tenders, tool room, dewatering pump men, pitman, dumpmen, snow removal and firewatch, asphalt man, joint setter, signal person, pipelayer, pipelining and relining, wellpoints, conduit and duct layer, wire puller rip rap and dry stone layer, steel rod carrier, core drill, rock splitter, Hilti gun air or electric, jackhammer, bush hammer, pavement breaker, chipping hammer, wagon drill, air track, jib rig, joy drill, gunite and sand blasting, coal passer and other machine operators, power tool operator, sprayer and nozzle man on mulching and seeding machine, all guard rail and fence, all seeding and sod laying, all landscape work, grade checker, all bridge work, walk behind self-propelled power saw, grinder, groover or similar type machine, walk behind tamper and roller of all types, salvage, stripping, wrecking and dismantling laborer (including barman, cutting torch and burner man), sheeting and shoring coming under laborers
jurisdicition, bit grinder, operator of form pin puller and drivers, sandblasting, joint and jet sealer, filling and wiring baskets for gabion walls, permanent sign man, median barrier,
sta-wall or similar type product, chain saw operator, railroad track laborer, waterproofer, pre-stressed and pre-cast concrete brick, block and stone pavers, power tools used to perform work usually done by laborers, power buggy and pumpcrete operator, fireproof, plaster and acoustic pump, asbestos, toxic, bio-remediation, phyto-remediation, lead or hazardous materials abatement when protective clothing and equipment is not required, power brush cutter, retention liners, artificial turf, retaining walls, walk behind surface planer, welding related to laborers work, remote controlled equipment normally operated by laborers, all technician work including but not limited to stitching, seaming, heat

welding, fireproof sprayer, mortar mixer, concrete finisher, form setter for concrete curbs and flatwork. Gunite nozzle man, stone cutters, granite stone layer, manhole, catch basin or inlet installing, lase men. Ground man on milling machine.

GROUP 3: Ingersoll Rand eavy duty crawler master type HCMZ any drill using 4" or larger bit, asbestos, toxic, bio-remediation, phyto-remediation, lead or hazardous material abatement when protective clothing and equipment is required, all working foremen including grade, pipe, concrete, clearing, blacktop, drill, paving and blaster etc., Hydraulic drill or similar, forklift for masonry only, Blaster and asphalt screedman.

GROUP 4: Asbestos, toxic, lead or hazardous material abatement foreman.

HEAVY & HIGHWAY CLASSIFICATIONS

GROUP 1: Asbestos, toxic, bio-remediation, phyto-remediation, lead or hazardous material abatement; when protective equipment and clothing are not required.

GROUP 2: Asbestos toxic, bio-remediation, phyto-remediation, lead or hazardous material abatement when protective clothing and equipment is required.

FOOTNOTE:

PAID HOLIDAYS: New Years Day, Presidents's Day, Memorial Day, Independence Day, Labor Day, Election Day, Veterans Day, Thanksgiving Day, Christmas Day

TUNNEL, SHAFT & CASSION CLASSIFICATIONS

GROUP 1: Laborer, Pit and Dumpman, Chuck Tender, Brakeman and Powder; Miner and all mavhine men, Safety Miner, all shaft work, casson work, drilling, blow pipe, all air tools, tugger scaling, nipper gunniting srom pot to nozzle, bit grinder, singal man (top and bottom), shift steward, concrete man, shield driven tunnel, mixed face and soft ground liner plate tunnel in free air.

LABO1000-001 06/01/2006

DUTCHESS COUNTY

	Rates	Fringes
Laborers:		
BUILDING CONSTRUCTION		
GROUP 1	$ 25.10	16.10
GROUP 2	$ 25.60	16.10
GROUP 3	$ 27.45	16.10

LABORERS CLASSIFICATIONS (BUILDING)

GROUP 1: Mason tenders, carpenter tenders, laborer stripping and cleaning forms, laborer grading and digging ditches, sweepers, cleaners.

GROUP 2: Hod carriers, plasterers' tenders, scaffold builders (padlock and self-supporting scaffold 14 ft. or under all runways, mortar mixers) machine and hand, concrete mixers by machine under 21e, vibrators, form setters, asphalt rakers, handling reinforcement rods, drillers, jackhammer, operator, signalman, gunniting, motorbugs, water pump 2" or under barco machine, wreckers, paving breakers, power saw operators, other machine operators.

GROUP 3: Blasters, Laser beam operator.

LABO1000-004 05/01/2009

DUTCHESS COUNTY

	Rates	Fringes
Laborers:		
HEAVY & HIGHWAY		
GROUP 1	$ 24.20	18.75+a
GROUP 2	$ 27.96	18.75+a
GROUP 3	$ 28.96	18.75+a

LABORERS CLASSIFICATIONS (HEAVY & HIGHWAY)

GROUP 1: Flagperson, placing and maintenance of all flares, cones, light, signs, barricades, traffic control, custodial work, traffic directors, temporary heat or light tenders, tool rooms.

GROUP 2: General Laborers, Dumpman, Pitman, Concrete Man, Signal Man, Pipelayer, Rip Rap, Dry Stone Layer, Jackhammer, Powderman, Highscalers, Power Buggy Operator, Steel Rod Carrier, Vibratory Operator, Other Machine Operator, Wrecking, Vibrator Operator-Compactor, Gunite and Sand Blasting, Water Pump 2" or under, Nipper, Chucker, Asphalt Workers.

GROUP 3: Asphalt Raker, Asphlat Screeman, Drillers (all), Laser Beam Operator, Form Setter/Aligners, Blasters.

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Lincoln's Birthday, Good Friday, Washington's Birthday, November Election Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Thanksgiving Day and Christmas Day and Veteran's Day.

PAIN0009-004 05/01/2012

DUTCHESS, ORANGE, SULLIVAN and ULSTER COUNTIES

	Rates	Fringes
GLAZIER	$ 40.00	32.89

PAIN0155-003 05/01/2012

	Rates	Fringes
Painters:		
DUTCHESS COUNTY, SULLIVAN AND ULSTER COUNTIES		
Drywall Finishers	$ 28.69	17.16
Lead Abatement Work	$ 28.69	17.16
Painter/Paperhanger	$ 28.69	17.16
Spray Rate	$ 29.69	17.16
ORANGE COUNTY		
Drywall Finishers	$ 28.69	17.16
Lead Abatement Work	$ 28.69	17.16
Painter/Paperhanger	$ 28.69	17.16
Spray Rate	$ 29.69	17.16

PAIN0806-008 10/01/2012

DUTCHESS, ORANGE, SULLIVAN AND ULSTER COUNTIES

	Rates	Fringes
PAINTER		
Structural steel and Bridge	$ 47.00	32.08

PLUM0021-005 05/01/2012

ZONE 2

DUTCHESS COUNTY AND THE REMAINDER OF ULSTER COUNTY

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 44.64	25.27

PLUM0373-002 05/01/2012

ZONE 1

ORANGE COUNTY Towns of Lakeville, Four Corners, Sterling Forest, Tuxedo Park, Southfields, Arden, Newburgh Junction, Greenwood Lake, Monroe, Harriman, Woodbury Falls, Woodbury, Woodbury Station, Central Valley, and the Palisades Interstate Park and Bear Mountain Park

	Rates	Fringes
Plumber; Steamfitter	$ 36.20	32.17
REFRIGERATION MECHANIC	$ 23.04	11.88

PLUM0373-003 05/01/2012

ZONE 2

SULLIVAN COUNTY (Townships of Lumberland, Forestburgh, Highland, Tusten, Mamakating, Fallsburgh, Thompson, Bethel, Cochecton, Delaware, Freemont, Callicoon, Liberty, Monticello, Neversink and Rockland); ORANGE COUNTY (Remaining Townships) and ULSTER COUNTY (Towns of Shawangurk, Wawarsing, Plattekill, Marlboro and Ellenville up to Napanoch Prison)

	Rates	Fringes
Plumber; Steamfitter	$ 36.20	32.17

ROOF0008-002 07/01/2012

	Rates	Fringes
ROOFER	$ 39.00	27.35

SFNY0669-002 04/01/2012

	Rates	Fringes
SPRINKLER FITTER	$ 39.08	20.65

SHEE0038-001 07/01/2012

	Rates	Fringes
Sheet metal worker	$ 41.81	31.85

TEAM0445-001 05/01/2012

	Rates	Fringes
Truck drivers:		
GROUP 1	$ 30.35	26.25+a
GROUP 1A	$ 31.49	26.25+a
GROUP 2	$ 29.79	26.25+a
GROUP 3	$ 29.57	26.25+a
GROUP 4	$ 29.46	26.25+a
GROUP 5	$ 29.34	26.25+a

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Labor Day, President's Day, Presidential Election Day, Veterans Day, Decoration Day, Independence Day, Thanksgiving Day and Christmas Day provided the employee works two days in any calendar week during which the holidays occurs.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Drivers on Letourneau tractors, double barrel euclids, Athey wagons and similar equipment (except when

hooked to scrapers), I-beam and pole trailers, drivers of road oil distributors, tire trucks and tractors and trailers with 5 axles and over, Articulated Back Dumps and Articulated Water Trucks.

GROUP 1A: Drivers on detachable Gooseneck Low bed Trailers rated over 35 tons.

GROUP 2: Drivers on all equipment 25 yards and over, up to and including 30 yard bodies and cable dump trailers and powder and dynamite trucks.

GROUP 3: Drivers on all equipment up to and including 24 yard bodies, mixer trucks, dump crete trucks and similar types of equipment, fuel trucks, batch trucks and all other tractor trailers.

GROUP 4: Drivers on tri axles, ten-wheelers, grease trucks and tillermen.

GROUP 5: Drivers on pick-up trucks used for materials & parts, drivers on escort man over-the-road and drivers on straight trucks.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e.,

Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

APPENDIX A1

DBE GOALS STATEMENT

The undersigned Bidder has satisfied the requirements of the Contract in the following manner (Complete the appropriate spaces):

The Bidder is committed to meeting the DBE utilization goal set forth in this Contract.

or

The Bidder is unable to meet the DBE utilization goal set forth in this Contract, but is committed to a minimum of _____% DBE utilization on this Contract and submits the attached narrative and documentation demonstrating good faith efforts consistent with Appendix A of 49 CFR 26 to meet the DBE utilization goal set forth in this Contract. Attach as many pages as necessary to provide a full and complete narrative and supporting documentation of good faith efforts made. This narrative shall be submitted on company letterhead and signed.

It is the present intent of the Bidder to utilize the specific DBE firms identified in Appendix A2 in the performance of the Work of this Contract. If for any reason, one or more of the DBE firms identified in Appendix A2 are unable or unwilling to participate, the Bidder will make good faith efforts to replace the DBE firm with another DBE firm in accordance with the Information For Bidders clause entitled "DBE Program".

Bidder Name: Tutor Perini Corporation / Intercounty Paving Associates, JV

Federal Tax ID No.: [redacted]

By: James M. Laing
Signature and Title James M. Laing, Attorney-in-Fact

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: Stewart Airport Contract SWF-164.039

BIDDER:
Name of Firm: Tutor Perini Corp. / Intercounty Paving Assoc. LLC / JV

Address: 1000 Main St, New Rochelle, NY Telephone: 914 739-1908

DBE:
Name of Firm: Advanced Mill & Pave Inc.

Address: 214 Vincent Dr, East Meadow, NY 11554 Telephone: 516-523-2966

Description of work to be performed by DBE: Asphalt

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $2,063,000 or 3.4 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015 .

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Bushan Bandoji / President
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M. Laing
Signature of Bidder and Title

James M Laing
Sr Vice President

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor Perini Corp. / Intercounty PV. JV

Address: 1000 Main St, New Rochelle, NY 10801 Telephone: 914 739-1908

DBE:
Name of Firm .Dumont Electrical Inc.

Address: P.O. Box 525 Sparta, NJ 07871 Telephone: 973-729-8084

Description of work to be performed by DBE: Material Supplier

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $1,500,000 or 2.5 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015 .

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: John Irizarry President
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M. Laing
Signature of Bidder and Title

James M Laing
Sr Vice President

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF-164.039 Stewart Airport

BIDDER:
Name of Firm: Tutor Perini Corp. / Intercounty Paving Assoc. LLC / JV
Address: 1000 Main St, New Rochelle, NY 10801 Telephone: 914 739-1908

DBE:
Name of Firm: Jess Security and Investigation, Inc..
Address: 3125 Tibbett Avenue #10D, Bronx, NY 10663 Telephone: 718 219 1220
Description of work to be performed by DBE: Security Guard Services #9
Stewart International Airport

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $1,300,000 or 2.1 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015 .

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: David Imayeguahi C.E.O.
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M. Laing
Signature of Bidder and Title

James M Laing
Sr Vice President

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF-164.039 Stewart Int'l Airport Runway 9-27 & 16-34 Rehabilitation

BIDDER:
Name of Firm: Tutor Perini Corp/ Intercounty Paving Associates LLC / JV

Address: 1000 Main St, New Rochelle, NY 10801 Telephone: 914 739-1908

DBE:
Name of Firm .Perfect Cut Landscaping, Inc./Hudson Valley Trucking

Address: 24 Country Club Drive Florida, NY 10421 Telephone: 845-651-4263

Description of work to be performed by DBE: Tri-axle Dump trucking

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $606,000 or 1.0 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015 .

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Thomas E. Sanchez President
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M. Laing
Signature of Bidder and Title

James M Laing
Sr Vice President

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor/ Perini/Intercounty JV

Address: 1000 Main St, New Rochelle, NY 10801 Telephone: 914 739-1908

DBE:
Name of Firm .Montana Datacom .

Address: 35-15 11th St. Long Island, NY 11106 Telephone: 718-482-6789

Description of work to be performed by DBE: Material Supplier

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $489,000 or 0.8 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015 .

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Nona Meuse
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M. Laing
Signature of Bidder and Title

James M Laing
Sr Vice President

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor Perini Corp. / Intercounty Paving Assoc./LLC/JV

Address: 1000 Main St, New Rochelle, NY 10801 Telephone: 914 739-1908

DBE:
Name of Firm .Traffic Lane Closures, LLC

Address: 1214 Rt – 52, Carmel, NY 10512 Telephone: (845) 228-6100

Description of work to be performed by DBE: MPT, Erosion Control, PPE Supplier

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $140,000 or 0.2 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015 .

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Teresa Rosenfeld Owner
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M. Laing
Signature of Bidder and Title

James M Laing
Sr Vice President

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A3
INFORMATION ON SOLICITED FIRMS

The bidder must complete this form for itself and for all firms which gave the bidder a quotation for any work planned to be subcontracted regardless of whether they are ultimately chosen to participate in the Contract. Provide the information required below for every firm that provided a bid or a quote for a subcontract – even if the bid or quote from the firm is not used in the preparation of the final Proposal.

Name of Firm	Address of Firm	Phone Number	Contact Person	Firm Age	Annual Gross Revenue Range NOTE: See Footnote Below	DBE Certified (Yes/No)
Americore Drille & Cutting	12-11 38th Avenue LIC, NY 11101	(718) 392-1313	Alex			No
Atlantic Concrete Cutting	396 N Pemberton Road Mt. Holly, NJ 08060	(609) 261-7200	Michelle Morris	21 yrs.	Over $5 Million	Yes
Bel-Air Electric Construction, Inc.	30 Stewart Street Hewlett, NY 11557	(516) 593-6241	Amir Gal			No
Boundary Fence	131-02 Jamaica Avenue Richmond Hill, NY	(718) 847-3400	Aldo Sibeni	50 yrs.	Over $5 Million	Yes
Brooklyn Rebar	367 Vandervoot Ave Brooklyn, NY 11211	(718) 963-2777	Bob McKinstrey	5 yrs.	Over $5 Million	No
Cardinal / International Grooving & Grinding LLC	100 Barren Hill Road Conshohocken, PA 19428	(610) 825-2200	Phil A Zuzelo	12 yrs	$2 - $5 Million	No
Churchgate Security	747 Lexington Ave Ste 1 Brooklyn, NY 11221	(718) 498-5960	Kelley Eyubeh			Yes
Clemente Latham	18 Argenio drive, New Windsor, NY 12533	(845) 565-1041	Kevin Maher			No
Corporate Loss Prevention Associates	2635 Petti Avenue Bellmore, NY 11710	(516) 409-0003	Vincent Boue	33 yrs.	Over $5 Million	No
Cranesville Block Co	1250 Riverfront Center Amstredam, NY	(518) 684-6119	Patti VanAlstyne	57 yrs.	Over $5 Million	No
E. Tetz & Sons, Inc.	130 Crotly Road Middletown, NY 10941	(845) 692-4486	Bob Weber	56 yrs.	Over $5 Million	No
Fanshawe Inc/Rockland Electric	143 Main Street 1st Floor Nanuet, NY 10954	(845) 627-3232	George Fanshawe	31 yrs.	Over $5 Million	No
First Alert Security Services, Inc.	2174 Fulton Street Brooklyn, NY 11233	(718) 506-6066	Lateef Sammi	4 yrs.	$976,000	Yes

Footnote: Annual Gross Revenue Ranges: Less than $500,000; $500,000 - $1 Million; $1 - $2 Million; $2 - $5 Million; Over $5 Million - Select the category that best identifies the annual gross revenue of the solicited firm.

APPENDIX A3
INFORMATION ON SOLICITED FIRMS

FJC Securim Services	JFK Airport bld#75, RM 228 Jamaica, NY 11430	(718) 244-1400	Frank Festa	24 yrs.	Over $1 Million	No
Globosa Security Services	507 B E 163rd Street Bronx NY 10451	(718) 665-5321	Chris Odiase	4 yrs.	Less than $500,000	Yes
HBC Electric	131 Washington Street Lodi, NJ 07644	(973) 777-4472	Jay Hoogendoorn	20 yrs.	Over $5 Million	No
Hi Lite Markings Inc	PO Box 460, Adams Center NY 13606	(315) 583-6111	Dennis Haefner	23 yrs.	Over $5 Million	No
Hudson Valley Engineering Associates	560 Route 52 Suite 201 Beacon, NY 12508	(845) 838-3600	Jessica Marina	11 yrs.	$2 - $5 Million	Yes
Jess Security Services Inc.	3125 Tibbett Avenue Suite 10D Bronx, NY 10463	(718) 219-1220	David Imayequahi	12 yrs.	$500,000 - $1 Million	Yes
JP Hogan Coring & Sawing Corp	680 Gulf Avenue Staten Island NY 10314	(718) 761-7014	K Makowski	19 yrs	$2 - $5 Million	No
K&D Industries of New York, LLC	129 Gallows Hill Road Cortlandt Manor, NY 10567	(914) 293-7000	Darrell Bjorkland	9 yrs.	$500,000 - $1 Million	Yes
LB Electric LLC Tri-State Electric	50 Commerce Rd Cedar Grove, NJ 07009	(973) 571-2200	Leon K Baptiste	14 yrs.	Over $5 Million	Yes
LDS Lockdown Patrol, NYC	616 Bainbridge Street Brooklyn, NY 11233	(917) 620-8091				No
Master Halco	25 Mill Road Ronkonkoma, NY	(631) 585-8150	Bob Locurto	50 yrs.	Over $5 Million	No
Mohegan Associates, Inc.	130 Old Route 6 Carmel, NY 10512	(845) 225-6468	Lou Caliccha	15 yrs.	Over $5 Million	No
MS Construction	600 Franklin Avenue Mount Vernon, NY	(914) 667-7373	Josh Troetel	1 yr.	Less than $500,000	No
MS Unlimited, Inc	6828 Ellicott Drive E. Syracuse, NY 10357	(315) 437-1291				Yes
New York Geomatics	4601 39th Avenue #421 Sunnyside, NY 11104	(718) 757-1418	Rafael Perez	3 yrs.	Less than $500,000	Yes
O'Connell Electric Company, Inc	830 Phillips Road Victor, NY 14564	(585) 924-2176	Dick Borza	102 yrs.	Over $5 Million	No
Pagones-O'Neil, Inc.	355 Main Street Beacon, NY 12508	(845) 632-6900	Steven Pagones			No
Perfect Cut Landscaping dba Hudson Valley Trucking	24 Country Club Drive Florida, NY 10421	(845) 651-4263	Thomas E Sanchez	15 yrs.	Over $5 Million	No

Footnote: Annual Gross Revenue Ranges: Less than $500,000; $500,000 - $1 Million; $1 - $2 Million; $2 - $5 Million; Over $5 Million - Select the category that best identifies the annual gross revenue of the solicited firm.

APPENDIX A3
INFORMATION ON SOLICITED FIRMS

Perreca Electric Co., Inc.	27 West Street Newburgh, NY 12550	(845) 562-4080	Frank Carlstrom	64 yrs	Over $5 Million	No
Probek Construction Corp	251 Jernee Mill Road, Suite C Sayreville, NJ 08872	(732) 613-8822	Johnnie Provini	9 yrs.	$1 - $2 Million	No
Raritan Pipe & Supply	301 Meadow Road Edison, NJ 08817	(732) 985-5000				No
Rebar Steel Corp Safety Grooving & Grinding	2 Maplewood Avenue Farmingdale, NY 11735	(631) 390-9404	Mike Smith			Yes
	13-226 County Road R Napoleon, OH 43545	(419) 592-8666	Duff Parker	60 yrs.	Over $5 Million	No
Safety Markings, Inc	460 Bostwick Avenue Bridgport, CT 06605	(203) 333-6870	David Steffens	40 yrs.	Over $5 Million	No
Summit Security Services, Inc	390 RXR Plaza Uniondale, NY 11556	(516) 240-2426	Christopher Byrne	36 yrs	Over $5 Million	No
Tectconic Engineering Surveying Consultants	70 Pleasant Hill Road Nountainville, NY 10953	(845) 563-9081	James Duesel	27 yrs.	Over $5 Million	No
Trench Technologies	37 Overlook Road Livingston, NJ	(973) 543-1915	Andrew Amsterdam	6 yrs	Over $1 Million	No
Tutor Perini Corporation	1000 Main Street, New Rochelle, NY 10801	(914) 739-1908	Henry Cheung	118 yrs.	Over $5 Million	No
Vellano Bros., Inc	29 Vellano Drive Wappingers Falls, NY 12590	(845) 838-1010	Paul Meissner	65 yrs.	Over $5 Million	No

Footnote: Annual Gross Revenue Ranges: Less than $500,000; $500,000 - $1 Million; $1 - $2 Million; $2 - $5 Million; Over $5 Million - Select the category that best identifies the annual gross revenue of the solicited firm.

APPENDIX B (NY)
NOTICE TO CONTRACTORS
AFFIRMATIVE ACTION REQUIREMENTS
EQUAL EMPLOYMENT OPPORTUNITY

1. NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246, AS AMENDED).

The following is to be made a part of all solicitations for bids on all federally assisted construction contracts or subcontracts in excess of $10,000.00.

1.) The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2.) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce on all construction work in the covered area, are as follows:

Trade	
Electricians	9.0% - 10.2%
Carpenters	27.6% - 32.0%
Steamfitters	12.25%- 13.5%
Metal Lathers	24.6% - 25.6%
Painters	22.8% - 26.0%
Operating Engineers	25.6% - 26.0%
Plumbers	12.0% - 14.5%
Iron Workers (Structural)	25.9% - 32.0%
Elevator Constructors	5.5% - 6.5%
Bricklayers	13.4% - 15.5%
Asbestos Workers	22.8% - 28.0%
Roofers	6.3% - 7.5%
Iron Workers (Ornamental)	22.4% - 23.0%
Cement Masons	23.0% - 27.0%
Glaziers	16.0% - 20.0%
Plasterers	15.8% - 18.0%
Teamsters	22.0% - 22.5%
Boilermakers	13.0% - 15.5%
All other	16.4% - 17.5%*
Women	6.9%*

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* In the event that during the performance of this Contract the Office of Federal Contract Compliance establishes different goals for New York City, the Contractor shall be deemed bound to such different goals and this Appendix shall be deemed amended to substitute such goals for the goals set forth above.

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally-assisted) performed in the covered area. If the Contractor performs construction Work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where this Contract is to be performed.

The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the Contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3.) The Contractor shall provide written notification to the Director OFCCP, within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under this Contract. The notification shall list: the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and, the geographical area in which the subcontract is to be performed.

4.) As used in this notice, and in this Contract, the "covered area" means the Counties of New York State which comprise the five Boroughs of New York City - specifically, Bronx, Kings, New York, Queens and Richmond Counties.

5.) The Department of Labor has eliminated all imposed EEO plans and the Philadelphia Plan as a means of complying with Executive Order 11246. Hometown Plans can still be used; however, signatories are required to submit goals and timetables for the utilization of women to the Director, Office of Federal Contract Compliance Programs, Department of Labor, Washington, D.C.

2. STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246, AS AMENDED)

The following specifications are made a part of all federally assisted construction contracts or subcontracts over $10,000.00 and included in all invitations for bids:

A. As used in these specifications:

1.) "Covered area" means the Counties of New York State which comprise the five Boroughs of New York City - specifically, Bronx, Kings, New York, Queens and Richmond Counties.

2.) "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), United States Department of Labor, or any person to whom the Director delegates authority;

3.) "Employer identification number" means the Federal Social Security Number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;

4.) "Minority" includes:

a. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

b. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South America, or other Spanish culture or origin regardless of race);

c. Asian or Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast, Asia, the Indian Subcontinent, or the Pacific Islands); and

d. American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

B. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the Work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the notice above which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this Contract resulted.

C. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the plan area (including goals and timetables) shall be in accordance with that plan for those trades which have unions participating in the plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO Clause and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the plan goals and timetables.

D. The Contractor shall implement the specific affirmative action standards provided in paragraphs G.(1) through (16) of these Specifications. The goals set forth in this Contract are expressed as percentages of the total hours of employment and training of minority and female utilizations; the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction Work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply to the minority and female goals established for the geographical area where the Work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any OFCCP office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

E. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the Contractor has a collective bargaining agreement to refer either minorities or women shall excuse the Contractor's obligations under these Specifications, Executive Order 11246, as amended, or the regulations promulgated pursuant thereto.

F. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

G. The Contractor shall take specific affirmative actions to ensure Equal Employment Opportunity (EEO). The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

1.) Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

2.) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

3.) Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason, therefor, along with whatever additional actions the Contractor may have taken.

4.) Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

5.) Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under G.(2) above.

6.) Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction Work is performed.

7.) Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job sites. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

8.) Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media,. and providing written notification to and discussing the Contractor's EEO policy with other Contractors and subcontractors with whom the Contractor does or anticipates doing business.

9.) Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female. recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

10.) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of the Contractor's workforce.

11.) Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

12.) Conduct, at least annually, an inventory and evaluation, at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

13.) Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

14.) Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

15.) Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

16.) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

H. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (G.(1) through (16)). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar groups of which the Contractor is a member and participant, may be asserted as fulfilling any one of more of its obligations under G.(1) through (16) of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

I. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provided EEO and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate number (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

J. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

K. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246, as amended.

L. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the OFCCP. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

M. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph G of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

N. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.

O. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

CONFORMED

THE PORT AUTHORITY OF NY & NJ

May 28, 2013

Lillian D. Valenti
Director, Procurement

VIA FACSIMILE AND UPS NEXT DAY DELIVERY

Tutor Perini Corporation
Intercounty Paving Associates, LLC (JV)
1000 Main Street
New Rochelle, NY 10801

SUBJECT: STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY 16-34 – CONTRACT #SWF-164.039
PURCHASE ORDER USWF164039

Gentlemen:

The Port Authority of New York and New Jersey hereby accepts your proposal on the above Contract.

The Port Authority elects not to require you to furnish a performance and payment bond.

Your attention is directed to the clause of the Contract entitled "Time for Completion and Damages for Delay" and to the fact that before you may commence performance of the work you must furnish whichever of the documents mentioned in that clause are applicable.

Forwarded herewith for your use and compliance are "General Instructions Relating to the Direction and Processing of Correspondence and of Those Other Items Specified to be Submitted to the Port Authority Under the Terms of the Contract".

In order to ensure that payments are processed properly, please include the above-referenced Purchase Order No. on all payment invoices and correspondence.

Very truly yours,

THE PORT AUTHORITY OF NEW YORK
AND NEW JERSEY

BY _____
Director of Procurement

2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 201 395 7477

UPS DELIVERED TO CONTRACTOR ON MAY 29, 2013

TUTOR-PERINI CORPORATION/
INTERCOUNTY PAVING ASSOCIATES, LLC
(JV)

THE PORT AUTHORITY OF NY & NJ

CA06-164039
PQLFAA

1

#
D.H.

STEWART INTERNATIONAL AIRPORT

REHABILITATION OF RUNWAY 9-27 AND RUNWAY 16-34

CONTRACT SWF-164.039

JANUARY 2013

This proposal is not complete unless bidder's Signature appears on page 19

5.) Fill in below the name and address of the bidder's chief banking representative handling the bidder's account.

Banking Institution:	Bank of America Merrill Lynch
Address:	333 S. Hope Street 13th Floor
	Los Angeles, CA 90071
Bank Representative:	Adam Feit
Telephone Number:	213-621-7163

6.) Fill in below the bidder's Federal Employer Identification Number (i.e., the number assigned to firms by the Federal Government for tax purposes); the bidder's Dun and Bradstreet number, if any; the name of any other credit service to which the bidder has furnished information and the number, if any, assigned by such service to the bidder's account.

[redacted]

Federal Employer Identification No.

006954432

Dun and Bradstreet No.

N/A

Other Credit Service

Account No.

D. The Form of Contract bound herewith, with the bidder's prices inserted in the clause thereof entitled "Unit Prices and Lump Sum". The amounts must be given both in figures and in writing and, in case of discrepancy, the writing shall control. The unit prices must be extended and totaled. The Estimated Total for Classified Work and the Lump Sum must be entered in the recapitulation and totaled. One copy of each addendum, if any, issued during the bidding period shall be initialled and attached to the Proposal, but any Proposal submitted without such addendum initialled and attached will nevertheless be construed as though such addendum had been initialled and attached.

E. The bidder's analysis of bid filled in on the form furnished herewith. The Contractor will be required to furnish a more detailed analysis of bid at a later date in accordance with the requirements of the Section of Division 1 of the Specifications referring to the Analysis of Bid.

F. A Certification of Nonsegregated Facilities and a Certification of Title VI Civil Rights Act of 1964 Compliance filled in on the forms attached hereto in Appendix A.

G. A DBE Goals Statement filled in on the form attached hereto as Appendix A1.

5.) Fill in below the name and address of the bidder's chief banking representative handling the bidder's account.

Banking Institution: NY Commercial Bank
Address: 1 Jericho Plaza
Jericho NY 11753
Bank Representative: Eric Buchowski
Telephone Number: 516-942-6819

6.) Fill in below the bidder's Federal Employer Identification Number (i.e., the number assigned to firms by the Federal Government for tax purposes); the bidder's Dun and Bradstreet number, if any; the name of any other credit service to which the bidder has furnished information and the number, if any, assigned by such service to the bidder's account.

[redacted]

Federal Employer Identification No.

0031 0073 6

Dun and Bradstreet No.

[redacted]

Other Credit Service

Account No.

D. The Form of Contract bound herewith, with the bidder's prices inserted in the clause thereof entitled "Unit Prices and Lump Sum". The amounts must be given both in figures and in writing and, in case of discrepancy, the writing shall control. The unit prices must be extended and totaled. The Estimated Total for Classified Work and the Lump Sum must be entered in the recapitulation and totaled. One copy of each addendum, if any, issued during the bidding period shall be initialled and attached to the Proposal, but any Proposal submitted without such addendum initialled and attached will nevertheless be construed as though such addendum had been initialled and attached.

E. The bidder's analysis of bid filled in on the form furnished herewith. The Contractor will be required to furnish a more detailed analysis of bid at a later date in accordance with the requirements of the Section of Division 1 of the Specifications referring to the Analysis of Bid.

F. A Certification of Nonsegregated Facilities and a Certification of Title VI Civil Rights Act of 1964 Compliance filled in on the forms attached hereto in Appendix A.

G. A DBE Goals Statement filled in on the form attached hereto as Appendix A1.

5.) Fill in below the name and address of the bidder's chief banking representative handling the bidder's account.

Banking Institution: To be established upon contract award

Address: _____

_____

Bank Representative: _____

Telephone Number: _____

6.) Fill in below the bidder's Federal Employer Identification Number (i.e., the number assigned to firms by the Federal Government for tax purposes); the bidder's Dun and Bradstreet number, if any; the name of any other credit service to which the bidder has furnished information and the number, if any, assigned by such service to the bidder's account.

To be established upon contract award

Federal Employer Identification No.

_____

Dun and Bradstreet No.

_____ _____

Other Credit Service Account No.

D. The Form of Contract bound herewith, with the bidder's prices inserted in the clause thereof entitled "Unit Prices and Lump Sum". The amounts must be given both in figures and in writing and, in case of discrepancy, the writing shall control. The unit prices must be extended and totaled. The Estimated Total for Classified Work and the Lump Sum must be entered in the recapitulation and totaled. One copy of each addendum, if any, issued during the bidding period shall be initialled and attached to the Proposal, but any Proposal submitted without such addendum initialled and attached will nevertheless be construed as though such addendum had been initialled and attached.

E. The bidder's analysis of bid filled in on the form furnished herewith. The Contractor will be required to furnish a more detailed analysis of bid at a later date in accordance with the requirements of the Section of Division 1 of the Specifications referring to the Analysis of Bid.

F. A Certification of Nonsegregated Facilities and a Certification of Title VI Civil Rights Act of 1964 Compliance filled in on the forms attached hereto in Appendix A.

G. A DBE Goals Statement filled in on the form attached hereto as Appendix A1.

PROPOSAL

To The Port Authority of New York and New Jersey:

The undersigned[3]

Tutor Perini Corporation, a Corporation organized under the laws of the State of Massachusetts

(hereinafter called "the Contractor") hereby offers to perform all the obligations and to assume all the duties and liabilities of the Contractor provided for in the annexed Contract, at the prices inserted by the undersigned in the clause of the Form of Contract entitled "Unit Prices and Lump Sum".

This offer shall be irrevocable for ninety (90) days after the date on which The Port Authority of New York and New Jersey opens this Proposal.

To induce the acceptance of this Proposal, the undersigned hereby makes each and every certification, statement, assurance, representation and warranty made by the Contractor in said Contract. Moreover as a condition to receipt and consideration by the Authority of the Proposal whether or not it is accepted, the undersigned agrees that all information of any nature whatsoever, regardless of the form of the communication, received from the undersigned (including its officers, agents, or employees) by the Authority, its Commissioners, officers, agents or employees, and notwithstanding any statement therein to the contrary, has not been given in confidence and may be used or disclosed by or on behalf of the Authority without liability of any kind except as may arise under letters patent of the undersigned, if any.

02-04-13P02:49 RCVD

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3 Insert bidder's name at the top of the page. After the bidder's name, insert one of the following phrases:

If a corporation, give state of incorporation, using the phrase, "a corporation organized under the laws of the State of ."

If a partnership, give full names of partners, using also the phrase, "co-partners doing business under the firm name of ."

If an individual using a trade name, give individual name, using also the phrase, "an individual doing business under the trade name of ."

If a joint venture, give the information required above for each participant in the joint venture.

PROPOSAL

To The Port Authority of New York and New Jersey:

The undersigned[3]

Carl Lizza III (Managing Member), John Lizza (Member), Estate of Carl Lizza, Jr. and John Perrucci, Jr. (Member) - "co-partners doing business under the firm name of Intercounty Paving Associates, LLC"

(hereinafter called "the Contractor") hereby offers to perform all the obligations and to assume all the duties and liabilities of the Contractor provided for in the annexed Contract, at the prices inserted by the undersigned in the clause of the Form of Contract entitled "Unit Prices and Lump Sum".

This offer shall be irrevocable for ninety (90) days after the date on which The Port Authority of New York and New Jersey opens this Proposal.

To induce the acceptance of this Proposal, the undersigned hereby makes each and every certification, statement, assurance, representation and warranty made by the Contractor in said Contract. Moreover as a condition to receipt and consideration by the Authority of the Proposal whether or not it is accepted, the undersigned agrees that all information of any nature whatsoever, regardless of the form of the communication, received from the undersigned (including its officers, agents, or employees) by the Authority, its Commissioners, officers, agents or employees, and notwithstanding any statement therein to the contrary, has not been given in confidence and may be used or disclosed by or on behalf of the Authority without liability of any kind except as may arise under letters patent of the undersigned, if any.

---

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If a corporation, give state of incorporation, using the phrase, "a corporation organized under the laws of the State of ."

If a partnership, give full names of partners, using also the phrase, "co-partners doing business under the firm name of ."

If an individual using a trade name, give individual name, using also the phrase, "an individual doing business under the trade name of ."

If a joint venture, give the information required above for each participant in the joint venture.

PROPOSAL

To The Port Authority of New York and New Jersey:

The undersigned[3]

Tutor Perini Corporation / Intercounty Paving Associates LLC , JV

(hereinafter called "the Contractor") hereby offers to perform all the obligations and to assume all the duties and liabilities of the Contractor provided for in the annexed Contract, at the prices inserted by the undersigned in the clause of the Form of Contract entitled "Unit Prices and Lump Sum".

This offer shall be irrevocable for ninety (90) days after the date on which The Port Authority of New York and New Jersey opens this Proposal.

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If a partnership, give full names of partners, using also the phrase, "co-partners doing business under the firm name of ."

If an individual using a trade name, give individual name, using also the phrase, "an individual doing business under the trade name of ."

If a joint venture, give the information required above for each participant in the joint venture.

Unless expressly stated otherwise, the Information for Bidders, all papers required by it and submitted in connection herewith at any time, said Form of Contract, and all papers made part of the Contract by the terms of the Form of Contract are made part of this Proposal.

The undersigned hereby designates the following as the bidders office[4]:

1000 Main Street

New Rochelle, NY 10801

The telephone number of the bidder is: 914-739-1908

The fax number of the bidder is: 914-739-5101

The E-Mail address of the bidder is: jlaing@perini.com

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[4] Insert office address.

Unless expressly stated otherwise, the Information for Bidders, all papers required by it and submitted in connection herewith at any time, said Form of Contract, and all papers made part of the Contract by the terms of the Form of Contract are made part of this Proposal.

The undersigned hereby designates the following as the bidders office[4]:

859 WIllow Grove Street

Hackettstown, nj 07840

The telephone number of the bidder is: (908) 852-5868

The fax number of the bidder is: (908) 852-9015

The E-Mail address of the bidder is: flizza@intercountypaving.com

[4] Insert office address.

Unless expressly stated otherwise, the Information for Bidders, all papers required by it and submitted in connection herewith at any time, said Form of Contract, and all papers made part of the Contract by the terms of the Form of Contract are made part of this Proposal.

The undersigned hereby designates the following as the bidders office[4]:

1000 Main Street

New Rochelle, NY 10801

The telephone number of the bidder is: 914-739-1908

The fax number of the bidder is: 914-739-5101

The E-Mail address of the bidder is: jlaing@perini.com

[4] Insert office address.

SIGNATURE AND CERTIFICATE OF AUTHORITY[5]

Dated, FEB. 4, 20 13

(Signature of individual or name of corporation or partnership)

Tutor Perini Corporation

(Signature of agent, partner or corporate officer)

By[6 7] James M. Laing

James M. Laing, Senior Vice President

(Acknowledgment of signature to be taken on proper form on following page(s))

CERTIFICATE OF AUTHORITY, IF BIDDER IS A CORPORATION

I, the undersigned, as Secretary of the corporation submitting the foregoing Proposal, hereby certify that under and pursuant to the by-laws and resolutions of said corporation, each officer who has signed said Proposal on behalf of the corporation is fully and completely authorized so to do.

(Corporate Seal)

Daniel T. Flanagan, Assistant Secretary

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5 If bidder is a joint venture, insert signatures as appropriate for one participant of the joint venture on this page and attach and complete an additional signature sheet in the same form as appears on this page for each other participant as required.

6 If Proposal is signed by an officer or agent, give title.

7 NOTE: The foregoing signature shall be deemed to have been provided with full knowledge that the foregoing Proposal, the accompanying Contract booklet, as well as any certification, statement, assurance, representation, warranty, schedule or other document submitted by the bidder with the Proposal will become a part of the records of the Authority and that the Authority will rely in awarding the Contract on the truth and accuracy of such Proposal and each such certification, statement, assurance, representation, warranty and schedule made therein by the Contractor. Knowingly submitting a false statement in connection with any of the foregoing may be the basis for prosecution for offering a false instrument for filing (see, e.g., N.Y. Penal Law, Section 175.30 et seq.).

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SIGNATURE AND CERTIFICATE OF AUTHORITY[5]

Dated, February 1, 20 13

(Signature of individual or name of corporation or partnership)

Intercounty Paving Associates, LLC

(Signature of agent, partner or corporate officer)

By[6 7]

Frank C. Lizza, Jr., General Manager

(Acknowledgment of signature to be taken on proper form on following page(s))

CERTIFICATE OF AUTHORITY, IF BIDDER IS A CORPORATION

I, the undersigned, as Secretary of the corporation submitting the foregoing Proposal, hereby certify that under and pursuant to the by-laws and resolutions of said corporation, each officer who has signed said Proposal on behalf of the corporation is fully and completely authorized so to do.

(Corporate Seal)

---

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SIGNATURE AND CERTIFICATE OF AUTHORITY[5]

Dated, FEB. 4, 2013

(Signature of individual or name of corporation or partnership)

Tutor Perini Corporation / Intercounty Paving Associates LLC, JV

(Signature of agent, partner or corporate officer)

By[6 7] James M Laing

James M. Laing, Attorney-In-Fact

(Acknowledgment of signature to be taken on proper form on following page(s))

CERTIFICATE OF AUTHORITY, IF BIDDER IS A CORPORATION

I, the undersigned, as Secretary of the corporation submitting the foregoing Proposal, hereby certify that under and pursuant to the by-laws and resolutions of said corporation, each officer who has signed said Proposal on behalf of the corporation is fully and completely authorized so to do.

(Corporate Seal)

---

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6 If Proposal is signed by an officer or agent, give title.

7 NOTE: The foregoing signature shall be deemed to have been provided with full knowledge that the foregoing Proposal, the accompanying Contract booklet, as well as any certification, statement, assurance, representation, warranty, schedule or other document submitted by the bidder with the Proposal will become a part of the records of the Authority and that the Authority will rely in awarding the Contract on the truth and accuracy of such Proposal and each such certification, statement, assurance, representation, warranty and schedule made therein by the Contractor. Knowingly submitting a false statement in connection with any of the foregoing may be the basis for prosecution for offering a false instrument for filing (see, e.g., N.Y. Penal Law, Section 175.30 et seq.).

ACKNOWLEDGMENT[8]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of New York

SS:

County of Westchester

On this 4th day of FEB., 20 , before me personally came and appeared James M. Laing, to me known, who, being by me duly sworn, did depose and say that he resides at [redacted], that he is the Senior Vice President of Tutor Perini Corporation, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of _____

SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known and known to me to be one of the members of the firm of _____, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal)

(Notary Signature)

02-04-13P02:49 RCVD

[8] If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

ACKNOWLEDGMENT[8]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of New York

_____ SS:

County of Westchester

On this 1st day of Feb., 20[13], before me personally came and appeared Frank C. Lizza, Jr., to me known and known to me to be one of the members of the firm of Intercounty Paving Associates, LLC, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal) _____

(Notary Signature)

---

8 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

ACKNOWLEDGMENT[8]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A ~~PARTNERSHIP~~ JOINT VENTURE

State of New York

_____ SS:

County of Westchester

On this 7th day of FEB., 2013, before me personally ~~came~~ and appeared James M. Laing, Attorney-In-Fact, to me known and known to me to be one of the members of the firm of Tutor Perini Corporation / Intercounty Paving Associates LLC, JV, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified In Orange County
Term Expires August 20, 2015

_____

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal) _____

(Notary Signature)

---

8 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

STATEMENT ACCOMPANYING PROPOSAL[9]

Names and Residences of Officers, If Bidder is a Corporation

Name	Title	Residence[10]
See Attachment-Corporate Office List		

Names and Residences of Partners, If Bidder is a Partnership

Name	General or Limited Partner	Residence[11]

Bidder's Residence, If an Individual[12]

02-04-13P02:49 RCVD

9 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Statement Accompanying Proposal sheet in the same form as appears on this page for each other participant as required.

10 Give Street and Number of Residence. Do not give business address.

11 Give Street and Number of Residence. Do not give business address.

12 Give Street and Number of Residence. Do not give business address.

Tutor Perini
CORPORATION

CORPORATE OFFICERS
January 2013

NAME & TITLE	HOME/OFFICE ADDRESS
Ronald N. Tutor Chairman & CEO	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Robert Band President	[redacted] (o) 73 Mt. Wayte Avenue, Framingham, MA 01701
Kenneth R. Burk Executive Vice President , CEO-Contractors Specialty Group	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
James A. Frost Executive Vice President, CEO-Civil Group	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Michael J. Kershaw Executive Vice President and CFO	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
William B. Sparks Executive Vice President, Treasurer, Corporate Secretary & Clerk	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
James Laing Senior Vice President	[redacted] (o) 1000 Main Street, New Rochelle, NY 10801
William G. O'Brien Senior Vice President	[redacted] (o) 73 Mt. Wayte Avenue, Framingham, MA 01701
Kevin J. Woods Senior Vice President	[redacted] (o) 1000 Main Street, New Rochelle, NY 10801
Paul E. Lloyd Senior Vice President	[redacted] (o) 73 Mt. Wayte Avenue, Framingham, MA 01701
John D. Barrett Senior Vice President, Tax	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Kevin W. Cvengros, Asst. Treasurer, Asst. Secretary and Clerk	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Henry Cheung Vice President, Estimating	[redacted] (o) 1000 Main Street, New Rochelle, NY 10801
Daniel T. Flanagan Assistant Secretary	[redacted] (o) 1000 Main Street, New Rochelle, NY 10801
Lisa M. Melonas Assistant Secretary & Clerk	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Donna E. Tannar Assistant Secretary & Clerk	[redacted] (o) 73 Mt. Wayte Avenue, Framingham, MA 01701
Robert Van Buren Assistant Secretary & Clerk	[redacted] (o) 1022 Lower South Street, Peekskill, NY 10566

STATEMENT ACCOMPANYING PROPOSAL[9]

Names and Residences of Officers, If Bidder is a Corporation

Name	Title	Residence[10]

Names and Residences of Partners, If Bidder is a Partnership

Name	General or Limited Partner	Residence[11]

See Attachment - Limited Liability Company for Intercounty Paving Associates, LLC

Bidder's Residence, If an Individual[12]

---

9 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Statement Accompanying Proposal sheet in the same form as appears on this page for each other participant as required.

10 Give Street and Number of Residence. Do not give business address.

11 Give Street and Number of Residence. Do not give business address.

12 Give Street and Number of Residence. Do not give business address.

INTERCOUNTY PAVING ASSOCIATES, LLC

Road Construction Contractors

LIMITED LIABILITY COMPANY

Members	**% of Stock**
Carl Lizza III-Managing Member 16 Beacon Hill Drive Chester, NJ 07930	34%
John Lizza – Member 2 Mill River Road Oyster Bay, NY 11771	34%
Estate of Carl Lizza, Jr. 6000 Island Blvd. Apt.# 501 Williams Island, Fla. 33160	20%
John Perrucci, Jr. – Member 2260 Biddle Lane Easton, PA 18040	12%

Principal Office
859 Willow Grove Street~Hackettstown, NJ 07840
Ph: (908) 852-5868 Fax: (908) 852-9015
New York Division
385 W. John Street 2nd Fl~Hicksville, NY 11801
Ph: (516) 827-6900 Fax: (516) 827-5906

CONTRACT SWF-164.039

STATEMENT ACCOMPANYING PROPOSAL[9]

Names and Residences of Officers, If Bidder is a Corporation

Name	Title	Residence[10]

Names and Residences of Partners, If Bidder is a ~~Partnership~~ Joint Venture

Name	General or Limited Partner	Residence[11]

See Attachments Tutor Perini Corporation Corporate Officers and Limited Liability Company for Intercounty Paving Associates, LLC

Bidder's Residence, If an Individual[12]

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9 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Statement Accompanying Proposal sheet in the same form as appears on this page for each other participant as required.

10 Give Street and Number of Residence. Do not give business address.

11 Give Street and Number of Residence. Do not give business address.

12 Give Street and Number of Residence. Do not give business address.

Tutor Perini
CORPORATION

CORPORATE OFFICERS
January 2013

NAME & TITLE	HOME/OFFICE ADDRESS
Ronald N. Tutor Chairman & CEO	[redacted] (o) 15901 Olden Street, Sylmar , CA 91[redacted]
Robert Band President	[redacted] (o) 73 Mt. Wayte Avenue, Framingham, MA 01701
Kenneth R. Burk Executive Vice President , CEO-Contractors Specialty Group	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
James A. Frost Executive Vice President, CEO-Civil Group	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Michael J. Kershaw Executive Vice President and CFO	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
William B. Sparks Executive Vice President, Treasurer, Corporate Secretary & Clerk	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
James Laing Senior Vice President	[redacted] (o) 1000 Main Street, New Rochelle, NY 10801
William G. O'Brien Senior Vice President	[redacted] (o) 73 Mt. Wayte Avenue, Framingham, MA 01701
Kevin J. Woods Senior Vice President	[redacted] (o) 1000 Main Street, New Rochelle, NY 10801
Paul E. Lloyd Senior Vice President	[redacted] (o) 73 Mt. Wayte Avenue, Framingham, MA 01701
John D. Barrett Senior Vice President, Tax	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Kevin W. Cvengros, Asst. Treasurer, Asst. Secretary and Clerk	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Henry Cheung Vice President, Estimating	[redacted] (o) 1000 Main Street, New Rochelle, NY 10801
Daniel T. Flanagan Assistant Secretary	[redacted] (o) 1000 Main Street, New Rochelle, NY 10801
Lisa M. Melonas Assistant Secretary & Clerk	[redacted] (o) 15901 Olden Street, Sylmar , CA 91342
Donna E. Tannar Assistant Secretary & Clerk	[redacted] (o) 73 Mt. Wayte Avenue, Framingham, MA 01701
Robert Van Buren Assistant Secretary & Clerk	[redacted] (o) 1022 Lower South Street, Peekskill, NY 10566

INTERCOUNTY PAVING ASSOCIATES, LLC

Road Construction Contractors

LIMITED LIABILITY COMPANY

Members	**% of Stock**
Carl Lizza III-Managing Member [redacted]	34%
John Lizza – Member [redacted]	34%
Estate of Carl Lizza, Jr. [redacted]	20%
John Perrucci, Jr. – Member [redacted]	12%

Principal Office
859 Willow Grove Street~Hackettstown, NJ 07840
Ph: (908) 852-5868 Fax: (908) 852-9015
New York Division
385 W. John Street 2nd Fl~Hicksville, NY 11801
Ph: (516) 827-6900 Fax: (516) 827-5906

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
TWENTY EIGHT MILLION ONE HUNDRED ONE THOUSAND NINE HUNDRED TWENTY ..... Dollars ZERO ..... Cents	$28,101,920.00

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	$32,786,080.00
LUMP SUM FOR UNCLASSIFIED WORK.....	$28,101,920.00
ESTIMATED TOTAL CONTRACT PRICE: [21]	$60,888,000.00

The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

[21] The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

02-04-13P02:48 RCVD

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned[13] Tutor Perini Corporation a corporation organized under the laws of the Commonwealth of Massachusetts and Intercounty Paving Associates, LLC a limited liability company organized under the laws of the State Of New Jersey bidding as Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV as principal(s); and[14] Travelers Casualty and Surety Company of America

as surety are hereby held and firmly bound unto The Port Authority of New York and New Jersey (herein called the "Authority") in the penal sum of Seven Million Eight Hundred Fifty Thousand Dollars ($7,850,000), for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed this 31st day of January , 20 13

The condition of the above obligation is such that whereas the above named principal(s) has submitted to the Authority a certain Proposal, bound herewith and hereby made a part hereof, to perform the obligations of the Contractor under a contract in writing, known as Contract SWF-164.039, "Stewart International Airport - Rehabilitate Runways 9-27 and 16-34", now therefore:

A. If said Proposal shall not be accepted, or

B. If said Proposal shall be accepted and the Authority does not require the principal(s) to furnish a Performance and Payment Bond, or

C. If said Proposal shall be accepted and the Authority requires the principal(s) to furnish a Performance and Payment Bond and either the principal(s) furnishes a Performance and Payment Bond satisfactory to the Authority in accordance with the requirements of said Proposal or the Authority does not terminate the Contract as provided therein on account of the failure to furnish such a bond,

Then, this obligation shall be void, otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

02-04-13P02:48 RCVD

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13 Insert bidder's name. If a corporation, give the state of incorporation using the phrase "a corporation organized under the laws of the ".

If a partnership, give full names of partners, using also the phrase, "co-partners doing business under the firm name of ".

If an individual using a trade name, give individual name, using also the phrase, "an individual doing business under the trade name of ".

If a joint venture, give the information required above for each participant in the joint venture.

14 Insert name of surety.

The surety, for value received, hereby stipulates and agrees that the obligations of said surety and its bond shall be in no way impaired or affected by any extensions of the times within which the Authority may receive or accept such Proposal or within which the principal(s) may furnish a Performance and Payment Bond or by any waiver by the Authority of any of the requirements of said Proposal; and said surety does hereby waive notice of any such extensions or waivers.

IN WITNESS WHEREOF, the principal(s) and surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Tutor Perini Corporation

Principal [15]

(Seal)

By[16] James M Fay
SR. VICE PRESIDENT

Travelers Casualty and Surety Company of America

Surety

(Seal)

By[17]
Eamonn Long, Attorney-in-Fact

---

15 If bidder is a joint venture, insert signature and information required as appropriate for one participant of the joint venture on this page and attach and complete an additional sheet in the same form as appears on this page for each other participant as required.

16 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

17 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

The surety, for value received, hereby stipulates and agrees that the obligations of said surety and its bond shall be in no way impaired or affected by any extensions of the times within which the Authority may receive or accept such Proposal or within which the principal(s) may furnish a Performance and Payment Bond or by any waiver by the Authority of any of the requirements of said Proposal; and said surety does hereby waive notice of any such extensions or waivers.

IN WITNESS WHEREOF, the principal(s) and surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Intercounty Paving Associates, LLC

Principal [15]

(Seal)

By[16] OFFICE MANAGER

Travelers Casualty and Surety Company of America

Surety

(Seal)

By[17]

Esmond Long, Attorney-in-Fact

---

15 If bidder is a joint venture, insert signature and information required as appropriate for one participant of the joint venture on this page and attach and complete an additional sheet in the same form as appears on this page for each other participant as required.

16 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

17 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

The surety, for value received, hereby stipulates and agrees that the obligations of said surety and its bond shall be in no way impaired or affected by any extensions of the times within which the Authority may receive or accept such Proposal or within which the principal(s) may furnish a Performance and Payment Bond or by any waiver by the Authority of any of the requirements of said Proposal; and said surety does hereby waive notice of any such extensions or waivers.

IN WITNESS WHEREOF, the principal(s) and surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV

Principal [15]

(Seal)

By[16] James M Fay
ATTORNEY-IN-FACT

Travelers Casualty and Surety Company of America

Surety

(Seal)

By[17]
Eamonn Long, Attorney-in-Fact

---

15 If bidder is a joint venture, insert signature and information required as appropriate for one participant of the joint venture on this page and attach and complete an additional sheet in the same form as appears on this page for each other participant as required.

16 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

17 If bond is signed by an officer or agent, give title; if signed by a corporation, affix corporate seal.

ACKNOWLEDGMENT[18]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of NEW YORK

SS:

County of WESTCHESTER

On this ~~31st~~ 4th day of ~~January~~ FEBRUARY, 2013, before me personally came and appeared JAMES H. LANG, to me known, who, being by me duly sworn, did depose and say that he resides at [redacted], that he is the SR. VICE PRESIDENT of TUTOR PERINI CORPORATION, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of _____

SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known and known to me to be one of the members of the firm of _____, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

SS:

County of _____

On this _____ day of. _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal)

(Notary Signature)

AFFIX ACKNOWLEDGMENT AND JUSTIFICATION OF SURETY

---

18 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

See Attached Acknowledgement for Principal, If Limited Liability Company

ACKNOWLEDGMENT[18]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A PARTNERSHIP

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known and known to me to be one of the members of the firm of _____, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

_____ SS:

County of _____

On this _____ day of. _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal) _____

(Notary Signature)

AFFIX ACKNOWLEDGMENT AND JUSTIFICATION OF SURETY

---

18 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

ACKNOWLEDGEMENT FOR PRINCIPAL, IF LIMITED LIABILITY COMPANY

STATE OF NEW YORK } SS

COUNTY OF WESTCHESTER

On this 4th day of ~~January~~ FEBRUARY, 2013 before me personally appeared FRANK C. LIZZA, JR., to me known and known to me to be the GENERAL MANAGER of INTERCONTINENTAL FUNDING ASSOCIATES, LLC, a Limited Liability Company, described in and who executed the foregoing insurance instrument and acknowledged to me that he/she executed the foregoing insurance instrument and acknowledged to me that he/she executed the same as and for the act and deed of said Limited Liability Company.

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

NY acknowledgment

ACKNOWLEDGMENT[18]

ACKNOWLEDGMENT OF BIDDER, IF A CORPORATION

State of _____

_____ SS:

County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation; and that he signed his name thereto by like order.

(Notary Seal) _____

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF A ~~PARTNERSHIP~~ Joint Venture

State of NEW YORK

_____ SS:

County of WESTCHESTER

On this ~~31st~~ 4th day of ~~January~~ FEBRUARY, 2013, before me personally came and appeared JAMES N. LANG, to me known and known to me to be one of the members of the Joint Venture ~~firm~~ of Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV, described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and deed of said firm.

(Notary Seal)

CHRISTINE A. BUSEY
Notary Public, State of New York
No. 01BU6172961
Qualified in Orange County
Term Expires August 20, 2015

(Notary Signature)

ACKNOWLEDGMENT OF BIDDER, IF AN INDIVIDUAL

State of _____

_____ SS:

County of _____

On this _____ day of. _____, 20 , before me personally came and appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and he acknowledged to me that he executed the same.

(Notary Seal) _____

(Notary Signature)

AFFIX ACKNOWLEDGMENT AND JUSTIFICATION OF SURETY

---

18 If bidder is a joint venture, insert signature as appropriate for one participant of the joint venture on this page and attach and complete an additional Acknowledgment sheet in the same form as appears on this page for each other participant as required.

ACKNOWLEDGMENT OF SURETY COMPANY

STATE OF New York
COUNTY OF Westchester } SS

On this 31st day of January, 2013, before me personally came Eamonn Long to me known, who, being by me duly sworn, did depose and say; that he/she resides in Westchester, State of New York, that he/she is the Attorney-in-Fact of the Travelers Casualty and Surety Company of America the corporation described in which executed the above instrument; that he/she knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that is was so affixed by the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order; and the affiant did further depose and say that the Superintendent of Insurance of the State of New York, has, pursuant to Section 1111 of the Insurance Law of the State of New York, issued to Travelers Casualty and Surety Company of America (Surety) his/her certificate of qualification evidencing the qualification of said Company and its sufficiency under any law of the State of New York as surety and guarantor, and the propriety of accepting and approving it as such; and that such certificate has not been revoked.

Notary Public

NY acknowledgement

13

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 224408

Certificate No. 004665575

KNOW ALL MEN BY THESE PRESENTS: That St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company and St. Paul Mercury Insurance Company are corporations duly organized under the laws of the State of Minnesota, that Farmington Casualty Company, Travelers Casualty and Surety Company, and Travelers Casualty and Surety Company of America are corporations duly organized under the laws of the State of Connecticut, that United States Fidelity and Guaranty Company is a corporation duly organized under the laws of the State of Maryland, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Brenda L. Patterson, Eamonn Long, Jeri L. Russell, John R. Muha II, William G. Franey, Stanley T. Szczurek, and Cathy Urquhart

of the City of Lanham, State of Maryland, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 21st day of December, 2011.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: George W. Thompson, Senior Vice President

On this the 21st day of December, 2011, before me personally appeared George W. Thompson, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2016.

Marie C. Tetreault, Notary Public

58440-6-11Printed in U.S.A.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 31 day of JANUARY, 20 13

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.

TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA

HARTFORD, CONNECTICUT 06183

FINANCIAL STATEMENT AS OF DECEMBER 31, 2011

AS FILED IN THE STATE OF NEW YORK

CAPITAL STOCK $ 6,480,000

ASSETS		LIABILITIES & SURPLUS	
CASH AND INVESTED CASH	$ 103,657,622	UNEARNED PREMIUMS	$ 813,328,906
BONDS	3,525,992,354	LOSSES	937,681,730
INVESTMENT INCOME DUE AND ACCRUED	49,234,241	REINSURANCE PAYABLE ON PAID LOSSES & LOSS ADJ. EXPENSES	2,604,752
OTHER INVESTED ASSETS	249,171,807	LOSS ADJUSTMENT EXPENSES	525,055,953
PREMIUM BALANCES	239,276,662	COMMISSIONS	30,858,691
NET DEFERRED TAX ASSET	67,832,057	TAXES, LICENSES AND FEES	60,276,105
REINSURANCE RECOVERABLE	10,983,463	OTHER EXPENSES	29,866,613
SECURITIES LENDING REINVESTED COLLATERAL ASSETS	7,344,088	FUNDS HELD UNDER REINSURANCE TREATIES	95,031,416
UNDISTRIBUTED PAYMENTS	2,593,967	CURRENT FEDERAL AND FOREIGN INCOME TAXES	49,086,527
OTHER ASSETS	361,289	REMITTANCES AND ITEMS NOT ALLOCATED	18,641,351
		AMOUNTS WITHHELD / RETAINED BY COMPANY FOR OTHERS	31,860,277
		RETROACTIVE REINSURANCE RESERVE ASSUMED	3,152,706
		POLICYHOLDER DIVIDENDS	8,117,549
		PROVISION FOR REINSURANCE	6,397,371
		PAYABLE TO PARENT, SUBSIDIARIES AND AFFILIATES	53,766,609
		PAYABLE FOR SECURITIES	1,249,903
		PAYABLE FOR SECURITIES LENDING	7,344,088
		CEDED REINSURANCE NET PREMIUMS PAYABLE	(71,042,044)
		ESCHEAT LIABILITY	591,943
		OTHER ACCRUED EXPENSES AND LIABILITIES	501,836
		TOTAL LIABILITIES	$ 2,604,372,282
		CAPITAL STOCK	$ 6,480,000
		PAID IN SURPLUS	433,803,760
		OTHER SURPLUS	1,211,791,508
		TOTAL SURPLUS TO POLICYHOLDERS	$ 1,652,075,268
TOTAL ASSETS	$ 4,256,447,550	TOTAL LIABILITIES & SURPLUS	$ 4,256,447,550

STATE OF CONNECTICUT)

COUNTY OF HARTFORD) SS.

CITY OF HARTFORD)

MICHAEL J. DOODY, BEING DULY SWORN, SAYS THAT HE IS SECOND VICE PRESIDENT, OF TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA, AND THAT TO THE BEST OF HIS KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT STATEMENT OF THE FINANCIAL CONDITION OF SAID COMPANY AS OF THE 31ST DAY OF DECEMBER, 2011.

SECOND VICE PRESIDENT

SUBSCRIBED AND SWORN TO BEFORE ME THIS
13TH DAY OF APRIL, 2012

NOTARY PUBLIC

SUSAN M. WEISSLEDER
Notary Public
My Commission Expires November 30, 2012

SUSAN M. WEISSLEDER NOTARY PUBLIC CONNECTICUT

TO BE ATTACHED TO AND FORM A PART OF BOND NO. N/A

STATE OF New York

COUNTY OF Westchester

The undersigned, Eamonn Long, duly sworn, deposes and says: That she is the Attorney-in-Fact of Travelers Casualty and Surety Company of America, Surety on the attached bond, and that a Certificate of the Solvency of the Surety, as provided for in Section 327 and Section 1111 of the Insurance Law of the State of New York was issued by the Superintendent of Insurance of the State of New York and has not been revoked.

Subscribed to and sworn before me this 31st day of January, 2013

Travelers Casualty and Surety Company of America
(Surety)

BY: Eamonn Long ATTORNEY-IN-FACT

(NOTARY)

NOTARY PUBLIC, STATE OF
NO. 01UR6003477
QUALIFIED IN WESTCHESTER
MY COMMISSION EXPIRES SEPT 13

CERTIFICATE OF SOLVENCY UNDER SECTION 1111 OF THE NEW YORK INSURANCE LAW

STATE OF NEW YORK

DEPARTMENT OF FINANCIAL SERVICES

It is hereby certified that

Travelers Casualty and Surety Company of America
Of Hartford, Connecticut

a corporation organized under the laws of the State of Connecticut and duly authorized to transact the business of insurance in this State, is qualified to become surety or guarantor on all bonds, undertakings, recognizances, guaranties and other obligations required or permitted by law; and that the said corporation is possessed of a capital and surplus including gross paid-in and contributed surplus and unassigned funds (surplus) aggregating the sum of $488,992,332 (Capital $6,000,000) as is shown by its sworn financial statement for the end of the year December 31, 2011 on file in this Department, prior to audit.

The said corporation cannot lawfully expose itself to loss on any one risk or hazard to an amount exceeding 10% of its surplus to policyholders, unless it shall be protected in excess of that amount in the manner provided in Section 4118 of the Insurance Law of this State.

In Witness Whereof, I have

unto set my hand and affixed

official seal of this Department
in the City of Albany, this 8th
day of May, 2012.

Benjamin M. Lawsky
Superintendent of Insurance

By Jacqueline Catalfamo

Jacqueline Catalfamo
Special Deputy Superintendent

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK				
			Figures	
Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Unit Prices	Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD ONE DOLLARS SEVENTY FIVE CENTS	$1.75	$928,550.00
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD TWO DOLLARS EIGHTY FIVE CENTS	$2.85	$444,600.00
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD ONE DOLLARS ZERO CENTS	$1.00	$686,600.00
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON EIGHTY NINE DOLLARS ZERO CENTS	$89.00	$23,006,500.00
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON EIGHTY THREE DOLLARS ZERO CENTS	$83.00	$6,191,800.00
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT ONE DOLLARS ZERO CENTS	$1.00	$1,030,200.00
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD ONE DOLLARS ZERO CENTS	$1.00	$421,410.00
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT ZERO DOLLARS TEN CENTS	$0.10	$76,420.00

[20] The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

02-04-13P02:48 RCVD

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
TWENTY EIGHT MILLION ONE HUNDRED ONE THOUSAND NINE HUNDRED TWENTY ..... Dollars ZERO ..... Cents	$28,101,920.00

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	$32,786,080.00
LUMP SUM FOR UNCLASSIFIED WORK.....	$28,101,920.00
ESTIMATED TOTAL CONTRACT PRICE:[21]	$60,888,000.00

02-04-13P02:48 RCVD

The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

---

21 The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

CONTRACTOR'S CERTIFICATION OF ELIGIBILITY

The Bidder certifies, by submission of this Proposal or acceptance of this Contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this bid that it will include this Clause without modification in all lower tier transactions, solicitations, bids, proposals, contracts, and subcontracts. Where the Bidder/Offeror/Contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this Solicitation/Proposal.

That, the information above is true and complete to the best of my knowledge.

James M. Laing, Senior Vice President
Name and Title (please print)

Signature

FEB. 4, 2013
Date

NOTE: The penalty for making false statements in offers is prescribed in 19 U.S.C. 1001

CONTRACTOR'S CERTIFICATION OF ELIGIBILITY

The Bidder certifies, by submission of this Proposal or acceptance of this Contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this bid that it will include this Clause without modification in all lower tier transactions, solicitations, bids, proposals, contracts, and subcontracts. Where the Bidder/Offeror/Contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this Solicitation/Proposal.

That, the information above is true and complete to the best of my knowledge.

Frank C. Lizza, Jr., General Manager
Name and Title (please print)

Signature

Feb. 4, 2013
Date

NOTE: The penalty for making false statements in offers is prescribed in 19 U.S.C. 1001

CONTRACTOR'S CERTIFICATION OF ELIGIBILITY

The Bidder certifies, by submission of this Proposal or acceptance of this Contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this bid that it will include this Clause without modification in all lower tier transactions, solicitations, bids, proposals, contracts, and subcontracts. Where the Bidder/Offeror/Contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this Solicitation/Proposal.

That, the information above is true and complete to the best of my knowledge.

James M Laing

James M. Laing, Attorney-In-Fact

Name and Title (please print)

James M Laing

Signature

Feb. 4, 2013

Date

NOTE: The penalty for making false statements in offers is prescribed in 19 U.S.C. 1001

V. TITLE VI CIVIL RIGHTS ACT OF 1964 COMPLIANCE COMMITMENT

All bidders will be required to submit with their bids the Title VI Civil Rights Act of 1964 Compliance Commitment form, including an agreement to get similar compliance commitment from proposed subcontractors. This compliance commitment will be required prior to award of the Contract.

Reference: Contract Number and Title: SWF-164.039 Rehabilitation of Runway 9-27 and Runway 16-34

The Tutor Perini Corporation (Company) having submitted a bid for the referenced Contract, advises that contingent upon award of the Contract to our company, we will comply with Title VI Civil Rights Act of 1964 by not discriminating on the basis of age, race, sex, color, national origin or disability in its hiring and employment practices, or in admission to, access to, or operation of its programs, services, and activities. We will forward a copy of our commitment to comply with Title VI Civil Rights Act of 1964 to all vendors and subcontractors utilized for the referenced Contract, as listed below and inform them of their obligation to comply.

Subcontractors:

1) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

2) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

3) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

James M. Laing, Senior Vice President
(SIGNATURE OF BIDDER)

DATE: FEB. 4, 2013

V. TITLE VI CIVIL RIGHTS ACT OF 1964 COMPLIANCE COMMITMENT

All bidders will be required to submit with their bids the Title VI Civil Rights Act of 1964 Compliance Commitment form, including an agreement to get similar compliance commitment from proposed subcontractors. This compliance commitment will be required prior to award of the Contract.

Reference: Contract Number and Title: SWF-164.039 REHABILITATION OF RUNWAY 9-27 AND RUNWAY 16-34

The INTERCOUNTY PAVING ASSOCIATES, LLC **(Company) having submitted a bid for the referenced Contract, advises that contingent upon award of the Contract to our company, we will comply with Title VI Civil Rights Act of 1964 by not discriminating on the basis of age, race, sex, color, national origin or disability in its hiring and employment practices, or in admission to, access to, or operation of its programs, services, and activities. We will forward a copy of our commitment to comply with Title VI Civil Rights Act of 1964 to all vendors and subcontractors utilized for the referenced Contract, as listed below and inform them of their obligation to comply.**

Subcontractors:

1) **Name:**
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

2) **Name:**
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

3) **Name:**
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

(SIGNATURE OF BIDDER) FRANK C. LIZZA, JR., GENERAL MANAGER

DATE: Feb. 4, 2013

V. TITLE VI CIVIL RIGHTS ACT OF 1964 COMPLIANCE COMMITMENT

All bidders will be required to submit with their bids the Title VI Civil Rights Act of 1964 Compliance Commitment form, including an agreement to get similar compliance commitment from proposed subcontractors. This compliance commitment will be required prior to award of the Contract.

Reference: Contract Number and Title: SWF-164.039 REHABILITATION OF RUNWAY 9-27 AND RUNWAY 16-34

The TUTOR PERINI CORPORATION / INTERCOUNTY PAVING ASSOCIATES, LLC, JV **(Company) having submitted a bid for the referenced Contract, advises that contingent upon award of the Contract to our company, we will comply with Title VI Civil Rights Act of 1964 by not discriminating on the basis of age, race, sex, color, national origin or disability in its hiring and employment practices, or in admission to, access to, or operation of its programs, services, and activities. We will forward a copy of our commitment to comply with Title VI Civil Rights Act of 1964 to all vendors and subcontractors utilized for the referenced Contract, as listed below and inform them of their obligation to comply.**

Subcontractors:

1) **Name:**
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

2) **Name:**
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

3) **Name:**
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

James M Laing

(SIGNATURE OF BIDDER) JAMES M. LAING, ATTORNEY-IN-FACT

DATE: FEB. 4, 2013

APPENDIX A1

DBE GOALS STATEMENT

The undersigned Bidder has satisfied the requirements of the Contract in the following manner (Complete the appropriate spaces):

The Bidder is committed to meeting the DBE utilization goal set forth in this Contract.

or

The Bidder is unable to meet the DBE utilization goal set forth in this Contract, but is committed to a minimum of _____% DBE utilization on this Contract and submits the attached narrative and documentation demonstrating good faith efforts consistent with Appendix A of 49 CFR 26 to meet the DBE utilization goal set forth in this Contract. Attach as many pages as necessary to provide a full and complete narrative and supporting documentation of good faith efforts made. This narrative shall be submitted on company letterhead and signed.

It is the present intent of the Bidder to utilize the specific DBE firms identified in Appendix A2 in the performance of the Work of this Contract. If for any reason, one or more of the DBE firms identified in Appendix A2 are unable or unwilling to participate, the Bidder will make good faith efforts to replace the DBE firm with another DBE firm in accordance with the Information For Bidders clause entitled "DBE Program".

Bidder Name: Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV

Federal Tax ID No.: 04-1717070

By: James M Laing

Signature and Title James M. Laing, Attorney-in-Fact

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: STEWART AIRPORT CONTRACT SWF 164.039

BIDDER:
Name of Firm: TUTOR PERINI CORP / INTERCOUNTY PAVING ASSOC. LLC / JV
Address: 1000 MAIN ST, NEW ROCHELLE, NY Telephone: 914 739 - 1908

DBE:
Name of Firm: ADVANCED MILL & PAVE INC.
Address: 214 Vincent Dr, East Meadow NY-11554 Telephone: 516-523-2966
Description of work to be performed by DBE: ASPHALT

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 2,063,000 or 3.4% of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 04/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: _____
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: _____
Signature of Bidder and Title
JAMES MCLAING
SR VICE PRESIDENT

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

595

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor Perini/Intercounty JV
Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914 739 - 1908

DBE:
Name of Firm: Dumont Electrical Inc
Address: P.O. Box 525 Sparta, NJ 07871 Telephone: 973-729-8084
Description of work to be performed by DBE: Material Supplier

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ ~~2,500,000~~ 1,500,000 GH or 2.5 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: [signature] President
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: [signature]
Signature of Bidder and Title
JAMES A LAING
SR VICE PRESIDENT

FOR OBIO USE ONLY
Contract Goals: ☐ Approved ☒ Waived ☐ Rejected
Reviewed By: _____
OBIO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF 164.039 STEWART AIRPORT

BIDDER:
Name of Firm: TUTOR PERINI CORP/INTERCOUNTY PAVING ASSOC LLC / JV
Address: 1000 MAIN ST NEW ROCHELLE 10801 Telephone: 914-739-1908

DBE:
Name of Firm: JESS SECURITY AND INVESTIGATION, INC.
Address: 3125 TIBBETT AVENUE APTO, BRONX, NY 10463 Telephone: 718 219 1220
Description of work to be performed by DBE: SECURITY GUARD SERVICES AT STEWART INTERNATIONAL AIRPORT

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 1,300,000 or 2.1 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: David Smayegrichi C.E.O.
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M Laing
Signature of Bidder and Title
JAMES M LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2

DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor/Perini/Intercounty JV
Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914 739 - 1908

DBE:
Name of Firm: Montana Datacom
Address: 35-15 11th St. Long Island, NY 11106 Telephone: 718-482-6789
Description of work to be performed by DBE: Material Supplier

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ ~~800,000~~ 489,900 or 0.8% of the total contract amount of $ 60,888,000 The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: [signature]
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: [signature]
Signature of Bidder and Title
JAMES M LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY
Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF-164.039 Stewart Airport Runway 9-27 and 16-34 Rehabilitation

BIDDER:
Name of Firm: Tutor Perini Corp/ INTERCOUNTY PAVING ASSOCIATES LLC / JJ
Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914-739-1908

DBE:
Name of Firm: Perfect Cut Landscaping, Inc. / Hudson Valley Trucking
Address: 24 Country Club Drive Florida, NY 10921 Telephone: 845-651-4263
Description of work to be performed by DBE: Tri-axle Dump trucking

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 606,000 or 1.0% of the total contract amount of $ 60,888,000. The anticipated start date is 9/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Thomas E. Scalzo President
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M Laing
Signature of Bidder and Title
JAMES M LAING
SR. VICE PRESIDENT

FOR OBJO USE ONLY
Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 + 16-34

BIDDER:
Name of Firm: Tutor Perini Corp / INTERCOUNTY PAVING ASSOC. / LLC / JV
Address: 1000 MAIN ST. NEW ROCHELLE, NY **Telephone:** 914 739-1908

DBE:
Name of Firm: Traffic Lane Closures, LLC
Address: 1214 Rt-52, Carmel, NY, 10512 **Telephone:** (845) 228-6100
Description of work to be performed by DBE: MPT, Erosion Control, PPE Supplier.

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 140,000 or 0.2% of the total contract amount of $ 60,888,00 The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: _____ Owner
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: _____
Signature of Bidder and Title
JAMES M. LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ **Date:** _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A1

DBE GOALS STATEMENT

The undersigned Bidder has satisfied the requirements of the Contract in the following manner (Complete the appropriate spaces):

The Bidder is committed to meeting the DBE utilization goal set forth in this Contract.

or

The Bidder is unable to meet the DBE utilization goal set forth in this Contract, but is committed to a minimum of _____% DBE utilization on this Contract and submits the attached narrative and documentation demonstrating good faith efforts consistent with Appendix A of 49 CFR 26 to meet the DBE utilization goal set forth in this Contract. Attach as many pages as necessary to provide a full and complete narrative and supporting documentation of good faith efforts made. This narrative shall be submitted on company letterhead and signed.

It is the present intent of the Bidder to utilize the specific DBE firms identified in Appendix A2 in the performance of the Work of this Contract. If for any reason, one or more of the DBE firms identified in Appendix A2 are unable or unwilling to participate, the Bidder will make good faith efforts to replace the DBE firm with another DBE firm in accordance with the Information For Bidders clause entitled "DBE Program".

Bidder Name: Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV

Federal Tax ID No.: 04-1717070

By: James M. Laing

Signature and Title James M. Laing, Attorney-in-Fact

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: STEWART AIRPORT CONTRACT SWF 164.039

BIDDER:
Name of Firm: TUTOR PERINI CORP. / INTERCOUNTY PAVING ASSOC. LLC / JV
Address: 1000 MAIN ST, NEW ROCHELLE, NY Telephone: 914 739 - 1908

DBE:
Name of Firm: ADVANCED MILL & PAVE INC.
Address: 214 Vincent Dr, East Meadow NY-11554 Telephone: 516-523-2966
Description of work to be performed by DBE: ASPHALT

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 2,063,000 or 3.4% of the total contract amount of $ 60,883,000. The anticipated start date is 5/2013 and the anticipated completion date is 04/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: _____
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: _____
Signature of Bidder and Title
JAMES MCLAINO
SR VICE PRESIDENT

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

595

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor Perini/Intercounty JV
Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914 739 - 1908

DBE:
Name of Firm: Dumont Electrical Inc
Address: P.O. Box 525 Sparta, NJ 07871 Telephone: 973-729-8084
Description of work to be performed by DBE: Material Supplier

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ ~~2,500,000~~ 1,500,000 GW or 2.5 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: [signature] President
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: [signature]
Signature of Bidder and Title
JAMES M LAING
SR VICE PRESIDENT

FOR OBIO USE ONLY

Contract Goals: ☐ Approved ☒ Waived ☐ Rejected
Reviewed By: _____
OBIO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF 164.039 STEWART AIRPORT

BIDDER:
Name of Firm: TUTOR PERINI CORP/INTERCOUNTY PAVING ASSOC LLC / JV
Address: 1000 MAIN ST NEW ROCHELLE 10801 Telephone: 914-739-1908

DBE:
Name of Firm: JESS SECURITY AND INVESTIGATION, INC.
Address: 3125 TIBBETT AVENUE #100, BRONX, NY 10463 Telephone: 718 219 1220
Description of work to be performed by DBE: SECURITY GUARD SERVICES AT STEWART INTERNATIONAL AIRPORT

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 1,300,000 or 2.1 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: David Imayrgulki C.E.O.
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M Laing
Signature of Bidder and Title
JAMES M LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor/Perini/Intercounty JV
Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914 739-1908

DBE:
Name of Firm: Montana Datacom
Address: 35-15 11th St. Long Island, NY 11106 Telephone: 718-482-6789
Description of work to be performed by DBE: Material Supplier

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ ~~800,000~~ 489,900 or 0.8% of the total contract amount of $ 60,888,000 The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: [signature]
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: [signature]
Signature of Bidder and Title
JAMES M LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY
Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF-164.039 Stewart Airport Runway 9-27 and 16-34 Rehabilitation

BIDDER:
Name of Firm: Tutor Perini Corp/ INTERCOUNTY PAVING ASSOCIATES LLC / JV

Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914-739-1908

DBE:
Name of Firm: Perfect Cut Landscaping, Inc. / Hudson Valley Trucking

Address: 24 Country Club Drive Florida, NY 10921 Telephone: 845-651-4263

Description of work to be performed by DBE: Tri-axle Dump trucking

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 606,000 or 1.0% of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Thomas E. Schayer President
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M Laing
Signature of Bidder and Title
JAMES M LAING
SR. VICE PRESIDENT

FOR OBJO USE ONLY

Contract Goals: ☐ Approved ☐ Waived ☐ Rejected
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ Date: _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 + 16-34

BIDDER:
Name of Firm: Tutor Perini Corp / INTER COUNTY PAVING ASSOC. / LLC / JV
Address: 1000 MAIN ST NEW ROCHELLE, NY **Telephone:** 914 739-1908

DBE:
Name of Firm: Traffic Lane Closures, LLC
Address: 1214 Rt- 52, Carmel, NY, 10512 **Telephone:** (845) 228-6100
Description of work to be performed by DBE: MPT, Erosion Control, PPE Supplier.

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 140,000 **or** 0.2% **of the total contract amount of $** 66,888,00 **The anticipated start date is** 5/2015 **and the anticipated completion date is** 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Owner
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By:
Signature of Bidder and Title
JAMES M. LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY

Contract Goals: ☐ **Approved** ☐ **Waived** ☐ **Rejected**
Reviewed By: _____
OBJO Business Development Representative
Print Name: _____ **Date:** _____

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A3
INFORMATION ON SOLICITED FIRMS

The bidder must complete this form for itself and for all firms which gave the biddre a quotation for any work planned to be subcontracted regardless of whether they are ultimately chosen to participate in the Contract. Provide the information required below for every firm that provided a bid or a quote for a subcontract - even if the bid or quote from the firm is not used in the preparation of the final Proposal.

Name of Firm	Address of Firm	Phone Number	Contact Person	Firm Age	Annual Gross Revenue Range NOTE: See Footnote Below	DBE Certified (Yes/No)
Americore Drilling & Cutting, Inc.	12-11 38th Avenue LIC, NY 11101	(718) 392-1313	Alex			No
Atlantic Concrete Cutting	396 N Pemberton Road Mt. Holly, NJ 08060	(609) 261-7200	Michelle Morris	21 yrs.	Over $5 Million	Yes
Bel-Air Electric Construction, Inc.	30 Stewart Street Hewlett, NY 11557	(516) 593-6241	Amir Gal			No
Boundary Fence	131-02 Jamaica Avenue Richmond Hill, NY	(718) 847-3400	Aldo Sibeni	50 yrs.	Over $5 Million	Yes
Brooklyn Rebar	367 Vandervoort Ave Brooklyn, NY 11211	(718) 963-2777	Bob McKinstrey	5 yrs.	Over $5 Million	No
Cardinal / International Grooving & Grinding LLC	100 Barren Hill Road Conshohocken, PA 19428	(610) 825-2200	Philip A Zuzelo	12 yrs.	$2 - $5 Million	No
Churchgate Security	747 Lexington Ave Ste 1 Brooklyn, NY 11221	(718) 498-5960	Kelley Eyubeh			Yes
Clemente Latham Concrete	18 Argenio Drive, New Windsor, NY 12533	(845) 565-1041	Kevin Maher			No
Corpoarte Loss Prevention Associates	2635 Petti Avenue Bellmore, NY 11710	(516) 409-0003	Vincent Boue	33 yrs.	Over $5 Million	No
Cranesville Block Co	1250 Riverfront Center Amstredam, NY	(518) 684-6119	Patti VanAlstyne	57 yrs.	Over $5 Million	No
E. Tetz & Sons, Inc	130 Crotly Road Middletown, NY 10941	(845) 692-4486	Bob Weber	56 yrs.	Over $5 Million	No
Fanshawe Inc/Rockland Electric	143 Main Street 1st Floor Nanuet, NY 10954	(845) 627-3232	George Fanshawe	31 yrs.	Over $5 Million	No

APPENDIX A3

INFORMATION ON SOLICITED FIRMS

First Alert Security Services, Inc.	2174 Fulton Street Brooklyn, NY 11233	(718) 506-6066	Lateef Sammi	4 yrs.	$976,000	Yes
FJC Securim Services Inc	JFK Airport Bld#75, RM 228 Jamaica, NY 11430	(718) 244-1400	Frank Festa	24 yrs.	Over $1 Million	No
Globosa Security Services	507 B E 163rd Street Bronx NY 10451	(718) 665-5321	Chris Odiase	4 yrs.	Less than $500,000	Yes
HBC Electric	131 Washington Street Lodi, NJ 07644	(973) 777-4472	Jay Hoogendoorn	20 yrs.	Over $5 Million	No
Hi Lite Markings Inc	PO Box 460, Adams Center NY 13606	(315) 583-6111	Dennis Haefner	23 yrs.	Over $5 Million	No
Hudson Valley Engineering Associates	560 Route 52 Suite 201 Beacon, NY 12508	(845) 838-3600	Jessica Marina	11 yrs.	$2 - $5 Million	Yes
Jess Security Services Inc.	3125 Tibbett Avenue Suite 10 D Bronx, NY 10463	(718) 219-1220	David Imayequahi	12 yrs.	$500,000 - $1 Million	Yes
JP Hogan Coring & Sawing Corp	680 Gulf Avenue Staten Island NY 10314	(718) 761-7014	K Makowski	19 yrs	$2 - $5 Million	No
K&D Industries of New York, LLC	129 Gallows Hill Road Cortlandt Manor, NY 10567	(914) 293-7000	Darrell Bjorkland	9 yrs.	$500,000 - $1 Million	Yes
LB Electric LLC Tri-State Electric	50 Commerce Rd Cedar Grove, NJ 07009	(973) 571-2200	Leon K Baptiste	14 yrs.	Over $5 Million	Yes
LDS Lockdown Patrol, NYC	616 Bainbridge Street Brooklyn, NY 11233	(917) 620-8091				No
Master Halco	25 Mill Road Ronkonkoma, NY	(631) 585-8150	Bob Locurto	50 yrs.	Over $5 Million	No
Mohegan Associates, Inc.	130 Old Route 6 Carmel, NY 10512	(845) 225-6468	Lou Caliccha	15 yrs.	Over $5 Million	No
MS Construction	600 Franklin Avenue Mount Vernon, NY	(914) 667-7373	Josh Troetel	1 yr.	Less than $500,000	No
MS Unlimited, Inc	6828 Ellicott Drive E. Syracuse, NY 13057	(315) 437-1291				Yes

APPENDIX A3

INFORMATION ON SOLICITED FIRMS

New York Geomatics	4601 39th Avenue #421 Sunnyside, NY 11104	(718) 757-1418	Rafael Perez	3 yrs.	Less than $500,000	Yes
O'Connell Electric Company, Inc	830 Phillips Road Victor, NY 14564	(585) 924-2176	Dick Borza	102 yrs.	Over $5 Million	No
Pagones-O'Neil, Inc.	355 Main Street Beacon, NY 12508	(845) 632-6900	Steven Pagones			No
Perfect Cut Landscaping dba Hudson Valley Trucking	24 Country Club Drive Florida, NY 10421	(845) 651-4263	Thomas E Sanchez	15 yrs.	Over $5 Million	No
Perreca Electric Co., Inc.	27 West Street Newburgh, NY 12550	(845)-562-4080	Frank Carlstrom	64 yrs.	Over $5 Million	No
Probek Construction Corp	251 Jernee Mill Road, Suite C Sayreville, NJ 08872	(732) 613-8822	Johnnie Provini	9 yrs.	$1 - $2 Million	No
Raritan Pipe & Supply	301 Meadow Road Edison, NJ 08817	(732) 985-5000				No
Rebar Steel Corp	2 Maplewood Avenue Farmingdale, NY 11735	(631) 390-9404	Mike Smith			Yes
Safety Grooving & Grinding	13-226 County Road R Napoleon, OH 43545	(419) 592-8666	Duff Parker	60 yrs.	Over $5 Million	No
Safety Markings, Inc	460 Bostwick Avenue Bridgport, CT 06605	(203) 333-6870	David Steffens	40 yrs.	Over $5 Million	No
Summit Security Services, Inc	390 RXR Plaza Uniondale, NY 11556	(516) 240-2426	Christopher Byrne	36 yrs	Over $5 Million	No
Tectconic Engineering Surveying Consultants	70 Pleasant Hill Road Nountainville, NY 10953	(845) 563-9081	James Duesel	27 yrs.	Over $5 Million	No
Trench Technologies	37 Overlook Road Livingston, NJ	(973) 543-1915	Andrew Amsterdam	6 yrs	Over $1 Million	No
Tutor Perini Corporation	1000 Main Street, New Rochelle, NY 10801	(914) 739-1908	Henry Cheung	118 yrs.	Over $5 Million	No

APPENDIX A3
INFORMATION ON SOLICITED FIRMS

Vellano Bros., Inc	29 Vellano Drive Wappingers Falls, NY 12590	(845)838-1010	Paul Meissner	65 yrs.	Over $5 Million	No

Footnote: Annual Gross Revenue Ranges: Less than $500,000, $500,000-$1 Million, $1-$2 Million; $2 - $5 Million; Over $5 Million - Select the category that best identifies the annual gross revenue of the solicited firm.

IV. CERTIFICATION OF NONSEGREGATED FACILITIES.

All bidders will be required to submit with their bids a Certification of Nonsegregated Employee Facilities, including an agreement to get a similar certification from proposed subcontractors. These certifications will be required prior to award of the Contract.

The Contractor certifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The Contractor certifies further that it will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The Contractor agrees that a breach of this Certification is a violation of the equal opportunity clause in this Contract. As used in this Certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or any other reason. The Contractor agrees that (except where it has obtained identical Certifications from proposed subcontractors for specific time periods) he will obtain identical Certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause, and that it will retain such Certifications in its files.

Certification - The information above is true and complete to the best of my knowledge and belief.

James M. Laing, Senior Vice President

Name and Title of Signer (Please Print)

James M Laing

Signature

Feb. 4, 2013

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

IV. CERTIFICATION OF NONSEGREGATED FACILITIES.

All bidders will be required to submit with their bids a Certification of Nonsegregated Employee Facilities, including an agreement to get a similar certification from proposed subcontractors. These certifications will be required prior to award of the Contract.

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Certification - The information above is true and complete to the best of my knowledge and belief.

Frank C. Lizza, Jr., General Manager

Name and Title of Signer (Please Print)

Signature

FEB. 4, 2013

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Intercounty Paving Associates, LLC

IV. CERTIFICATION OF NONSEGREGATED FACILITIES.

All bidders will be required to submit with their bids a Certification of Nonsegregated Employee Facilities, including an agreement to get a similar certification from proposed subcontractors. These certifications will be required prior to award of the Contract.

The Contractor certifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The Contractor certifies further that it will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The Contractor agrees that a breach of this Certification is a violation of the equal opportunity clause in this Contract. As used in this Certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or any other reason. The Contractor agrees that (except where it has obtained identical Certifications from proposed subcontractors for specific time periods) he will obtain identical Certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause, and that it will retain such Certifications in its files.

Certification - The information above is true and complete to the best of my knowledge and belief.

James M. Laing, Attorney-in-Fact

Name and Title of Signer (Please Print)

James M Laing

Signature

FEB. 4, 2013

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions (1)	Quantity	Unit (2)	Unit Price	Amount
1	Civil				
2	Sawcut	4405	LF	$ 3.00	$ 13,215.00
3	Filter Material Removal (Include Off-Site Disposal)	1,287	CY	$ 15.00	$ 19,305.00
4	Subdrain Removal	5,600	LF	$ 3.00	$ 16,800.00
5	Reset Storm Drain Structure	86	EA	$ 2,200.00	$ 189,200.00
6	Reset/Replace Subdrain Inspection Port	184	EA	$ 1,300.00	$ 239,200.00
7	15" RCP	310	LF	$ 110.00	$ 34,100.00
8	36" RCP	511	LF	$ 135.00	$ 68,985.00
9	8" HDPE Preforated Pipe	5,800	LF	$ 65.00	$ 377,000.00
10	Subdrain Fittings	50	EA	$ 32.00	$ 1,600.00
11	8" DIP (Class 56)	668	LF	$ 110.00	$ 73,480.00
12	Filter Fabric	11,635	SY	$ 2.00	$ 23,270.00
13	Stone Otlet Protection (Riprap)	165	CY	$ 110.00	$ 18,150.00
14	Reinforced Concrete Encasement for Pipe	69	CY	$ 560.00	$ 38,640.00
15	Clean Backfill (for Grading)	17,588	CY	$ 40.00	$ 703,520.00
16	Excavation and Stockpile	63,603	CY	$ 25.00	$ 1,590,075.00
17	Dense Graded Aggregate Base Course	19,454	CY	$ 30.00	$ 583,620.00
18	Plant Mix Macadam	20,239	TON	$ 100.00	$ 2,023,900.00
19	Other Civil	1	LS	$ 750,000.00	$ 750,000.00
20	Structural				
21	Structural - Sign Foundation (incl. removal & Disposal of Existing)				
22	10 FT Concrete Sign Foundation	35	EA	$ 6,500.00	$ 227,500.00
23	12 FT Concrete Sign Foundation	26	EA	$ 5,100.00	$ 132,600.00
24	14 FT Concrete Sign Foundation	1	EA	$ 8,300.00	$ 8,300.00
25	16 FT Concrete Sign Foundation	24	EA	$ 9,600.00	$ 230,400.00
26	18 FT Concrete Sign Foundation	4	EA	$ 12,000.00	$ 48,000.00
27	Concrete Flared End Sections	4	CY	$ 2,200.00	$ 8,800.00

02-04-13P02:49 RCVD

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions (1)	Quantity	Unit (2)	Unit Price	Amount
28	Reil Foundation and Aiming Pad	28	CY	$ 1,800.00	$ 50,400.00
29	Electrical				
30	Type L-804 LED Runway Elevated Guard Light on L-867 Base Can, Isolation Tranformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	7	EA	$ 6,400.00	$ 44,800.00
31	Type L-849 LED Runway End Identifier Light, L-867 Base Can, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Concrete Foundation	6	EA	$ 11,000.00	$ 66,000.00
32	Type L-850A LED Runway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	235	EA	$ 5,300.00	$ 1,245,500.00
33	Type L-850B LED Runway Touchdown Zone Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	180	EA	$ 2,700.00	$ 486,000.00
34	Type L-850C Runway In-Pavement Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections In Paved Shoulder	37	EA	$ 4,100.00	$ 151,700.00
35	Type L-852 LED Taxiway Centerline Light, L-868 LightBase, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	337	EA	$ 6,100.00	$ 2,055,700.00
36	Type L-852G In-Pavement Runway Guard Light L-868 Base Can, Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	34	EA	$ 5,400.00	$ 183,600.00
37	Type L-861T LED Taxiway Elevated Edge Light. Furnish and Install Light Fixture , L-867 Light Base, L-823 Connectors, Collar, Isolation Transformer and Ground Rod and associated wiring	81	EA	$ 3,300.00	$ 267,300.00
38	Type L-861T LED Taxiway Elevated Edge Light. Reinstall Light Fixture. Furnish and install L-867 Light Base, L-823 Connectors, Collar, Isolation Transformer and Ground Rod and associated wiring	64	EA	$ 2,700.00	$ 172,800.00
39	Type L-862 24" Runway Elevated Edge Light Fixture, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Paved Shoulder	185	EA	$ 2,700.00	$ 499,500.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
40	Runway Landing Zone InfraRed Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground 40 Rod, and Connections	8	EA	$ 6,000.00	$ 48,000.00
41	Runway Landing Zone InfraRed Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground 41 Rod, and Connections	2	EA	$ 6,500.00	$ 13,000.00
42	Runway Landing Zone Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	8	EA	$ 5,500.00	$ 44,000.00
43	Runway Landing Zone Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	2	EA	$ 5,500.00	$ 11,000.00
44	1-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	5	EA	$ 15,000.00	$ 75,000.00
45	1-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	9	EA	$ 450.00	$ 4,050.00
46	1-Module,Type L-858 LED Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	14	EA	$ 2,500.00	$ 35,000.00
47	2-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	20	EA	$ 7,500.00	$ 150,000.00
48	3-Module, Type L-858 LED Taxi Guidance Sign, IsolationTransformer, L-823 Connectors, Ground Rod and Connections	14	EA	$ 10,000.00	$ 140,000.00
49	3-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	26	EA	$ 1,600.00	$ 41,600.00
50	4-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	3	EA	$ 8,400.00	$ 25,200.00
51	Spare Parts - Furnish Only	1	LS	$ 230,000.00	$ 230,000.00
52	Re-Install In-pavement Steady Burn ALSF-11 fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections And Plow Ring	211	EA	$ 4,800.00	$ 1,012,800.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
53	Re-Install In-pavement ALSF-11 Flasher fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections and Plow Ring	11	EA	$ 5,400.00	$ 59,400.00
54	Re-Install Elevated ALSF-11 Threshold fixture, Furnish & Install L-867 Light Base, Isolation Transformer, L-823 Connectors, Gro,u,n d Rod and Connections	28	EA	$ 4,100.00	$ 114,800.00
55	Adjust Type L-852G In-Pavement Runway Guard Light on existing L-868 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	121	EA	$ 1,500.00	$ 181,500.00
56	Adjust Type L-861T Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. Furnish L-823 Connectors, Extension Collar and associated wiring	121	EA	$ 1,800.00	$ 217,800.00
57	Adjust Type L-804 Runway Elevated Guard Light on existing L-867 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	23	EA	$ 1,800.00	$ 41,400.00
58	Adjust Electrical Manhole Frame and Cover	14	EA	$ 3,000.00	$ 42,000.00
59	Adjust Electrical Handhole Frame and Cover	9	EA	$ 3,000.00	$ 27,000.00
60	4 kW Constant Current Regulator (5 Step)	2	EA	$ 15,000.00	$ 30,000.00
61	7.5kW Constant Current Regulator (5 Step)	8	EA	$ 15,000.00	$ 120,000.00
62	15 kW Constant Current Regulator (5 Step)	5	EA	$ 18,000.00	$ 90,000.00
63	20 kW Constant Current Regulator (5 Step)	7	EA	$ 28,000.00	$ 196,000.00
64	4' X 4' X 4' Concrete Electrical Handhole with Frame and Cover	27	EA	$ 8,400.00	$ 226,800.00
65	Runway Weather Instrument System Suface Sensor	8	EA	$ 15,000.00	$ 120,000.00
66	L-824 1/C No. 6, 5kV, Series Lighting Circuit Cable installed in Conduit	15,000	LF	$ 3.00	$ 45,000.00
67	L-824 1/C No. 8, 5kV, Series Lighting Circuit Cable installed in Conduit	415,000	LF	$ 2.00	$ 830,000.00
68	1/C No. 6, 600V Grounding Conductor	150,000	LF	$ 1.00	$ 150,000.00
69	1/C No.6, Counterpoise Grounding Conductor, with Ground Rods	100,000	LF	$ 2.00	$ 200,000.00
70	2" Concrete Encased Schedule 40 PVC Conduit	98,277	LF	$ 30.00	$ 2,948,310.00
71	4-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	5,929	LF	$ 150.00	$ 889,350.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions (1)	Quantity	Unit (2)	Unit Price	Amount
72	4-Way Concrete Encased Ductbank - 6" SCH 40 PVC -H Conduit	600	LF	$ 230.00	$ 138,000.00
73	6-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1,315	LF	$ 150.00	$ 197,250.00
74	8-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1,870	LF	$ 250.00	$ 467,500.00
75	Calibration of Regulators	1	LS	$ 7,500.00	$ 7,500.00
76	ALCS Modifications	1	LS	$ 60,000.00	$ 60,000.00
77	Power Distribution	1	LS	$ 300,000.00	$ 300,000.00
78	Communication Distribution	1	LS	$ 50,000.00	$ 50,000.00
79	Stage I Temporary Connections and Staging	1	LS	$ 50,000.00	$ 50,000.00
80	Stage II Temporary Connections and Staging	1	LS	$ 60,000.00	$ 60,000.00
81	Stage III Temporary Connections and Staging	1	LS	$ 67,000.00	$ 67,000.00
82	Demolition of Type L-824 1/C No.6, 5kV, Series Lighting Circuit Cable installed in Conduit	10,000	LF	$ 0.40	$ 4,000.00
83	Demolition of 1/C No.6, 600V Grounding Conductor	50,000	LF	$ 0.35	$ 17,500.00
84	Demolition of Type L-824 1/C No. 8, 5kV, Series Lighting Circuit Cable instalied in Conduit	90,000	LF	$ 0.20	$ 18,000.00
85	Demolition of In-pavement Steady Burn ALSF-11 fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	239	EA	$ 2,200.00	$ 525,800.00
86	Demolition of In-pavement ALSF-11 Flasher fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors,Ground Rod and Connections (Store Existing Fixtures)	11	EA	$ 3,800.00	$ 41,800.00
87	Demolition of Type L-858 Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	73	EA	$ 600.00	$ 43,800.00
88	Demolition of type L-858 Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	8	EA	$ 1,200.00	$ 9,600.00
89	Removal Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. L-823 Connectors, Extension Collar and associated wiring	191	EA	$ 1,000.00	$ 191,000.00
90	Demolition of All Types of Runway Lighting, Light Base, Transformer, Connectors, Ground Rod and Connections (not listed above)	900	EA	$ 1,200.00	$ 1,080,000.00
91	Demolition of Concrete Encased Junction Box (L-867 Light Base) in Unpaved Areas	50	EA	$ 3,000.00	$ 150,000.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
92	Remove Electrical Manhole/ Handhole Frame and Cover	23	EA	$ 2,400.00	$ 55,200.00
93	Other Electrical	1	LS	$1,366,000.00	$ 1,366,000.00
94	Environmental- Sediment and Erosion Control Measure	1	LS	$ 200,000.00	$ 200,000.00
95	Provide Security Personnel and Equipment as required to support the Work in Aeronautical and/or Sensitive areas.	1	LS	$ 2,000,000.00	$ 2,000,000.00
96	**Total Lump Sum (Unclassified Only)**				$ 28,101,920.00

1. Separate and list all items or operations of work included in your estimate in accordance with Specifications. When listing subcontracts, the prime contractor will have each subcontractor complete an analysis of bid form.
2. Unit of measure, i.e., SF, CY, Bbls, Pes, Ea., etc.
3. Include all charges, such as moving on site, removal, rental, etc.
4. In case of conflict between information hereon (whether supplied by the Authority or the bidder) and the terms or prices contained or inserted in the Contract Booklet or Contract Drawings, said Booklet and Drawings shall control.
5. The Analysis of Bid is not part of the contract. No information hereon (whether supplied by the Authority or the bidder) and no information deduced from information hereon, including quantities of materials or work, shall be deemed to vary, alter or modify and provision of the Contract, including provisions therein as to compensation and performance. The unit prices contained hereon serve the sole purpose of informing Port Authority as to components of the bidder's price quoted in the Contract. The items of materials or work contained hereon shall not deemed to be an exhaustive list of the items of materials or work required by the Contract Drawings and Specifications in their present form.

02-04-13P02:49 RCVD

SWF-164.039 ECCO II Enterprises/CCA Civil

02-04-13P03:15 RCVD

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK

Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Figures: Unit Prices	Figures: Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD ~~THREE~~ TWO DOLLARS ZERO CENTS	2.00 ~~3.00~~	1,061,200 ~~1,591,800~~
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD FOUR DOLLARS ZERO CENTS	4.00	624,000
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD ONE DOLLARS ZERO CENTS	1.00	686,600
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON SEVENTY-FIVE DOLLARS ZERO CENTS	75.00	19,387,500
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON SEVENTY-FIVE ~~NINETY SIX~~ DOLLARS ZERO CENTS	75.00 ~~96.00~~	5,595,000 ~~7,161,600~~
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT ZERO DOLLARS SEVENTY FIVE CENTS	0.75	772,650
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD ONE DOLLARS ZERO CENTS	1.00	421,410
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT ONE DOLLARS ZERO CENTS	1.00	764,200

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[20] The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

ECCO III Enterprises / CCA Civil

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
FORTY-FOUR-MILLION, FOUR HUNDRED TWENTY THOUSAND, FOUR HUNDRED FORTY Dollars ZERO Cents	$44,420,440.00

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	29,312,560.00 ~~44,420,44~~
LUMP SUM FOR UNCLASSIFIED WORK.....	44,420,440.00
ESTIMATED TOTAL CONTRACT PRICE:	[21] 73,733,000.00

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The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

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21 The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34**

CONTRACT **SWF - 164.039**

CONTRACTOR ECCO III ENTERPRISES/ACA CIVIL JOINT VENTURE

DATE

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
1	Civil				
2	Sawcut	3,650	LF	$5.00	$18,250.00
3	Filter Material Removal (Include Off-Site Disposal)	1,726	CY	$25.00	$43,150.00
4	Subdrain Removal	4,664	LF	$9.00	$41,976.00
5	Reset Storm Drain Structure Casting	87	EA	$2,900.00	$252,300.00
6	Reset/Replace Subdrain Inspection Port	193	EA	$1,000.00	$193,000.00
7	15 " RCP	310	LF	$60.00	$18,600.00
8	36" RCP	492	LF	$112.00	$55,104.00
9	8" HDPE Perforated Pipe (Corrugated)	6,405	LF	$65.00	$416,325.00
10	Subdrain Fittings	80	EA	$50.00	$4,000.00
11	8" DIP (Class 56)	580	LF	$52.00	$30,160.00
12	Filter Fabric	11,200	SY	$1.00	$11,200.00
13	Stone Otlet Protection (Riprap)	195	CY	$133.00	$25,935.00
14	Reinforced Concrete Encasement for Pipe	40	CY	$368.00	$14,720.00
	(Continue to next page)				

1. Separate and list all items or operations of work included in your estimate in accordance with Specifications. When listing subcontracts, the prime contractor will have each subcontractor complete an analysis of bid form.
2. Unit of measure, i.e., SF, CY, Bbls, Pcs, Ea., etc.
3. Include all charges, such as moving on site, removal, rental, etc.
4. In case of conflict between information hereon (whether supplied by the Authority or the bidder) and the terms or prices contained or inserted in the Contract Booklet or Contract Drawings, said Booklet and Drawings shall control.
5. The Analysis of Bid is not part of the contract. No information hereon (whether supplied by the Authority or the bidder) and no information deduced from information hereon, including quantities of materials or work, shall be deemed to vary, alter or modify and provision of the Contract, including provisions therein as to compensation and performance. The unit prices contained hereon serve the sole purpose of informing Port Authority as to components of the bidder's price quoted in the Contract. The items of materials or work contained hereon shall not deemed to be an exhaustive list of the items of materials or work required by the Contract Drawings and Specifications in their present form.

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR ECCO III ENTERPRISES/CCA CIVIL Joint Venture DATE

15	Clean Backfill (for Grading)	32,906	CY	$27.00	$888,462.00
16	Excavation and Stockpile	53,478	CY	$30.00	$1,604,340.00
17	Dense Graded Aggregate Base Course	19,066	CY	$48.00	$915,168.00
18	Plant Mix Macadam	23,966	TON	$95.00	$2,276,770.00
19	Other Civil	1	LS	$21,123,142	$21,123,142
20	Structural				
21	Structural - Sign Foundation (incl. Removal and Disposal of Existing)				
22	10 FT Concrete Sign Foundation	35	EA	$2,000.00	$70,000.00
23	12 FT Concrete Sign Foundation	0	EA	$0.00	$0.00
24	14 FT Concrete Sign Foundation	26	EA	$2,244.00	$58,344.00
25	16 FT Concrete Sign Foundation	1	EA	$2,500.00	$2,500.00
26	18 FT Concrete Sign Foundation	28	EA	$2,700.00	$75,600.00
27	Concrete Flared End Sections	3	CY	$1,700.00	$5,100.00
28	Reil Foundation and Aiming Pad	5	CY	$6,200.00	$31,000.00
29	Electrical				
30	Type L-804 LED Runway Elevated Guard Light on L-867 Base Can, Isolation Transformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	24	EA	$5,500.00	$132,000.00
31	Type L-849 LED Runway End Identifier Light, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Concrete Foundation	4	EA	$5,500.00	$22,000.00
32	Type L-850A LED Runway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	235	EA	$4,500.00	$1,057,500.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR ECCOTTI ENTERPRISES / CCACIVIL JOINT Venture DATE

33	Type L-850B LED Runway Touchdown Zone Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	180	EA	$4,500.00	$810,000.00
34	Type L-850C Runway In-Pavement Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections In Paved Shoulder	36	EA	$4,500.00	$162,000.00
35	Type L-852 LED Taxiway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	341	EA	$4,500.00	$1,534,500.00
36	Type L-852G In-Pavement Runway Guard Light L-868 Base Can, Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	48	EA	$5,500.00	$264,000.00
37	Type L-861T LED Taxiway Elevated Edge Light. Furnish and Install Light Fixture , L-867 Light Base, L-823 Connectors, Collar,Isolation Transformer and Ground Rod and associated wiring	25	EA	$3,200.00	$80,000.00
38	Type L-861T LED Taxiway Elevated Edge Light. Reinstall Light Fixture. Furnish and install L-867 Light Base, L-823 Connectors, Collar,Isolation Transformer and Ground Rod and associated wiring	41	EA	$2,500.00	$102,500.00
39	Type L-862 24" Runway Elevated Edge Light Fixture, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Paved Shoulder	185	EA	$2,600.00	$481,000.00
40	Runway Landing Zone InfraRed Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	14	EA	$3,500.00	$49,000.00
41	Runway Landing Zone InfraRed Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	2	EA	$3,000.00	$6,000.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR ECCO III ENTERPRISES / CCA CIVIL JOINT VENTURE DATE

42	Runway Landing Zone Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	8	EA	$2,000	$16,000
43	Runway Landing Zone Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	2	EA	$2,000	$4,000
44	1-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	20	EA	$3,500.00	$70,000.00
45	1-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	9	EA	$3,000	$27,000
46	1-Module,Type L-858 LED Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	14	EA	$2,000	$28,000
47	2-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	41	EA	$4,500.00	$184,500.00
48	3-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	26	EA	$6,500.00	$169,000.00
49	3-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	26	EA	$6,500	$169,000
50	4-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	3	EA	$9,500.00	$28,500.00
51	Spare Parts - Furnish Only	1	LS	$80,000.00	$80,000.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR ECCO III ENTERPRISES/CCA CIVIL JOINT Venture DATE

52	Re-Install In-pavement Steady Burn ALSF-II fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections And Plow Ring	7	EA	$1,800.00	$12,600.00
53	Re-Install In-pavement ALSF-II Flasher fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections and Plow Ring	162	EA	$3,400.00	$550,800.00
54	Re-Install Elevated ALSF-II Threshold fixture, Furnish & Install L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	26	EA	$4,500.00	$117,000.00
55	Adjust Type L-852G In-Pavement Runway Guard Light on existing L-868 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	107	EA	$1,200.00	$128,400.00
56	Adjust Type L-861T Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. Furnish L-823 Connectors, Extension Collar and associated wiring	78	EA	$1,200.00	$93,600.00
57	Adjust Type L-804 Runway Elevated Guard Light on existing L-867 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	4	EA	$1,700.00	$6,800.00
58	Adjust Electrical Manhole Frame and Cover	14	EA	$1,400.00	$19,600.00
59	Adjust Electrical Handhole Frame and Cover	9	EA	$1,400.00	$12,600.00
60	4 kW Constant Current Regulator (5 Step)	2	EA	$22,000.00	$44,000.00
61	7.5kW Constant Current Regulator (5 Step)	7	EA	$26,000.00	$182,000.00
62	15 kW Constant Current Regulator (5 Step)	5	EA	$28,000.00	$140,000.00
63	20 kW Constant Current Regulator (5 Step)	7	EA	$36,000.00	$252,000.00
64	4' X 4' X 4' Concrete Electrical Handhole with Frame and Cover	27	EA	$4,700.00	$126,900.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR ECCO III ENTERPRISES/CCA CIVIL Joint Venture DATE

65	Runway Weather Instrument System Suface Sensor	8	EA	$3,800.00	$30,400.00
66	L-824 1/C No. 6, 5kV , Series Lighting Circuit Cable installed in Conduit	15,000	LF	~~$4.00~~ $3.85	$57,750.00
67	L-824 1/C No. 8, 5kV , Series Lighting Circuit Cable installed in Conduit	425,000	LF	$4.00	$1,700,000.00
68	1/C No. 6, 600V Grounding Conductor	200,000	LF	$2.00	$400,000.00
69	1/C No. 6, Counterpoise Grounding Conductor, with Ground Rods	399,460	LF	$4.00	$1,597,840.00
70	2" Concrete Encased Schedule 40 PVC Conduit	101,960	LF	$27.00	$2,752,920.00
71	4-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	2,904	LF	$95.00	$275,880.00
72	4-Way Concrete Encased Ductbank - 6" SCH 40 PVC -H Conduit	600	LF	$140.00	$84,000.00
73	6-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1,765	LF	$98.00	$172,970.00
74	8-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1,175	LF	$98.00	$115,150.00
75	Calibration of Regulators	1	LS	$20,000.00	$20,000.00
76	ALCS Modifications	1	LS	$32,000.00	$32,000.00
77	Power Distribution	1	LS	$35,000.00	$35,000.00
78	Communication Distribution	1	LS	$35,000.00	$35,000.00
79	Stage I Temporary Connections and Staging	1	LS	$26,000.00	$26,000.00
80	Stage II Temporary Connections and Staging	1	LS	$28,000.00	$28,000.00
81	Stage III Temporary Connections and Staging	1	LS	$21,000.00	$21,000.00
82	Demolition of Type L-824 1/C No. 6, 5kV, Series Lighting Circuit Cable installed in Conduit	22,000	LF	0.70	15,400
83	Demolition of 1/C No. 6, 600V Grounding Conductor	80,000	LF	0.70	56,000

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR ECCO III ENTERPRISES/CCA CIVIL Joint Venture DATE

84	Demolition of Type L-824 1/C No. 8, 5kV, Series Lighting Circuit Cable installed in Conduit	160,000	LF	0.70	112,000
85	Demolition of In-pavement Steady Burn ALSF-II fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	211	EA	144	30,384
86	Demolition of In-pavement ALSF-II Flasher fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	218	EA	$350.00	$76,300.00
87	Demolition of Type L-858 Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	10	EA	$350.00	$3,500.00
88	Demolition of type L-858 Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	40	EA	$350.00	$14,000.00
89	Removal Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. L-823 Connectors, Extension Collar and associated wiring	32	EA	$350.00	$11,200.00
90	Demolition of All Types of Runway Lighting, Light Base, Transformer, Connectors, Ground Rod and Connections (not listed above)	148	EA	$350.00	$51,800.00
91	Demolition of Concrete Encased Junction Box (L-867 Light Base) in Unpaved Areas	900	EA	$350.00	$315,000.00
92	Remove Electrical Manhole/Handhole Frame and Cover	8	EA	$1,000.00	$8,000.00
93	Other Electrical	1	LS	$350,000.00	$350,000.00
94	Environmental- Sediment and Erosion Control Measure	1	LS	$55,000.00	$55,000.00
95	Provide Security Personnel and Equipment as required to support the Work in Aeronautical and/or Sensitive areas.	1	LS	$600,000.00	$600,000.00
96	**Total Lump Sum (Unclassified)**				$44,420,440.00

340f-164.039 The Lane Construction Corp.

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK				
			Figures	
Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Unit Prices	Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD One DOLLARS and zero CENTS	1.	530,600.
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD Two DOLLARS and thirty CENTS	2.30	358,800.
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD Zero DOLLARS and fifty CENTS	.50	343,300.
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON Ninety seven DOLLARS and zero CENTS	97.	25,074,500.
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON Ninety two DOLLARS and zero CENTS	92.	6,863,200
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT Zero DOLLARS and ninety CENTS	.90	927,180.
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD One DOLLARS and zero CENTS	1.	421,410
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT Zero DOLLARS and ninety CENTS	.90	687,780

[20] The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

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The Lane Construction Corp.

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
Thirty two million three hundred forty thousand Dollars and zero Cents	32,340,000.

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	35,206,770
LUMP SUM FOR UNCLASSIFIED WORK.....	32,340,000
ESTIMATED TOTAL CONTRACT PRICE:[21]	$ 67,546,770.

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The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

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21 The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

The Port Authority of New York and New Jersey

Analysis of Bid

This is not part of the contract

Project SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34 SWF - 164.039

Contractor LANE Construction Corporation 2/4/2013

Item #	Description	Qty	Unit	Unit Price	Amount
1	Civil	X	X	X	X
2	Sawcut	45,860	LF	$ 4.54	$ 208,089.75
3	Filter Material Removal	-	CY	$ -	$ -
4	Subdrain Removal (Incl Ports)	5,503	LF	$ 24.75	$ 136,199.25
5	Reset Storm Structure Castings (CB's and MH)	70	EA	$ 2,310.00	$ 161,700.00
6	Reset / Replace Subdrain Inspection Port	175	EA	$ 1,650.00	$ 288,750.00
7	15" RCP	305	LF	$ 90.75	$ 27,678.75
8	36" RCP	402	LF	$ 165.00	$ 66,330.00
9	8" HDPE Perf	5,672	LF	$ 52.80	$ 299,481.60
10	Subdrain Fittings	37	EA	$ -	$ -
11	8" DIP (encased in concrete w/ reinforcement)	780	LF	$ 82.50	$ 64,350.00
12	Filter Fabric	1,355	SY	$ 6.60	$ 8,943.00
13	Erosion Control Stone (check dams and outlet)	192	CY	$ 118.80	$ 22,809.60
14	Reinforced Concrete Encasement Pipe	-	CY	$ -	$ -
15	Clean Backfill for Grading	-	CY	$ -	$ -
16	Excavation and Backfill	52,364	CY	$ 30.53	$ 1,598,411.10
17	Dense Graded Aggregate Base Course	40,409	TN	$ 21.45	$ 866,773.05
18	Plant Mix Macadam	24,417	TON	$ 115.50	$ 2,820,163.50
19	Other Civil	1	LS	$ 5,348,379.30	$ 5,348,379.30
20	Structural	X	X	X	X
21	Structural - Sign Foundation	X	X	X	X
22	10 Ft Concrete Sign Foundation	3	EA	$ 6,435.00	$ 19,305.00
23	12 Ft Concrete Sign Foundation	33	EA	$ 8,563.50	$ 282,595.50
24	14 Ft Concrete Sign Foundation	48	EA	$ 9,801.00	$ 470,448.00
25	16 Ft Concrete Sign Foundation	5	EA	$ 10,593.00	$ 52,965.00
26	18 Ft Concrete Sign Foundation	2	EA	$ 11,385.00	$ 22,770.00
27	Concrete Flared End Sections	-	CY	$ -	$ -
28	REIL Foundations	6	CY	$ 14,099.25	$ 84,595.50
29	Electrical	X	X	X	X

The Lane Construction Corp

30	Type L-804 Runway Elevated Guard Light	36	EA	$	5,808.00	$	209,088.00
31	Type L-849 LED Runway End Identifier Light	6	EA	$	28,792.50	$	172,755.00
32	Type L-850A LED Runway Centerline Light	235	EA	$	5,395.50	$	1,267,942.50
33	Type L-850B LED Runway Touchdown Zone Light	180	EA	$	5,098.50	$	917,730.00
34	Type L-850C Runway In-Pavement Edge Light	49	EA	$	4,331.25	$	212,231.25
35	Type L-852 LED Taxiway Centerline Light	339	EA	$	4,875.75	$	1,652,879.25
36	Type L-852G In-Pavement Runway Guard Light	34	EA	$	6,250.20	$	212,506.80
37	Type L-861T LED Taxiway Elevated Edge Light - Funr	146	EA	$	4,092.00	$	597,432.00
38	Type L-861T LED Taxiway Elevated Edge Light - Rein	111	EA	$	1,460.25	$	162,087.75
39	Type L-862 24" Runway Elevated Light Fixture	172	EA	$	5,709.00	$	981,948.00
40	Runway Landing Zone InfraRed Edge Light	8	EA	$	7,788.00	$	62,304.00
41	Runway Landing Zone Infrared Strobe Light	4	EA	$	16,401.00	$	65,604.00
42	Runway Landing Zone Edge Light	4	EA	$	8,085.00	$	32,340.00
43	Runway Landing Zone Strobe Light	4	EA	$	12,606.00	$	50,424.00
44	1-Module Type L-858 LED Mandatory Runway Sign	8	EA	$	6,303.00	$	50,424.00
45	1-Module Type L-858 LED Taxi Guidance Sign	1	EA	$	6,303.00	$	6,303.00
46	1 Module Type L-858 LED Distance Remaining Sign	11	EA	$	6,303.00	$	69,333.00
47	2 Module Type L-858 LED Taxi Guidance Sign	35	EA	$	7,829.25	$	274,023.75
48	3 Module Type L-858 LED Taxi Guidance Sign	11	EA	$	9,735.00	$	107,085.00
49	3 Module Type L-858 LED Mandatory Runway Sign	15	EA	$	9,735.00	$	146,025.00
50	4 Module Type L-858 LED Mandatory Runway Sign	7	EA	$	12,210.00	$	85,470.00
51	Spare Parts - Furnish Only	1	LS	$	314,655.00	$	314,655.00
52	Reinstall In-Pavement Steday Burn ALSF-2	211	EA	$	3,993.00	$	842,523.00
53	Re-Install In-Pavement ALSF-2 Flasher Fixture	19	EA	$	4,851.00	$	92,169.00
54	Re-Install Elevated A:SF-2 Threshold Fixture	26	EA	$	3,102.00	$	80,652.00
55	Adjust Type L-852-G In-Pavement Runway Guard Light	123	EA	$	3,250.50	$	399,811.50
56	Adjust Type L-861T Taxiway elevated Edge Light	122	EA	$	1,468.50	$	179,157.00
57	Adjust Type L-804 Runway Elevated Gaurdlight	36	EA	$	1,204.50	$	43,362.00
58	Adjust Electrical Manhole Frame and Cover	19	EA	$	924.00	$	17,556.00
59	Adjust Electrical Handhole Frame and Cover	4	EA	$	734.25	$	2,937.00
60	4kW Conctant Current Regulator	2	EA	$	20,542.50	$	41,085.00
61	7.5kW Constant Current Regulator	7	EA	$	26,004.00	$	182,028.00
62	15kW Constant Current Regulator	4	EA	$	31,185.00	$	124,740.00
63	20 kW Constant Current Regulator	7	EA	$	38,131.50	$	266,920.50
64	4' x 4' x 4' Concrete Electrical Handhole	31	EA	$	8,481.00	$	262,911.00
65	Runway Weather Instrument System Surface Sensor	8	EA	$	6,979.50	$	55,836.00
66	L-824 1/C No. 6 Series Lighting Cable	6,800	LF	$	2.15	$	14,586.00

The Lane Construction Corp

67	L-824 1/C No. 8 Series Lighting Cable	346,000	LF	$	1.98	$	685,080.00
68	1/C No. 6 Grounding Counductor	138,900	LF	$	1.47	$	203,974.65
69	1/C No. 6 Counterpoise Grounding Conductor	102,400	LF	$	2.15	$	219,648.00
70	2" Concrete encased Schedule 40 PVC	99,850	LF	$	31.68	$	3,163,248.00
71	4-Way Ductbank - 4" PVC	6,670	LF	$	72.60	$	484,242.00
72	4-Way Ductbank - 6" PVC	840	LF	$	77.22	$	64,864.80
73	6-Way Ductbank - 4" PVC	1,240	LF	$	119.30	$	147,925.80
74	8-Way Ductbank - 8" PVC	2,775	LF	$	161.70	$	448,717.50
75	Calibration of Regulators	1	LS	$	12,408.00	$	12,408.00
76	ALCS Modifications	1	LS	$	84,150.00	$	84,150.00
77	Power Distribution	1	LS	$	458,158.80	$	458,158.80
78	Communication Distribution	1	LS	$	202,999.50	$	202,999.50
79	Stage 1 Temp Connections	1	LS	$	25,740.00	$	25,740.00
80	Stage 2 Temp Connections	1	LS	$	36,795.00	$	36,795.00
81	Stage 3 Temp Connections	1	LS	$	32,670.00	$	32,670.00
82	Demo of Type L-824 1/C No. 6 Series Lighting	5,900	LF	$	0.41	$	2,433.75
83	Demo of 1/C No. 6 Grounding Conductor	118,200	LF	$	0.17	$	19,503.00
84	Demo of Type L-824 1/C No. 8 Series Lighting	285,300	LF	$	0.41	$	117,686.25
85	Demo of In-Pavement Steday Burn ALSF-2	257	EA	$	544.50	$	139,936.50
86	Demo of In-Pavement ALSF-2 Flasher Fixture	13	EA	$	544.50	$	7,078.50
87	Demo of Type L-858 Mandatory Runway Sign	30	EA	$	676.50	$	20,295.00
88	Demo of Type L-858 Distance Remaining Sign	11	EA	$	610.50	$	6,715.50
89	Removal Taxiway Elevated Edge Light	257	EA	$	346.50	$	89,050.50
90	Demo of All Types of Runway Lighting	795	EA	$	354.75	$	282,026.25
91	Demo of Concrete Encased Junction Box	39	EA	$	346.50	$	13,513.50
92	Remove Electrical manhole / Handhole Frame and Cov	12	EA	$	528.00	$	6,336.00
93	Other Electrical	1	LS	$	308,550.00	$	308,550.00
94	Erosion Control	1	LS	$	41,250.00	$	41,250.00
95	Security Personell and Equipment	1	LS	$	1,907,400.00	$	1,907,400.00
	Total Lump Sum (Unclassified)					$	32,340,000.00

SWF-164.039 Rifenburg Construction, Inc.

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK				
			Figures	
Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Unit Prices	Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD Two DOLLARS zero CENTS	2.00	1,061,200.00
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD Two DOLLARS zero CENTS	2.00	312,000.00
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD Zero DOLLARS Seventy CENTS	0.70	480,620.00
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON One Hundred DOLLARS zero CENTS	100.00	25,850,000.00
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON Ninety DOLLARS Zero CENTS	90.00	6,714,000.00
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT Zero DOLLARS Ninety Five CENTS	0.95	978,690.00
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD One DOLLARS Zero CENTS	1.00	421,410.00
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT Zero DOLLARS Ninety CENTS	0.90	687,780.00

[20] The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

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Rifenburg Construction, Inc.

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
Twenty Eight Million Five Hundred Forty Five Thousand Three Hundred Sixty Seven ....Dollars Fifty ....Cents	28,545,367.50

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	36,505,700.00
LUMP SUM FOR UNCLASSIFIED WORK.....	28,545,367.50
ESTIMATED TOTAL CONTRACT PRICE:	[21] $ 65,051,067.50

The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

[21] The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34**

CONTRACTOR RIFENBURG CONSTRUCTION, INC.

CONTRACT **SWF - 164.039**

DATE 2/4/13

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
1	Civil				
2	Sawcut	10.00	LF	10.00	100.00
3	Filter Material Removal (Include Off-Site Disposal)	1060.00	CY	17.00	18,020.00
4	Subdrain Removal	4725.00	LF	4.00	18,900.00
5	Reset Storm Drain Structure Casting	77.00	EA	1,750.00	134,750.00
6	Reset/Replace Subdrain Inspection Port	176.00	EA	1,500.00	264,000.00
7	15 " RCP	305	LF	95.00	28,975.00
8	36" RCP	510	LF	170.00	86,700.00
9	8" HDPE Perforated Pipe (Corrugated)	6095	LF	38.00	231,610.00
10	Subdrain Fittings	50	EA	150.00	7,500.00
11	8" DIP (Class 56)	340	LF	100.00	34,000.00
12	Filter Fabric	20,695	SY	1.50	31,042.50
13	Stone Otlet Protection (Riprap)	200	CY	90.00	18,000.00
14	Reinforced Concrete Encasement for Pipe	35	CY	335.00	11,725.00
	(Continue to next page)				

1. Separate and list all items or operations of work included in your estimate in accordance with Specifications. When listing subcontracts, the prime contractor will have each subcontractor complete an analysis of bid form.
2. Unit of measure, i.e., SF, CY, Bbls, Pcs, Ea., etc.
3. Include all charges, such as moving on site, removal, rental, etc.
4. In case of conflict between information hereon (whether supplied by the Authority or the bidder) and the terms or prices contained or inserted in the Contract Booklet or Contract Drawings, said Booklet and Drawings shall control.
5. The Analysis of Bid is not part of the contract. No information hereon (whether supplied by the Authority or the bidder) and no information deduced from information hereon, including quantities of materials or work, shall be deemed to vary, alter or modify and provision of the Contract, including provisions therein as to compensation and performance. The unit prices contained hereon serve the sole purpose of informing Port Authority as to components of the bidder's price quoted in the Contract. The items of materials or work contained hereon shall not deemed to be an exhaustive list of the items of materials or work required by the Contract Drawings and Specifications in their present form.

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34**

CONTRACTOR RIFENBURG CONSTRUCTION, INC.

CONTRACT **SWF - 164.039**

DATE 2/4/13

15	Clean Backfill (for Grading)	17,000	CY	50.00	850,000.00
16	Excavation and Stockpile	37,605	CY	55.00	2,068,275.00
17	Dense Graded Aggregate Base Course	19,868	CY	60.00	1,192,080.00
18	Plant Mix Macadam	25,430	TON	75.00	1,907,250.00
19	Other Civil	1.0	LS	6,550,000	6,550,000.00
20	Structural				
21	Structural - Sign Foundation (incl. Removal and Disposal of Existing)				
22	10 FT Concrete Sign Foundation	3	EA	4,800.00	14,400.00
23	12 FT Concrete Sign Foundation	33	EA	6,200.00	204,600.00
24	14 FT Concrete Sign Foundation	48	EA	7,200.00	345,600.00
25	16 FT Concrete Sign Foundation	5	EA	7,800.00	39,000.00
26	18 FT Concrete Sign Foundation	2	EA	8,400.00	16,800.00
27	Concrete Flared End Sections	3	CY	2,400.00	7,200.00
28	Reil Foundation and Aiming Pad	6	CY	10,500.00	63,000.00
29	Electrical				
30	Type L-804 LED Runway Elevated Guard Light on L-867 Base Can, Isolation Transformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	36	EA	4,300.00	154,800.00
31	Type L-849 LED Runway End Identifier Light, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Concrete Foundation	6	EA	22,000.00	132,000.00
32	Type L-850A LED Runway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	235	EA	4,000.00	940,000.00

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR RIFENBURG CONSTRUCTION, INC. DATE 2/4/13

33	Type L-850B LED Runway Touchdown Zone Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	180	EA	3,800.00	684,000.00
34	Type L-850C Runway In-Pavement Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections In Paved Shoulder	49	EA	3,200.00	156,800.00
35	Type L-852 LED Taxiway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	339	EA	3,600.00	1,220,400.00
36	Type L-852G In-Pavement Runway Guard Light L-868 Base Can, Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	34	EA	4,600.00	156,400.00
37	Type L-861T LED Taxiway Elevated Edge Light. Furnish and Install Light Fixture , L-867 Light Base, L-823 Connectors, Collar,Isolation Transformer and Ground Rod and associated wiring	146	EA	3,000.00	438,000.00
38	Type L-861T LED Taxiway Elevated Edge Light. Reinstall Light Fixture. Furnish and install L-867 Light Base, L-823 Connectors, Collar,Isolation Transformer and Ground Rod and associated wiring	111	EA	1,100.00	122,100.00
39	Type L-862 24" Runway Elevated Edge Light Fixture, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Paved Shoulder	172	EA	4,200.00	722,400.00
40	Runway Landing Zone InfraRed Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	8	EA	5,800.00	46,400.00
41	Runway Landing Zone InfraRed Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	4	EA	12,000.00	48,000.00

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR RIFENBURG CONSTRUCTION, INC. DATE 2/4/13

42	Runway Landing Zone Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	4	EA	6,000.00	24,000.00
43	Runway Landing Zone Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	4	EA	9,300.00	37,200.00
44	1-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	8	EA	4,700.00	37,600.00
45	1-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	1	EA	4,700.00	4,700.00
46	1-Module,Type L-858 LED Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	11	EA	4,700.00	51,700.00
47	2-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	35	EA	5,800.00	203,000.00
48	3-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	11	EA	7,200.00	79,200.00
49	3-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	15	EA	7,200.00	108,000.00
50	4-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	7	EA	9,000.00	63,000.00
51	Spare Parts - Furnish Only	1	LS	230,000.00	230,000.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY 2-04-13P03:14 RCVD

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34**

CONTRACTOR RIFENBURG CONSTRUCTION, INC.

CONTRACT **SWF - 164.039**

DATE 2/4/13

52	Re-Install In-pavement Steady Burn ALSF-II fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections And Plow Ring	211	EA	3,000.00	633,000.00
53	Re-Install In-pavement ALSF-II Flasher fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections and Plow Ring	19	EA	3,600.00	68,400.00
54	Re-Install Elevated ALSF-II Threshold fixture, Furnish & Install L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	26	EA	2,300.00	59,800.00
55	Adjust Type L-852G In-Pavement Runway Guard Light on existing L-868 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	123	EA	2,400.00	295,200.00
56	Adjust Type L-861T Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. Furnish L-823 Connectors, Extension Collar and associated wiring	122	EA	1,100.00	134,200.00
57	Adjust Type L-804 Runway Elevated Guard Light on existing L-867 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	36	EA	900.00	32,400.00
58	Adjust Electrical Manhole Frame and Cover	19	EA	700.00	13,300.00
59	Adjust Electrical Handhole Frame and Cover	4	EA	550.00	2,200.00
60	4 kW Constant Current Regulator (5 Step)	2	EA	15,000.00	30,000.00
61	7.5kW Constant Current Regulator (5 Step)	7	EA	19,000.00	133,000.00
62	15 kW Constant Current Regulator (5 Step)	4	EA	23,000.00	92,000.00
63	20 kW Constant Current Regulator (5 Step)	7	EA	28,000.00	196,000.00
64	4' X 4' X 4' Concrete Electrical Handhole with Frame and Cover	31	EA	6,300.00	195,300.00

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR RIFENBURG CONSTRUCTION, INC. DATE 2/4/13

65	Runway Weather Instrument System Suface Sensor	8	EA	5,200.00	41,600.00
66	L-824 1/C No. 6, 5kV , Series Lighting Circuit Cable installed in Conduit	6,800	LF	1.50	10,200.00
67	L-824 1/C No. 8, 5kV , Series Lighting Circuit Cable installed in Conduit	346,000	LF	1.40	484,400.00
68	1/C No. 6, 600V Grounding Conductor	138,900	LF	1.00	138,900.00
69	1/C No. 6, Counterpoise Grounding Conductor, with Ground Rods	102,400	LF	1.50	153,600.00
70	2" Concrete Encased Schedule 40 PVC Conduit	99,850	LF	24.00	2,396,400.00
71	4-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	6,670	LF	53.00	353,510.00
72	4-Way Concrete Encased Ductbank - 6" SCH 40 PVC -H Conduit	840	LF	56.00	47,040.00
73	6-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1240	LF	87.00	107,880.00
74	8-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	2775	LF	118.00	327,450.00
75	Calibration of Regulators	1	LS	9,000.00	9,000.00
76	ALCS Modifications	1	LS	60,000.00	60,000.00
77	Power Distribution	1	LS	335,000.00	335,000.00
78	Communication Distribution	1	LS	148,000.00	148,000.00
79	Stage I Temporary Connections and Staging	1	LS	18,000.00	18,000.00
80	Stage II Temporary Connections and Staging	1	LS	26,000.00	26,000.00
81	Stage III Temporary Connections and Staging	1	LS	23,000.00	23,000.00
82	Demolition of Type L-824 1/C No. 6, 5kV, Series Lighting Circuit Cable installed in Conduit	5,900	LF	0.30	1,770.00
83	Demolition of 1/C No. 6, 600V Grounding Conductor	118,200	LF	0.15	17,730.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY 02-04-13P03:14 RCVD

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34**

CONTRACTOR RIFENBURG CONSTRUCTION, INC.

CONTRACT **SWF - 164.039**

DATE 2/4/13

84	Demolition of Type L-824 1/C No. 8, 5kV, Series Lighting Circuit Cable installed in Conduit	285,300	LF	0.30	85,590.00
85	Demolition of In-pavement Steady Burn ALSF-II fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	257	EA	400.00	102,800.00
86	Demolition of In-pavement ALSF-II Flasher fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	13	EA	400.00	5,200.00
87	Demolition of Type L-858 Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	30	EA	500.00	15,000.00
88	Demolition of type L-858 Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	11	EA	450.00	4,950.00
89	Removal Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. L-823 Connectors, Extension Collar and associated wiring	257	EA	250.00	64,250.00
90	Demolition of All Types of Runway Lighting, Light Base, Transformer, Connectors, Ground Rod and Connections (not listed above)	795	EA	260.00	206,700.00
91	Demolition of Concrete Encased Junction Box (L-867 Light Base) in Unpaved Areas	39	EA	250.00	9,750.00
92	Remove Electrical Manhole/Handhole Frame and Cover	12	EA	385.00	4,620.00
93	Other Electrical	1	LS	709,000.00	709,000.00
94	Environmental- Sediment and Erosion Control Measure	1	LS	550,000.00	550,000.00
95	Provide Security Personnel and Equipment as required to support the Work in Aeronautical and/or Sensitive areas.	1	LS	400,000.00	400,000.00
96	**Total Lump Sum (Unclassified)**				28,545,367.50

SWF-164.039 Yonkers Contracting Co. Inc.

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK				
Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Figures: Unit Prices	Figures: Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD ZERO DOLLARS EIGHTY CENTS	0.80	424,480.00
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD ONE DOLLARS TEN CENTS	1.10	171,600.00
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD Zero DOLLARS Seventy Five CENTS	$0.75	$514,950.00
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON FORTY DOLLARS ZERO CENTS	40.00	10,340,000.00
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON FORTY-TWO DOLLARS ZERO CENTS	42.00	3,133,200.00
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT One DOLLARS Fifty CENTS	$1.50	$1,545,300.00
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD One DOLLARS Zero CENTS	$1.00	$421,410.00
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT Zero DOLLARS Ninety CENTS	$0.90	$687,780.00

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[20] The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

Yonkers Contracting Co. Inc.

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
Forty-Five Million Nine Hundred Seventy-Two Thousand Two Hundred Eighty .....Dollars Zero .....Cents	45,972,280.00

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	17,238,720.00
LUMP SUM FOR UNCLASSIFIED WORK.....	45,972,280.00
ESTIMATED TOTAL CONTRACT PRICE:	[21] 63,211,000.00

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The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

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[21] The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34**

CONTRACTOR Yonkers Contracting Company, Inc.

CONTRACT **SWF - 164.039**

DATE 02/04/13

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
1	Civil				
2	Sawcut	21,680	LF	$10.00	$216,800.00
3	Filter Material Removal (Include Off-Site Disposal)	-	CY	-	-
4	Subdrain Removal	2,286	LF	$100.00	$228,600.00
5	Reset Storm Drain Structure Casting	71	EA	$2,500.00	$177,500.00
6	Reset/Replace Subdrain Inspection Port	181	EA	$500.00	$90,500.00
7	15 " RCP	307	LF	$400.00	$122,800.00
8	36" RCP	508	LF	$500.00	$254,000.00
9	8" HDPE Perforated Pipe (Corrugated)	5,638	LF	$75.00	$422,850.00
10	Subdrain Fittings	25	EA	$150.00	$3,750.00
11	8" DIP (Class 56)	671	LF	$400.00	$268,400.00
12	Filter Fabric	7,745	SY	$5.00	$38,725.00
13	Stone Otlet Protection (Riprap)	160	CY	$300.00	$48,000.00
14	Reinforced Concrete Encasement for Pipe	363	CY	$400.00	$145,200.00
	(Continue to next page)				

1. Separate and list all items or operations of work included in your estimate in accordance with Specifications. When listing subcontracts, the prime contractor will have each subcontractor complete an analysis of bid form.
2. Unit of measure, i.e., SF, CY, Bbls, Pcs, Ea., etc.
3. Include all charges, such as moving on site, removal, rental, etc.
4. In case of conflict between information hereon (whether supplied by the Authority or the bidder) and the terms or prices contained or inserted in the Contract Booklet or Contract Drawings, said Booklet and Drawings shall control.
5. The Analysis of Bid is not part of the contract. No information hereon (whether supplied by the Authority or the bidder) and no information deduced from information hereon, including quantities of materials or work, shall be deemed to vary, alter or modify and provision of the Contract, including provisions therein as to compensation and performance. The unit prices contained hereon serve the sole purpose of informing Port Authority as to components of the bidder's price quoted in the Contract. The items of materials or work contained hereon shall not deemed to be an exhaustive list of the items of materials or work required by the Contract Drawings and Specifications in their present form.

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34**

CONTRACTOR Yonkers Contracting Company, Inc.

CONTRACT **SWF - 164.039**

DATE 02/04/13

15	Clean Backfill (for Grading)	38,452	CY	$20.00	$769,040.00
16	Excavation and Stockpile	65,863	CY	$25.00	$1,646,575.00
17	Dense Graded Aggregate Base Course	19,020	CY	$75.00	$1,426,500.00
18	Plant Mix Macadam	24,650	TON	$95.00	$2,341,750.00
19	Other Civil	1	LS		22,405,290.00
20	Structural				
21	Structural - Sign Foundation (incl. Removal and Disposal of Existing)				
22	10 FT Concrete Sign Foundation	-	EA	-	-
23	12 FT Concrete Sign Foundation	37	EA	$10,000.00	$370,000.00
24	14 FT Concrete Sign Foundation	26	EA	$15,000.00	$390,000.00
25	16 FT Concrete Sign Foundation	1	EA	$20,000.00	$20,000.00
26	18 FT Concrete Sign Foundation	27	EA	$25,000.00	$675,000.00
27	Concrete Flared End Sections	9	CY	$3,000.00	$27,000.00
28	Reil Foundation and Aiming Pad	28	CY	$3,000.00	$84,000.00
29	Electrical				
30	Type L-804 LED Runway Elevated Guard Light on L-867 Base Can, Isolation Transformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	7	EA		Inc in 93
31	Type L-849 LED Runway End Identifier Light, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Concrete Foundation	6	EA		Inc in 93
32	Type L-850A LED Runway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	251	EA		Inc in 93

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Yonkers Contracting Company, Inc. DATE 02/04/13

33	Type L-850B LED Runway Touchdown Zone Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	180	EA		Inc.in 93
34	Type L-850C Runway In-Pavement Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections In Paved Shoulder	32	EA		Inc in 93
35	Type L-852 LED Taxiway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	322	EA		Inc in 93
36	Type L-852G In-Pavement Runway Guard Light L-868 Base Can, Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	39	EA		Inc in 93
37	Type L-861T LED Taxiway Elevated Edge Light. Furnish and Install Light Fixture , L-867 Light Base, L-823 Connectors, Collar,Isolation Transformer and Ground Rod and associated wiring	78	EA		Inc in 93
38	Type L-861T LED Taxiway Elevated Edge Light. Reinstall Light Fixture. Furnish and install L-867 Light Base, L-823 Connectors, Collar,Isolation Transformer and Ground Rod and associated wiring	6	EA		Inc in 93
39	Type L-862 24" Runway Elevated Edge Light Fixture, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Paved Shoulder	167	EA		Inc in 93
40	Runway Landing Zone InfraRed Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	8	EA		Inc in 93
41	Runway Landing Zone InfraRed Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	2	EA		Inc in 93

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Yonkers Contracting Company, Inc. DATE 02/01/13

42	Runway Landing Zone Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	8	EA		Inc in 93
43	Runway Landing Zone Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	2	EA		Inc in 93
44	1-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	7	EA		Inc in 93
45	1-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	33	EA		Inc in 93
46	1-Module,Type L-858 LED Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	14	EA		Inc in 93
47	2-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	12	EA		Inc in 93
48	3-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	9	EA		Inc in 93
49	3-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	1	EA		Inc in 93
50	4-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	13	EA		Inc in 93
51	Spare Parts - Furnish Only	1	LS		Inc in 93

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Yonkers Contracting Company, Inc. DATE 02/01/13

52	Re-Install In-pavement Steady Burn ALSF-II fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections And Plow Ring	133	EA		Inc in 93
53	Re-Install In-pavement ALSF-II Flasher fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections and Plow Ring	47	EA		Inc in 93
54	Re-Install Elevated ALSF-II Threshold fixture, Furnish & Install L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	312	EA		Inc in 93
55	Adjust Type L-852G In-Pavement Runway Guard Light on existing L-868 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	25	EA		Inc in 93
56	Adjust Type L-861T Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. Furnish L-823 Connectors, Extension Collar and associated wiring	-	EA		
57	Adjust Type L-804 Runway Elevated Guard Light on existing L-867 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	36	EA		Inc in 93
58	Adjust Electrical Manhole Frame and Cover	14	EA		Inc in 93
59	Adjust Electrical Handhole Frame and Cover	7	EA		Inc in 93
60	4 kW Constant Current Regulator (5 Step)	-	EA		Inc in 93
61	7.5kW Constant Current Regulator (5 Step)	-	EA		Inc in 93
62	15 kW Constant Current Regulator (5 Step)	-	EA		Inc in 93
63	20 kW Constant Current Regulator (5 Step)	-	EA		Inc in 93
64	4' X 4' X 4' Concrete Electrical Handhole with Frame and Cover	28	EA		Inc in 93

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Yonkers Contracting Company, Inc. DATE 02/04/13

65	Runway Weather Instrument System Suface Sensor	7	EA		Inc in 93
66	L-824 1/C No. 6, 5kV , Series Lighting Circuit Cable installed in Conduit	-	LF		Inc in 93
67	L-824 1/C No. 8, 5kV , Series Lighting Circuit Cable installed in Conduit	-	LF		Inc in 93
68	1/C No. 6, 600V Grounding Conductor	-	LF		Inc.in 93
69	1/C No. 6, Counterpoise Grounding Conductor, with Ground Rods	-	LF		Inc in 93
70	2" Concrete Encased Schedule 40 PVC Conduit	-	LF		
71	4-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	6,212	LF		Inc in 93
72	4-Way Concrete Encased Ductbank - 6" SCH 40 PVC -H Conduit	670	LF		Inc in 93
73	6-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	859	LF		Inc in 93
74	8-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	2,469	LF		Inc in 93
75	Calibration of Regulators	1	LS		Inc in 93
76	ALCS Modifications	1	LS		Inc in 93
77	Power Distribution	1	LS		Inc in 93
78	Communication Distribution	1	LS		Inc in 93
79	Stage I Temporary Connections and Staging	1	LS		Inc in 93
80	Stage II Temporary Connections and Staging	1	LS		Inc in 93
81	Stage III Temporary Connections and Staging	1	LS		Inc in 93
82	Demolition of Type L-824 1/C No. 6, 5kV, Series Lighting Circuit Cable installed in Conduit	4,267	LF		Inc in 93
83	Demolition of 1/C No. 6, 600V Grounding Conductor	-	LF		Inc in 93

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Yonkers Contracting Company, Inc. DATE 02/04/13

84	Demolition of Type L-824 1/C No. 8, 5kV, Series Lighting Circuit Cable installed in Conduit	68,385	LF		Inc in 93
85	Demolition of In-pavement Steady Burn ALSF-II fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	-	EA		
86	Demolition of In-pavement ALSF-II Flasher fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	-	EA		
87	Demolition of Type L-858 Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	76	EA		Inc in 93
88	Demolition of type L-858 Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	-	EA		
89	Removal Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. L-823 Connectors, Extension Collar and associated wiring	341	EA		Inc in 93
90	Demolition of All Types of Runway Lighting, Light Base, Transformer, Connectors, Ground Rod and Connections (not listed above)	1,057	EA		Inc in 93
91	Demolition of Concrete Encased Junction Box (L-867 Light Base) in Unpaved Areas	50	EA		Inc in 93
92	Remove Electrical Manhole/Handhole Frame and Cover	21	EA		Inc in 93
93	Other Electrical	1	LS		13,000,000.00
94	Environmental- Sediment and Erosion Control Measure	1	LS		$500,000.00
95	Provide Security Personnel and Equipment as required to support the Work in Aeronautical and/or Sensitive areas.	1	LS		300,000.00
96	**Total Lump Sum (Unclassified)**				45,972,280.00

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SWF-164-039 Tilcon New York, Inc

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK

Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Figures: Unit Prices	Figures: Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD Two DOLLARS Fifty CENTS	2.50	1,326,500.00
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD Twelve DOLLARS Fifty CENTS	12.50	1,950,000.00
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD No DOLLARS Eighty CENTS	0.80	549,280.00
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON Sixty DOLLARS No CENTS	60.00	15,510,000.00
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON Sixty DOLLARS No CENTS	60.00	4,476,000.00
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT No DOLLARS Seventy Five CENTS	0.75	772,650.00
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD One DOLLARS No CENTS	1.00	421,410.00
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT No DOLLARS Thirty Five CENTS	0.35	267,470.00

20 The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

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Tilton New York Inc.

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
Fifty Two Million Six Hundred Twenty Three Thousand Six Hundred Ninety ..... Dollars No ..... Cents	52,623,690.00

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	25,273,310.00
LUMP SUM FOR UNCLASSIFIED WORK.....	52,623,690.00
ESTIMATED TOTAL CONTRACT PRICE:	[21] 77,897,000.00

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The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

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[21] The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Tilcon New York, Inc DATE

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
1	Civil				
2	Sawcut	2,300	LF	3.50	8,050.00
3	Filter Material Removal (Include Off-Site Disposal)	2,333	CY	40.00	93,320.00
4	Subdrain Removal	5,250	LF	30.00	157,500.00
5	Reset Storm Drain Structure Casting	70	EA	3,000.00	210,000.00
6	Reset/Replace Subdrain Inspection Port	177	EA	3,500.00	619,500.00
7	15 " RCP	312	LF	200.00	62,400.00
8	36" RCP	520	LF	260.00	135,200.00
9	8" HDPE Perforated Pipe (Corrugated)	6,580	LF	140.00	921,200.00
10	Subdrain Fittings	58	EA	300.00	17,400.00
11	8" DIP (Class 56)	940	LF	210.00	197,400.00
12	Filter Fabric	10,000	SY	0.10	1,000.00
13	Stone Otlet Protection (Riprap)	267	CY	300.00	80,100.00
14	Reinforced Concrete Encasement for Pipe	70	CY	1,850.00	129,500.00
	(Continue to next page)				

1. Separate and list all items or operations of work included in your estimate in accordance with Specifications. When listing subcontracts, the prime contractor will have each subcontractor complete an analysis of bid form.
2. Unit of measure, i.e., SF, CY, Bbls, Pcs, Ea., etc.
3. Include all charges, such as moving on site, removal, rental, etc.
4. In case of conflict between information hereon (whether supplied by the Authority or the bidder) and the terms or prices contained or inserted in the Contract Booklet or Contract Drawings, said Booklet and Drawings shall control.
5. The Analysis of Bid is not part of the contract. No information hereon (whether supplied by the Authority or the bidder) and no information deduced from information hereon, including quantities of materials or work, shall be deemed to vary, alter or modify and provision of the Contract, including provisions therein as to compensation and performance. The unit prices contained hereon serve the sole purpose of informing Port Authority as to components of the bidder's price quoted in the Contract. The items of materials or work contained hereon shall not deemed to be an exhaustive list of the items of materials or work required by the Contract Drawings and Specifications in their present form.

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Tilcon New York Inc. DATE

15	Clean Backfill (for Grading)	24,954	CY	85.00	2,121,090.00
16	Excavation and Stockpile	27,882	CY	65.00	1,812,330.00
17	Dense Graded Aggregate Base Course	18,940	CY	90.00	1,704,600.00
18	Plant Mix Macadam	20,906	TON	145.00	3,031,870.00
19	Other Civil	1	LS	19,220,000.00	19,220,000.00
20	Structural				
21	Structural - Sign Foundation (incl. Removal and Disposal of Existing)				
22	10 FT Concrete Sign Foundation	23	EA	8,900.00	204,700.00
23	12 FT Concrete Sign Foundation	14	EA	9,750.00	136,500.00
24	14 FT Concrete Sign Foundation	26	EA	14,900.00	387,400.00
25	16 FT Concrete Sign Foundation	1	EA	15,775.00	15,775.00
26	18 FT Concrete Sign Foundation	28	EA	17,500.00	490,000.00
27	Concrete Flared End Sections	3	CY	5,500.00	16,500.00
28	Reil Foundation and Aiming Pad	42	CY	1,850.00	77,700.00
29	Electrical				
30	Type L-804 LED Runway Elevated Guard Light on L-867 Base Can, Isolation Transformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	6	EA	6,600.00	39,600.00
31	Type L-849 LED Runway End Identifier Light, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Concrete Foundation	6	EA	22,950.00	137,700.00
32	Type L-850A LED Runway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	235	EA	5,150.00	1,210,250.00

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Tilcon New York, Inc DATE

33	Type L-850B LED Runway Touchdown Zone Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	180	EA	3,300.00	594,000.00
34	Type L-850C Runway In-Pavement Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections In Paved Shoulder	37	EA	4,600.00	170,200.00
35	Type L-852 LED Taxiway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	312	EA	7.00	2,352.00
36	Type L-852G In-Pavement Runway Guard Light L-868 Base Can, Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	35	EA	6,200.00	217,000.00
37	Type L-861T LED Taxiway Elevated Edge Light. Furnish and Install Light Fixture , L-867 Light Base, L-823 Connectors, Collar,Isolation Transformer and Ground Rod and associated wiring	67	EA	4,000.00	268,000.00
38	Type L-861T LED Taxiway Elevated Edge Light. Reinstall Light Fixture. Furnish and install L-867 Light Base, L-823 Connectors, Collar,Isolation Transformer and Ground Rod and associated wiring	64	EA	3,800.00	243,200.00
39	Type L-862 24" Runway Elevated Edge Light Fixture, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Paved Shoulder	185	EA	3,200.00	592,000.00
40	Runway Landing Zone InfraRed Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	8	EA	6,300.00	50,400.00
41	Runway Landing Zone InfraRed Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	2	EA	7,100.00	14,200.00

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Tilcon New York, Inc DATE

42	Runway Landing Zone Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	8	EA	6,500.00	52,000.00
43	Runway Landing Zone Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	2	EA	6,500.00	13,000.00
44	1-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	3	EA	6,500.00	19,500.00
45	1-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	19	EA	5,000.00	95,000.00
46	1-Module,Type L-858 LED Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	14	EA	6,900.00	96,600.00
47	2-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	15	EA	8,000.00	120,000.00
48	3-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	16	EA	9,300.00	148,800.00
49	3-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	13	EA	9,900.00	128,700.00
50	4-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	12	EA	10,800.00	129,600.00
51	Spare Parts - Furnish Only	1	LS	240,000.00	240,000.00

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Tilcon New York Inc DATE

52	Re-Install In-pavement Steady Burn ALSF-II fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections And Plow Ring	211	EA	5,300.00	1,118,300.00
53	Re-Install In-pavement ALSF-II Flasher fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections and Plow Ring	13	EA	5,300.00	68,900.00
54	Re-Install Elevated ALSF-II Threshold fixture, Furnish & Install L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	26	EA	5,200.00	135,200.00
55	Adjust Type L-852G In-Pavement Runway Guard Light on existing L-868 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	122	EA	1,800.00	219,600.00
56	Adjust Type L-861T Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. Furnish L-823 Connectors, Extension Collar and associated wiring	120	EA	1600.00	192,000.00
57	Adjust Type L-804 Runway Elevated Guard Light on existing L-867 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	24	EA	1,700.00	40,800.00
58	Adjust Electrical Manhole Frame and Cover	14	EA	2,900.00	40,600.00
59	Adjust Electrical Handhole Frame and Cover	9	EA	2,300.00	20,700.00
60	4 kW Constant Current Regulator (5 Step)	2	EA	14,350.00	28,700.00
61	7.5kW Constant Current Regulator (5 Step)	7	EA	17,200.00	120,400.00
62	15 kW Constant Current Regulator (5 Step)	4	EA	23,000.00	92,000.00
63	20 kW Constant Current Regulator (5 Step)	7	EA	29,000.00	203,000.00
64	4' X 4' X 4' Concrete Electrical Handhole with Frame and Cover	27	EA	10,000.00	270,000.00

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Tilcon New York Inc DATE

65	Runway Weather Instrument System Suface Sensor	8	EA	16,000.00	128,000.00
66	L-824 1/C No. 6, 5kV , Series Lighting Circuit Cable installed in Conduit	12,000	LF	2.80	33,600.00
67	L-824 1/C No. 8, 5kV , Series Lighting Circuit Cable installed in Conduit	378,465	LF	2.15	813,699.75
68	1/C No. 6, 600V Grounding Conductor	105,480	LF	1.70	179,316.00
69	1/C No. 6, Counterpoise Grounding Conductor, with Ground Rods	96,485	LF	1.70	164,024.50
70	2" Concrete Encased Schedule 40 PVC Conduit	102,485	LF	51.00	5,226,735.00
71	4-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	5930	LF	88.00	521,840.00
72	4-Way Concrete Encased Ductbank - 6" SCH 40 PVC -H Conduit	600	LF	165.00	99,000.00
73	6-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1315	LF	95.00	124,925.00
74	8-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1860	LF	145.00	269,700.00
75	Calibration of Regulators	1	LS	14,350.00	14,350.00
76	ALCS Modifications	1	LS	58,000.00	58,000.00
77	Power Distribution	1	LS	220,000.00	220,000.00
78	Communication Distribution	1	LS	40,000.00	40,000.00
79	Stage I Temporary Connections and Staging	1	LS	43,000.00	43,000.00
80	Stage II Temporary Connections and Staging	1	LS	50,000.00	50,000.00
81	Stage III Temporary Connections and Staging	1	LS	58,000.00	58,000.00
82	Demolition of Type L-824 1/C No. 6, 5kV, Series Lighting Circuit Cable installed in Conduit	22,000	LF	0.85	18,700.00
83	Demolition of 1/C No. 6, 600V Grounding Conductor	100,100	LF	0.75	75,075.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
ANALYSIS OF BID
THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF - 164.039**

CONTRACTOR Tilcon New York Inc. DATE

84	Demolition of Type L-824 1/C No. 8, 5kV, Series Lighting Circuit Cable installed in Conduit	159,500	LF	0.85	135,575.00
85	Demolition of In-pavement Steady Burn ALSF-II fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	190	EA	2,900.00	551,000.00
86	Demolition of In-pavement ALSF-II Flasher fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	10	EA	2,900.00	29,000.00
87	Demolition of Type L-858 Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	69	EA	600.00	41,400.00
88	Demolition of type L-858 Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	16	EA	650.00	10,400.00
89	Removal Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. L-823 Connectors, Extension Collar and associated wiring	191	EA	1,150.00	219,650.00
90	Demolition of All Types of Runway Lighting, Light Base, Transformer, Connectors, Ground Rod and Connections (not listed above)	696	EA	1,720.00	1,197,120.00
91	Demolition of Concrete Encased Junction Box (L-867 Light Base) in Unpaved Areas	200	EA	450.00	90,000.00
92	Remove Electrical Manhole/Handhole Frame and Cover	11	EA	2,600.00	28,600.00
93	Other Electrical	1	LS	2,000,000.00	2,000,000.00
94	Environmental- Sediment and Erosion Control Measure	1	LS	200,142.75	200,142.75
95	Provide Security Personnel and Equipment as required to support the Work in Aeronautical and/or Sensitive areas.	1	LS	1,000,000.00	1,000,000.00
96	**Total Lump Sum (Unclassified)**				52,623,690.00

SWF-164.039 Tully Construction Co. Inc.

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I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK

Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Figures: Unit Prices	Figures: Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD One DOLLARS zero CENTS	1.00	530,600.00
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD Nine DOLLARS zero CENTS	9.00	1,404,000.00
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD Zero DOLLARS sixty CENTS	0.60	411,960.00
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON One DOLLARS zero CENTS	1.00	258,500.00
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON One DOLLARS zero CENTS	1.00	74,600.00
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT One DOLLARS zero CENTS	1.00	1,030,200.00
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD One DOLLARS ten CENTS	1.10	463,551.00
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT One DOLLARS twenty five CENTS	1.25	955,250.00

[20] The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

Tully Construction Co. Inc.

II. LUMP SUM FOR UNCLASSIFIED WORK

Writing	Figures
Six million One hundred thousand ..... Dollars zero ..... Cents	56,110,000.00

III. RECAPITULATION

	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	5,128,661.00
LUMP SUM FOR UNCLASSIFIED WORK.....	56,110,000.00
ESTIMATED TOTAL CONTRACT PRICE:	61,238,661.00

The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

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SWF-164.039 Halmar Int'l / Crisdel

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK				
Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Figures: Unit Prices	Figures: Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD None DOLLARS one CENTS	0 01/xx	5,306 00/xx
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD SEVEN DOLLARS 00 CENTS	7 00/xx	1,092,000 00/xx
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD NONE DOLLARS FIFTY CENTS	0 50/xx	343,300 00/xx
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON None DOLLARS one CENTS	0 01/xx	2,585 00/xx
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON None DOLLARS one CENTS	0 01/xx	746 00/xx
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT NONE DOLLARS 75/100 CENTS	0 75/xx	772,650 00/xx
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD One DOLLARS 00/100 CENTS	1 00/xx	421,410 00/xx
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT NONE DOLLARS 35/100 CENTS	0 35/xx	267,470 00/xx

[20] The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

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Halmar Int'l / Crisdel

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
Two million nine hundred & five thousand four hundred sixty seven ....Dollars zero ....Cents	2,905,467 00/xx

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	2,905,467 00/xx
LUMP SUM FOR UNCLASSIFIED WORK.....	62,973,000 00/xx
ESTIMATED TOTAL CONTRACT PRICE: [21]	65,878,467 00/xx

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The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

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21 The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

SWF 164.039 Tutor Perini Corp. / Intercounty Paving

I. SCHEDULE OF UNIT PRICES FOR CLASSIFIED WORK

Item No.	Estimated Quantities	Items of Classified Work With Unit Prices Written	Figures: Unit Prices	Figures: Amounts[20]
1	530,600 S.Y.	MILL 1" EXISTING ASPHALT CONCRETE WEARING COURSE, PER SQUARE YARD ONE DOLLARS SEVENTY FIVE CENTS	$1.75	$928,550.00
2	156,000 S.Y.	MILL EXISTING ASPHALT CONCRETE 3" BELOW FINISHED GRADE, PER SQUARE YARD TWO DOLLARS EIGHTY FIVE CENTS	$2.85	$444,600.00
3	686,600 S.Y.	TACK COAT, PER SQUARE YARD ONE DOLLARS ZERO CENTS	$1.00	$686,600.00
4	258,500 TONS	ASPHALT CONCRETE MIX 3 WITH MODIFIED ASPHALT PG 76-22, PER TON EIGHTY NINE DOLLARS ZERO CENTS	$89.00	$23,006,500.00
5	74,600 TONS	WARM MIX ASPHALT CONCTETE MIX 3 PG 64-22, PER TON EIGHTY THREE DOLLARS ZERO CENTS	$83.00	$6,191,800.00
6	1,030,200 S.F.	AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT ONE DOLLARS ZERO CENTS	$1.00	$1,030,200.00
7	421,410 S.Y.	AIRFIELD PAVEMENT GROOVING, PER SQURE YARD ONE DOLLARS ZERO CENTS	$1.00	$421,410.00
8	764,200 S.F.	REMOVE AIRFIELD PAVEMENT MARKINGS, PER SQUARE FOOT ZERO DOLLARS TEN CENTS	$0.10	$76,420.00

[20] The amount for each item shall be computed by multiplying the estimated quantity of that item by the unit price for the item.

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Tutor Perini Corp/Intercounty Paving Assoc. LLC

II. LUMP SUM FOR UNCLASSIFIED WORK	
Writing	Figures
TWENTY EIGHT MILLION ONE HUNDRED ONE THOUSAND NINE HUNDRED TWENTY ....Dollars ZERO ....Cents	$28,101,920.00

III. RECAPITULATION	
	Figures
ESTIMATED TOTAL FOR CLASSIFIED WORK.....	$32,786,080.00
LUMP SUM FOR UNCLASSIFIED WORK.....	$28,101,920.00
ESTIMATED TOTAL CONTRACT PRICE:	[21] $60,888,000.00

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The following provisions are applicable to the Schedule of Unit Prices for Classified Work. The quantity for payment described in the following provisions shall be the quantity of Classified Work furnished, installed, performed and/or placed in accordance with the Specifications, as shown on the Contract Drawings and where ordered by the Engineer.

---

[21] The Estimated Total Contract Price shall be computed by adding the Estimated Total for Classified Work to the Lump Sum for Unclassified Work.

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
1	Civil				
2	Sawcut	4405	LF	$ 3.00	$ 13,215.00
3	Filter Material Removal (Include Off-Site Disposal)	1,287	CY	$ 15.00	$ 19,305.00
4	Subdrain Removal	5,600	LF	$ 3.00	$ 16,800.00
5	Reset Storm Drain Structure	86	EA	$ 2,200.00	$ 189,200.00
6	Reset/Replace Subdrain Inspection Port	184	EA	$ 1,300.00	$ 239,200.00
7	15" RCP	310	LF	$ 110.00	$ 34,100.00
8	36" RCP	511	LF	$ 135.00	$ 68,985.00
9	8" HDPE Preforated Pipe	5,800	LF	$ 65.00	$ 377,000.00
10	Subdrain Fittings	50	EA	$ 32.00	$ 1,600.00
11	8" DIP (Class 56)	668	LF	$ 110.00	$ 73,480.00
12	Filter Fabric	11,635	SY	$ 2.00	$ 23,270.00
13	Stone Otlet Protection (Riprap)	165	CY	$ 110.00	$ 18,150.00
14	Reinforced Concrete Encasement for Pipe	69	CY	$ 560.00	$ 38,640.00
15	Clean Backfill (for Grading)	17,588	CY	$ 40.00	$ 703,520.00
16	Excavation and Stockpile	63,603	CY	$ 25.00	$ 1,590,075.00
17	Dense Graded Aggregate Base Course	19,454	CY	$ 30.00	$ 583,620.00
18	Plant Mix Macadam	20,239	TON	$ 100.00	$ 2,023,900.00
19	Other Civil	1	LS	$ 750,000.00	$ 750,000.00
20	Structural				
21	Structural - Sign Foundation (incl. removal & Disposal of Existing)				
22	10 FT Concrete Sign Foundation	35	EA	$ 6,500.00	$ 227,500.00
23	12 FT Concrete Sign Foundation	26	EA	$ 5,100.00	$ 132,600.00
24	14 FT Concrete Sign Foundation	1	EA	$ 8,300.00	$ 8,300.00
25	16 FT Concrete Sign Foundation	24	EA	$ 9,600.00	$ 230,400.00
26	18 FT Concrete Sign Foundation	4	EA	$ 12,000.00	$ 48,000.00
27	Concrete Flared End Sections	4	CY	$ 2,200.00	$ 8,800.00

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THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions (1)	Quantity	Unit (2)	Unit Price	Amount
28	Reil Foundation and Aiming Pad	28	CY	$ 1,800.00	$ 50,400.00
29	Electrical				
30	Type L-804 LED Runway Elevated Guard Light on L-867 Base Can, Isolation Tranformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	7	EA	$ 6,400.00	$ 44,800.00
31	Type L-849 LED Runway End Identifier Light, L-867 Base Can, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Concrete Foundation	6	EA	$ 11,000.00	$ 66,000.00
32	Type L-850A LED Runway Centerline Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	235	EA	$ 5,300.00	$ 1,245,500.00
33	Type L-850B LED Runway Touchdown Zone Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	180	EA	$ 2,700.00	$ 486,000.00
34	Type L-850C Runway In-Pavement Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections In Paved Shoulder	37	EA	$ 4,100.00	$ 151,700.00
35	Type L-852 LED Taxiway Centerline Light, L-868 LightBase, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	337	EA	$ 6,100.00	$ 2,055,700.00
36	Type L-852G In-Pavement Runway Guard Light L-868 Base Can, Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	34	EA	$ 5,400.00	$ 183,600.00
37	Type L-861T LED Taxiway Elevated Edge Light. Furnish and Install Light Fixture , L-867 Light Base, L-823 Connectors, Collar, Isolation Transformer and Ground Rod and associated wiring	81	EA	$ 3,300.00	$ 267,300.00
38	Type L-861T LED Taxiway Elevated Edge Light. Reinstall Light Fixture. Furnish and install L-867 Light Base, L-823 Connectors, Collar, Isolation Transformer and Ground Rod and associated wiring	64	EA	$ 2,700.00	$ 172,800.00
39	Type L-862 24" Runway Elevated Edge Light Fixture, L-867 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections In Paved Shoulder	185	EA	$ 2,700.00	$ 499,500.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
40	Runway Landing Zone InfraRed Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground 40 Rod, and Connections	8	EA	$ 6,000.00	$ 48,000.00
41	Runway Landing Zone InfraRed Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground 41 Rod, and Connections	2	EA	$ 6,500.00	$ 13,000.00
42	Runway Landing Zone Edge Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	8	EA	$ 5,500.00	$ 44,000.00
43	Runway Landing Zone Strobe Light, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, and Connections	2	EA	$ 5,500.00	$ 11,000.00
44	1-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	5	EA	$ 15,000.00	$ 75,000.00
45	1-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	9	EA	$ 450.00	$ 4,050.00
46	1-Module,Type L-858 LED Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	14	EA	$ 2,500.00	$ 35,000.00
47	2-Module, Type L-858 LED Taxi Guidance Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	20	EA	$ 7,500.00	$ 150,000.00
48	3-Module, Type L-858 LED Taxi Guidance Sign, IsolationTransformer, L-823 Connectors, Ground Rod and Connections	14	EA	$ 10,000.00	$ 140,000.00
49	3-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	26	EA	$ 1,600.00	$ 41,600.00
50	4-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections-Module, Type L-858 LED Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	3	EA	$ 8,400.00	$ 25,200.00
51	Spare Parts - Furnish Only	1	LS	$ 230,000.00	$ 230,000.00
52	Re-Install In-pavement Steady Burn ALSF-11 fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections And Plow Ring	211	EA	$ 4,800.00	$ 1,012,800.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions (1)	Quantity	Unit (2)	Unit Price	Amount
53	Re-Install In-pavement ALSF-11 Flasher fixture, Furnish & Install L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod, Connections and Plow Ring	11	EA	$ 5,400.00	$ 59,400.00
54	Re-Install Elevated ALSF-11 Threshold fixture, Furnish & Install L-867 Light Base, Isolation Transformer, L-823 Connectors, Gro,u,n d Rod and Connections	28	EA	$ 4,100.00	$ 114,800.00
55	Adjust Type L-852G In-Pavement Runway Guard Light on existing L-868 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	121	EA	$ 1,500.00	$ 181,500.00
56	Adjust Type L-861T Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. Furnish L-823 Connectors, Extension Collar and associated wiring	121	EA	$ 1,800.00	$ 217,800.00
57	Adjust Type L-804 Runway Elevated Guard Light on existing L-867 Base Can, with existing Isolation Trasnformer, L-823 Connectors, Ground Rod, Extension Collar, and Connections	23	EA	$ 1,800.00	$ 41,400.00
58	Adjust Electrical Manhole Frame and Cover	14	EA	$ 3,000.00	$ 42,000.00
59	Adjust Electrical Handhole Frame and Cover	9	EA	$ 3,000.00	$ 27,000.00
60	4 kW Constant Current Regulator (5 Step)	2	EA	$ 15,000.00	$ 30,000.00
61	7.5kW Constant Current Regulator (5 Step)	8	EA	$ 15,000.00	$ 120,000.00
62	15 kW Constant Current Regulator (5 Step)	5	EA	$ 18,000.00	$ 90,000.00
63	20 kW Constant Current Regulator (5 Step)	7	EA	$ 28,000.00	$ 196,000.00
64	4' X 4' X 4' Concrete Electrical Handhole with Frame and Cover	27	EA	$ 8,400.00	$ 226,800.00
65	Runway Weather Instrument System Suface Sensor	8	EA	$ 15,000.00	$ 120,000.00
66	L-824 1/C No. 6, 5kV, Series Lighting Circuit Cable installed in Conduit	15,000	LF	$ 3.00	$ 45,000.00
67	L-824 1/C No. 8, 5kV, Series Lighting Circuit Cable installed in Conduit	415,000	LF	$ 2.00	$ 830,000.00
68	1/C No. 6, 600V Grounding Conductor	150,000	LF	$ 1.00	$ 150,000.00
69	1/C No.6, Counterpoise Grounding Conductor, with Ground Rods	100,000	LF	$ 2.00	$ 200,000.00
70	2" Concrete Encased Schedule 40 PVC Conduit	98,277	LF	$ 30.00	$ 2,948,310.00
71	4-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	5,929	LF	$ 150.00	$ 889,350.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions (1)	Quantity	Unit (2)	Unit Price	Amount
72	4-Way Concrete Encased Ductbank - 6" SCH 40 PVC -H Conduit	600	LF	$ 230.00	$ 138,000.00
73	6-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1,315	LF	$ 150.00	$ 197,250.00
74	8-Way Concrete Encased Ductbank - 4" SCH 40 PVC -H Conduit	1,870	LF	$ 250.00	$ 467,500.00
75	Calibration of Regulators	1	LS	$ 7,500.00	$ 7,500.00
76	ALCS Modifications	1	LS	$ 60,000.00	$ 60,000.00
77	Power Distribution	1	LS	$ 300,000.00	$ 300,000.00
78	Communication Distribution	1	LS	$ 50,000.00	$ 50,000.00
79	Stage I Temporary Connections and Staging	1	LS	$ 50,000.00	$ 50,000.00
80	Stage II Temporary Connections and Staging	1	LS	$ 60,000.00	$ 60,000.00
81	Stage III Temporary Connections and Staging	1	LS	$ 67,000.00	$ 67,000.00
82	Demolition of Type L-824 1/C No.6, 5kV, Series Lighting Circuit Cable installed in Conduit	10,000	LF	$ 0.40	$ 4,000.00
83	Demolition of 1/C No.6, 600V Grounding Conductor	50,000	LF	$ 0.35	$ 17,500.00
84	Demolition of Type L-824 1/C No. 8, 5kV, Series Lighting Circuit Cable instalied in Conduit	90,000	LF	$ 0.20	$ 18,000.00
85	Demolition of In-pavement Steady Burn ALSF-11 fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors, Ground Rod and Connections (Store Existing Fixtures)	239	EA	$ 2,200.00	$ 525,800.00
86	Demolition of In-pavement ALSF-11 Flasher fixture, L-868 Light Base, Isolation Transformer, L-823 Connectors,Ground Rod and Connections (Store Existing Fixtures)	11	EA	$ 3,800.00	$ 41,800.00
87	Demolition of Type L-858 Mandatory Runway Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	73	EA	$ 600.00	$ 43,800.00
88	Demolition of type L-858 Distance Remaining Sign, Isolation Transformer, L-823 Connectors, Ground Rod and Connections	8	EA	$ 1,200.00	$ 9,600.00
89	Removal Taxiway Elevated Edge Light on existing L-867 Light Base, with existing Isolation Transformer and Ground Rod. L-823 Connectors, Extension Collar and associated wiring	191	EA	$ 1,000.00	$ 191,000.00
90	Demolition of All Types of Runway Lighting, Light Base, Transformer, Connectors, Ground Rod and Connections (not listed above)	900	EA	$ 1,200.00	$ 1,080,000.00
91	Demolition of Concrete Encased Junction Box (L-867 Light Base) in Unpaved Areas	50	EA	$ 3,000.00	$ 150,000.00

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ANALYSIS OF BID

THIS IS NOT PART OF THE CONTRACT

PROJECT **SWF - 164.039 Rehabilitation of Runway 9-27 and Runway 16-34** CONTRACT **SWF-164.039**

CONTRACTOR Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV DATE February 4, 2013

Unit No.	Descriptions [1]	Quantity	Unit [2]	Unit Price	Amount
92	Remove Electrical Manhole/ Handhole Frame and Cover	23	EA	$ 2,400.00	$ 55,200.00
93	Other Electrical	1	LS	$1,366,000.00	$ 1,366,000.00
94	Environmental- Sediment and Erosion Control Measure	1	LS	$ 200,000.00	$ 200,000.00
95	Provide Security Personnel and Equipment as required to support the Work in Aeronautical and/or Sensitive areas.	1	LS	$ 2,000,000.00	$ 2,000,000.00
96	**Total Lump Sum (Unclassified Only)**				$ 28,101,920.00

1. Separate and list all items or operations of work included in your estimate in accordance with Specifications. When listing subcontracts, the prime contractor will have each subcontractor complete an analysis of bid form.
2. Unit of measure, i.e., SF, CY, Bbls, Pes, Ea., etc.
3. Include all charges, such as moving on site, removal, rental, etc.
4. In case of conflict between information hereon (whether supplied by the Authority or the bidder) and the terms or prices contained or inserted in the Contract Booklet or Contract Drawings, said Booklet and Drawings shall control.
5. The Analysis of Bid is not part of the contract. No information hereon (whether supplied by the Authority or the bidder) and no information deduced from information hereon, including quantities of materials or work, shall be deemed to vary, alter or modify and provision of the Contract, including provisions therein as to compensation and performance. The unit prices contained hereon serve the sole purpose of informing Port Authority as to components of the bidder's price quoted in the Contract. The items of materials or work contained hereon shall not deemed to be an exhaustive list of the items of materials or work required by the Contract Drawings and Specifications in their present form.

02-04-13P02:49 RCVD

THE PORT AUTHORITY OF NY & NJ

May 28, 2013

Lillian D. Valenti
Director, Procurement

VIA FACSIMILE AND UPS NEXT DAY DELIVERY

Tutor Perini Corporation
Intercounty Paving Associates, LLC (JV)
1000 Main Street
New Rochelle, NY 10801

SUBJECT: STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY 16-34 – CONTRACT #SWF-164.039
PURCHASE ORDER USWF164039

Gentlemen:

The Port Authority of New York and New Jersey hereby accepts your proposal on the above Contract.

The Port Authority elects not to require you to furnish a performance and payment bond.

Your attention is directed to the clause of the Contract entitled "Time for Completion and Damages for Delay" and to the fact that before you may commence performance of the work you must furnish whichever of the documents mentioned in that clause are applicable.

Forwarded herewith for your use and compliance are "General Instructions Relating to the Direction and Processing of Correspondence and of Those Other Items Specified to be Submitted to the Port Authority Under the Terms of the Contract".

In order to ensure that payments are processed properly, please include the above-referenced Purchase Order No. on all payment invoices and correspondence.

Very truly yours,

THE PORT AUTHORITY OF NEW YORK
AND NEW JERSEY

BY _____
for Director of Procurement

2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 201 395 7477

GENERAL INSTRUCTIONS RELATING TO THE DIRECTION AND PROCESSING OF CORRESPONDENCE AND OF THOSE OTHER ITEMS SPECIFIED TO BE SUBMITTED TO THE PORT AUTHORITY UNDER THE TERMS OF THE CONTRACT

DIRECTION OF CORRESPONDENCE

1. GENERAL

In general, all official correspondence relating to the conduct of this contract shall be directed to the Construction Resident Engineer. In the case of correspondence or other items specified herein to be directed elsewhere, the Construction Resident Engineer shall be informed by copies of correspondence or letter of transmittal:

CONSTRUCTION RESIDENT ENGINEER

Mr. Omar Astacio
Resident Engineer
The Port Authority of NY & NJ
1180 First Street
Building 138
New Windsor, NY 12553
Tel: (845)838-8219
Fax: (845)567-1321

2. INSURANCE MATTERS

Kirstin Brennan
MRM Consulting Inc.
Account Executive/Unit Leader
1720 Post Road East – Bldg. #221
Westport, CT 06880
(203) 254-2072 Work
(877) 277- 1882 Work
(203) 451-3077 Mobile
(877) 277-1886 FAX
kbrennan@mrmriskmanagement.com

3. APPROVAL OF SUBCONTRACTOR

Mr. Omar Astacio
Resident Engineer
The Port Authority of NY & NJ
1180 First Street
Building 138
New Windsor, NY 12553
Tel: (845)838-8219
Fax: (845)567-1321

4. **SHOP DRAWINGS AND CATALOG CUTS**

SEND TO:
Jane Hegarty
Assistant Director
Engineering Management Services
The Port Authority of NY & NJ
2 Gateway Center – 11th Floor
Newark, NJ 07102
Telephone (973) 792-3600

5. **FOR APPROVAL OF SUBMITTALS REGARDING**

a. Manufacturer/Source
b. Physical Samples
c. Product Data Sheets
d. Test Reports and Data
e. Mill Reports
f. Substitution Request
g. Manufacturers Certificates
h. Certificates of Conformance
i. Mix Designs
j. Welding Procedures
k. Welder Qualifications
l. Technical Data Sheets
m. Quality Control Procedures

Mr. Casimir J. Bognacki
Manager, Materials Engineering Div.
The Port Authority of NY & NJ
241 Erie Street - Room 234
Jersey City, NJ 07310-1397
Tel: (201) 216-2984
Fax: (201) 216-2949
Copy of transmittal to
Consultant (if any) for
information only - not processing

6. **ACCIDENT REPORTS**

Karl Lunan
Manager of Claims
The Port Authority of NY & N J
225 Park Avenue South – 13th Floor
New York, NY 10003
Tel. (212) 435-3424

Deputy General Counsel
The Port Authority of NY & NJ
225 Park Avenue South – 13th Floor
New York, NY 10003
Tel. (212)435-3417

You are requested to prepare a list of all submittals required under the Contract, by section, indicating the anticipated date when each such submittal will be transmitted. The list shall be submitted to the addressees under 1 and 5 above within 10 days after receipt of this letter.

You will be advised by a separate communication from the Engineer of Materials of the items of material and equipment that will require inspection at the point of manufacture or assembly together with instructions pertaining thereto. You will be similarly advised of the action taken on the required submittals of samples, material lists and their manufacturing sources.

The Construction Resident Engineer's office will instruct you further on specific contract requirements and the preparation of proper forms which must be used for progress payments, subcontractor approvals, and change orders.

PRELIMINARY BID RESULTS

CONTRACT: **SWF-164.039**
TITLE: **STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY 16-34**
BID DATE: **FEBRUARY 4, 2013**
ENG'S EST: **$ 77,320,000/ CW WK: $37,647,000 UNCL WK: $39,673,000 (PQL)**

	CONTRACTOR	CLASSIFIED WORK	UNCLASSIFIED WORK	ESTIMATED TOTAL
1.	Tutor-Perini Corporation/Intercounty Paving Associates, LLC (JV) New Rochelle, NY	$ 32,786,080	$ 28,101,920	$ 60,888,000
2.	Tully Construction Co., Inc. Flushing, NY	$ 5,128,661	$ 56,110,000	$ 61,238,661
3.	Yonkers Contracting Co., Inc. Yonkers, NY	$ 17,238,720	$ 45,972,280	$ 63,211,000
4.	Rifenburg Construction, Inc. Troy, NY	$ 36,505,700	$ 28,545,367.50	$ 65,051,067.50
5.	Halmar International/Crisdel Group, Inc. Nanuet, NY	$ 2,905,467	$ 62,973,000	$ 65,878,467
6.	The Lane Construction Corporation Northampton, MA	$ 35,206,770	$ 32,340,000	$ 67,546,770
7.	Ecco III Enterprises, Inc./CCA Civil, Inc (JV) Yonkers, NY	$ 29,312,560	$ 44,420,440	$ 73,733,000
8.	Tilcon New York, Inc. Wharton, NJ	$ 25,273,310	$ 52,623,690	$ 77,897,000

DESIGNATION OF SIGNATORY & ATTORNEY-IN-FACT

TO: **Port Authority of NY &NJ**

RE: **Rehabilitation of Runway 9-27 and Runway 16-34**

Contract SWF-164.039

SIR/MADAM

This will designate **James M. Laing** to act as Attorney-in-Fact and Signatory to the above captioned proposal/bid on behalf of the Joint Venture of **Tutor Perini Corporation** and **Intercounty Paving Associates, LLC**

(SEAL)

Tutor Perini Corporation

ATTEST:

BY:

James M. Laing
Sr. Vice President
Date: 2/4/13

(SEAL)

Intercounty Paving Associates, LLC

ATTEST:

BY:

Frank C. Lizza, Jr.
General Manager
Date:

THE PORT AUTHORITY OF NY & NJ

December 7, 2012

Ecco III Enterprises, Inc. / CCA Civil, Inc., JV
201 Saw Mill River Road
Yonkers, NY 10701

Attention: Raymond Gizzi

SUBJECT: **CONTRACT SWF-164.039 – STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY16-34**

Dear Sir/Madam:

Your firm has been prequalified by The Port Authority of New York and New Jersey to submit a Proposal on the subject Contract. You are invited to submit your Proposal in accordance with the instructions appearing in the beginning of the Contract Booklet.

Forwarded herewith are 3 copies of the Contract Booklet and 3 sets of prints of the Contract Drawings for the purpose of preparing your Proposal. The estimate range for this Contract is currently $70M - $80M.

Your Proposal must be submitted under the same firm name as appears on this invitation to bid. Failure to do so may result in your Proposal being deemed non-responsive. Your company may, however, submit its Proposal as part of a joint venture, provided that the other member of the joint venture has also been prequalified and its name appears on The Port Authority list of firms prequalified for this Contract.

Very truly yours,

Lillian D. Valenti
for Director
Procurement Department

Procurement Department
2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 212 435 7000

THE PORT AUTHORITY OF NY & NJ

December 7, 2012

Halmar International – Crisdel Group, Inc., JV
1 Blue Hill Plaza
Pearl River, NY 10965

Attention: Chris Larsen

SUBJECT: **CONTRACT SWF-164.039 – STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY16-34**

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Very truly yours,

for Lillian D. Valenti
Director
Procurement Department

Procurement Department
2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 212 435 7000

THE PORT AUTHORITY OF NY & NJ

December 7, 2012

Rifenburg Construction, Inc.
159 Brick Church Road
Troy, NY 12180-9643

Attention: Timothy Casey

SUBJECT: **CONTRACT SWF-164.039 – STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY16-34**

Dear Sir/Madam:

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Very truly yours,

Sucheta Premchand
for Lillian D. Valenti
Director
Procurement Department

Procurement Department
2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 212 435 7000

THE PORT AUTHORITY OF NY & NJ

December 7, 2012

The Lane Construction Corp.
2432 King Street, Suite 239
Northampton, MA 01060

Attention: Scott A. Leach

SUBJECT: **CONTRACT SWF-164.039 – STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY16-34**

Dear Sir/Madam:

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Very truly yours,

Lucretia Remchak
for Lillian D. Valenti
Director
Procurement Department

Procurement Department
2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 212 435 7000

THE PORT AUTHORITY OF NY & NJ

December 7, 2012

Tilcon New York, Inc.
625 Mount Hope Road
Wharton, NJ 07885

Attention: Frederick F. Griswold

SUBJECT: **CONTRACT SWF-164.039 – STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY16-34**

Dear Sir/Madam:

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Very truly yours,

Sukutha Premchand

for Lillian D. Valenti
Director
Procurement Department

Procurement Department
2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 212 435 7000

THE PORT AUTHORITY OF NY & NJ

December 7, 2012

Tully Construction Company, Inc.
127-50 Northern Boulevard
Flushing, NY 11368

Attention: Peter K. Tully

SUBJECT: **CONTRACT SWF-164.039 – STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY16-34**

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Very truly yours,

Sucheta Premchand
for Lillian D. Valenti
Director
Procurement Department

Procurement Department
2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 212 435 7000

THE PORT AUTHORITY OF NY & NJ

December 7, 2012

Tutor-Perini Corporation / Intercounty Paving Associates, LLC, JV
1000 Main Street
New Rochelle, NY 10801

Attention: James M. Laing

SUBJECT: **CONTRACT SWF-164.039 – STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY16-34**

Dear Sir/Madam:

Your firm has been prequalified by The Port Authority of New York and New Jersey to submit a Proposal on the subject Contract. You are invited to submit your Proposal in accordance with the instructions appearing in the beginning of the Contract Booklet.

Forwarded herewith are 3 copies of the Contract Booklet and 3 sets of prints of the Contract Drawings for the purpose of preparing your Proposal. The estimate range for this Contract is currently $70M - $80M.

Your Proposal must be submitted under the same firm name as appears on this invitation to bid. Failure to do so may result in your Proposal being deemed non-responsive. Your company may, however, submit its Proposal as part of a joint venture, provided that the other member of the joint venture has also been prequalified and its name appears on The Port Authority list of firms prequalified for this Contract.

Very truly yours,

Sucheita Premchand
for Lillian D. Valenti
Director
Procurement Department

Procurement Department
2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 212 435 7000

THE PORT AUTHORITY OF NY & NJ

December 7, 2012

Yonkers Contracting Company, Inc.
969 Midland Avenue
Yonkers, NY 10704

Attention: Richard McGrath

SUBJECT: **CONTRACT SWF-164.039 – STEWART INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 9-27 AND RUNWAY16-34**

Dear Sir/Madam:

Your firm has been prequalified by The Port Authority of New York and New Jersey to submit a Proposal on the subject Contract. You are invited to submit your Proposal in accordance with the instructions appearing in the beginning of the Contract Booklet.

Forwarded herewith are 3 copies of the Contract Booklet and 3 sets of prints of the Contract Drawings for the purpose of preparing your Proposal. The estimate range for this Contract is currently $70M - $80M.

Your Proposal must be submitted under the same firm name as appears on this invitation to bid. Failure to do so may result in your Proposal being deemed non-responsive. Your company may, however, submit its Proposal as part of a joint venture, provided that the other member of the joint venture has also been prequalified and its name appears on The Port Authority list of firms prequalified for this Contract.

Very truly yours,

Lucretia Lemchange

for Lillian D. Valenti
Director
Procurement Department

Procurement Department
2 Montgomery Street, 3rd Floor
Jersey City, NJ 07302
T: 212 435 7000

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor/Perini/Intercounty JV
Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914 739 - 1908 verify/update

DBE:
Name of Firm: Montana Datacom
Address: 35-15 11th St. Long Island, NY 11106 Telephone: 718-482-6789
Description of work to be performed by DBE: Material Supplier OF CABLE

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ ~~800,000~~ 419,900 or 0.3% of the total contract amount of $ 60,838,000 The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

419,900

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Jennifer Mulcahy SALES REP.
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M Laing
Signature of Bidder and Title
JAMES M LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY
Contract Goal: ☑ Approved ☐ Waived ☐ Rejected
Reviewed By: OBJO Business Development Representative
Print Name: Quinzell M Kerger Date: 4/23/13

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

595

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 & 16-34

BIDDER:
Name of Firm: Tutor Perini/Intercounty JV
Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914 739 - 1908

DBE:
Name of Firm: Dumont Electrical Inc
Address: P.O. Box 525 Sparta, NJ 07871 Telephone: 973-729-8084
Description of work to be performed by DBE: Material Supplier

Verdi Electric

manufacture some items

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ ~~2,500,000~~ 1,500,000 GN or 1.5 % of the total contract amount of $ 60,883,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: John Lynam President
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M Laing
Signature of Bidder and Title
JAMES M LAING
SR VICE PRESIDENT

FOR OBDO USE ONLY
Contract Goals: ☑ Approved ☐ Waived ☐ Rejected
Reviewed By: [signature]
OBDO Business Development Representative
Print Name: Quinnell Mckenzie Date: 4/23/13

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF-164.039 Stewart Airport Runway 9-27 and 16-34 Rehabilitation

BIDDER:
Name of Firm: Tutor Perini Corp/ INTERCOUNTY PAVING ASSOCIATES LLC/ JJ
Address: 1000 Main St. New Rochelle, NY 10801 Telephone: 914-739-1908

DBE:
Name of Firm: Perfect Cut Landscaping Inc. / Hudson Valley Trucking
Address: 24 Country Club Drive Florida, NY 10921 Telephone: ~~845-651-4263~~ cell - 845-721-0380
Description of work to be performed by DBE: Tri-axle Dump trucking

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 600,000 or 1.0% of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Thomas E. Sanchez President THOMAS SANCHEZ SR.
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M Laing
Signature of Bidder and Title
JAMES M LAING
SR. VICE PRESIDENT

FOR OBJO USE ONLY
Contract Goals: ☑ Approved ☐ Waived ☐ Rejected
Reviewed By: OBJO Business Development Representative
Print Name: Quinzell McGuire Date: 4/23/13

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: STEWART AIRPORT CONTRACT SWF 164.039

BIDDER:
Name of Firm: TUTOR PERINI CORP / INTERCOUNTY PAVING ASSOC. LLC / JV
Address: 1000 MAIN ST, NEW ROCHELLE, NY Telephone: 914 739-1908

DBE:
Name of Firm: ADVANCED MILL & PAVE INC.
Address: 214 Vincent Dr, East Meadow NY-11554 Telephone: 516-523-2966 718-219-1220
Description of work to be performed by DBE: ASPHALT (Supply MATERIALS) [illegible]

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 2,063,000 or 3.4% of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 04/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: [signature] SUSTAN BARDOTI
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: [signature]
Signature of Bidder and Title
JAMES MCLAING
SR VICE PRESIDENT

FOR OBJO USE ONLY
Contract Goals: ☒ Approved ☐ Waived ☐ Rejected
Reviewed By: [signature]
OBJO Business Development Representative
Print Name: Quinnell McLeyn Date: 4/23/13

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: SWF 164.039 STEWART AIRPORT

BIDDER:
Name of Firm: TUTOR PERINI CORP/INTERCOUNTY PAVING ASSOC LLC / JV
Address: 1000 MAIN ST NEW ROCHELLE 10801 Telephone: 914-739-1908

DBE:
Name of Firm: JESS SECURITY AND INVESTIGATION, INC.
Address: 3125 TIBBETT AVENUE 2ND, BRONX, NY 10463 Telephone: 718 219 1220
Description of work to be performed by DBE: SECURITY GUARD SERVICES AT STEWART INTERNATIONAL AIRPORT

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 1,300,000 or 2.1 % of the total contract amount of $ 60,888,000. The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: David Imayzurkhi C.E.O.
Signature of DBE and Title

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By: James M Laing
Signature of Bidder and Title
JAMES M LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY
Contract Goals: ☑ Approved ☐ Waived ☐ Rejected
Reviewed By: OBJO Business Development Representative
Print Name: Q Vinzell McKenzie Date: 4/23/13

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A2
DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT

Instructions: Submit one DBE PARTICIPATION PLAN AND AFFIRMATION STATEMENT form for each DBE firm used on this Contract.

CONTRACT NUMBER AND TITLE: #SWF-164.039 Stewart Int'l Airport Rehab of Runway 9-27 + 16-34

BIDDER:
Name of Firm: Tutor Perini Corp / INTER COUNTY PAVING ASSOC. / LLC / JV
Address: 1000 MAIN ST NEW ROCHELLE, NY **Telephone:** 914 739-1908

DBE:
Name of Firm: Traffic Lane Closures, LLC
Address: 1214 Rt- 52, Carmel, NY, 10512 **Telephone:** (845) 228-6100
Description of work to be performed by DBE: MPT, Erosion Control, PPE Supplier. manufacturer

The Bidder is committed to utilizing the above-named DBE for the work described above. The estimated dollar value of this work is $ 140,000 or 0.2% of the total contract amount of $ 60,988,00 The anticipated start date is 5/2013 and the anticipated completion date is 4/2015.

AFFIRMATION

The above-named DBE affirms that it will perform the portion of the Contract for the estimated dollar value as stated above.

By: Owner
Signature of DBE and Title

Thomas Rosenfeld
Jason Rosenfeld

If the Bidder does not receive award of the Contract, any and all representations in this DBE Participation Plan and Affirmation Statement shall be null and void.

By:
Signature of Bidder and Title
JAMES M. LAING
SR VICE PRESIDENT

FOR OBJO USE ONLY
Contract Goals: ☑ Approved ☐ Waived ☐ Rejected
Reviewed By:
OBJO Business Development Representative
Print Name: Quinzee McKenzie **Date:** 4/23/13

Please Note: Supplies, equipment and material men are only credited 60% towards the DBE goal. Please adjust calculations accordingly.

APPENDIX A1

DBE GOALS STATEMENT

The undersigned Bidder has satisfied the requirements of the Contract in the following manner (Complete the appropriate spaces):

The Bidder is committed to meeting the DBE utilization goal set forth in this Contract.

or

The Bidder is unable to meet the DBE utilization goal set forth in this Contract, but is committed to a minimum of _____% DBE utilization on this Contract and submits the attached narrative and documentation demonstrating good faith efforts consistent with Appendix A of 49 CFR 26 to meet the DBE utilization goal set forth in this Contract. Attach as many pages as necessary to provide a full and complete narrative and supporting documentation of good faith efforts made. This narrative shall be submitted on company letterhead and signed.

It is the present intent of the Bidder to utilize the specific DBE firms identified in Appendix A2 in the performance of the Work of this Contract. If for any reason, one or more of the DBE firms identified in Appendix A2 are unable or unwilling to participate, the Bidder will make good faith efforts to replace the DBE firm with another DBE firm in accordance with the Information For Bidders clause entitled "DBE Program".

Bidder Name: Tutor Perini Corporation / Intercounty Paving Associates, LLC, JV

Federal Tax ID No.: 04-1717070

By: James M. Lang

Signature and Title James M. Lang, Attorney-in-Fact

V. TITLE VI CIVIL RIGHTS ACT OF 1964 COMPLIANCE COMMITMENT

All bidders will be required to submit with their bids the Title VI Civil Rights Act of 1964 Compliance Commitment form, including an agreement to get similar compliance commitment from proposed subcontractors. This compliance commitment will be required prior to award of the Contract.

Reference: Contract Number and Title: SWF-164.039 REHABILITATION OF RUNWAY 9-27 AND RUNWAY 16-34

The TUTOR PERINI CORPORATION / INTERCOUNTY PAVING ASSOCIATES, LLC, JV (Company) having submitted a bid for the referenced Contract, advises that contingent upon award of the Contract to our company, we will comply with Title VI Civil Rights Act of 1964 by not discriminating on the basis of age, race, sex, color, national origin or disability in its hiring and employment practices, or in admission to, access to, or operation of its programs, services, and activities. We will forward a copy of our commitment to comply with Title VI Civil Rights Act of 1964 to all vendors and subcontractors utilized for the referenced Contract, as listed below and inform them of their obligation to comply.

Subcontractors:

1) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

2) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

3) Name:
   Work to be performed:
   Dollar Value:
   Address:
   Telephone:

James M. Laing

(SIGNATURE OF BIDDER) JAMES M. LAING, ATTORNEY-IN-FACT

DATE: FEB. 4, 2013