CITY OF VENICE, FLORIDA

Purchasing Department
401 W. Venice Avenue
Venice, FL 34285

INVITATION TO BID

ITB Number 3090-18

Date of Issue: November 9, 2018

Submission Deadline: December 14, 2018 at 2:00 PM

Title and Purpose of ITB:

CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY

Prepared By:

American Infrastructure Development, Inc.

NOVEMBER 2018

ISSUED FOR BID

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*** Denotes Non-FAA Standard Specification**

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Construction of Aircraft Wash Rack Facility

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ENGINEER:
Consultant's Name and Address

For: Civil: Gregg B. Hamm FL. P.E. # 69760	For:
For: Electrical: James W. Kappes FL. P.E. # 71499	For: Electrical, Conduit: Jeffery Sallee FL. P.E. # 76674

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INVITATION TO BID

The City of Venice invites sealed bids from qualified bidders to provide the following goods or services, which is described in detail in the Specifications.

Bid No.: 3090-18

Bid Title: Construction of Aircraft Wash Rack Facility

PROJECT DESCRIPTION: The project includes constructing an aircraft wash rack facility for the Venice Municipal Airport. The project will include a rigid pavement section of 290 SY of 6 inch portland cement concrete pavement and 320 SY of 4 inches recycled concrete aggregate base course P-219 for the aircraft wash pad. The project will include a flexible pavement section of 60 tons of new P-403 asphalt and 380 SY of 6 inches recycled concrete aggregate base course P-219 which will be used to tie-in the existing taxilanes to the new aircraft wash pad.

The project will include 185 lf or 12 inch by 18 inch elliptical reinforced concrete pipe, 2 Type "C" inlets, 1 Type “F” inlet, a type 8 Manhole and a mitered end section for drainage improvements. The project will include a XERXES 1,000 gallon double wall oil/water separator or approved equal.

The project will include a tap into the existing water main and shall provide a hose bib for potable water use for the aircraft wash rack. A ground mounted hose reel and 75 foot hose will be included for the project.

The project will include an E-One Grinder Pump Station or approved equal and connection to the existing forcemain a, 2 foot by 2 foot utility box, 4 foot by 4 foot utility box for utility improvements.

A wash rack card reader will be installed to monitor use of the aircraft wash rack. Three (3) electrical valve actuators will be used in the system. In the off position the electrical valve actuator will be in the closed position for the water line and the wastewater line to the oil/water separator and in the open position for storm pipe. When the card reader is activated the electrical valve actuator will be in the closed position for the storm pipe and in the open position for the water line and the wastewater line to the oil/water separator. This will allow the tenants to wash their aircrafts and will direct the runoff from the aircraft wash pad when in use to the existing forcemain. The project will include electrical tie-ins to the existing electrical service to provide power to the wash rack card reader, electrical valve actuators and the E-One Grinder Pump station.

The project will include a conduit run from the wash rack card reader to the existing administration building which will be connected into the existing security system.

The project will also include 940 sf of pavement markings, silt fence for erosion protection, 1,500 SY of sodding.

BID OPENING LOCATION: City of Venice, Venice City Hall, Community Hall, Room # 114, 401 W. Venice Ave., Venice FL 34285

BID SUBMITTAL DEADLINE and BID OPENING DATE & TIME: December 14, 2018 at 2:00 PM

A pre-bid meeting will be held on November 30, 2018 at 10:00 a.m. at the Venice Municipal Airport, 150 Airport Avenue East, Venice, FL 34285. Representatives from the City will be present to discuss the overall project and the Invitation to Bid. **Interested Firms are encouraged to attend.**

All questions, comments, or concerns about this ITB must be submitted in writing to Mr. Jon Mayes, Finance- Procurement Department, for the City of Venice, Room 204, 401 West Venice Avenue, Venice, FL 34285 or e-mail at jmayes@venicegov.com. Mr. Mayes is the only designated representative of the City authorized to respond to comments, questions and concerns. The City will not respond to comments, questions or concerns addressed to any person other than Mr. Mayes. If the City determines that a particular comment, question or concern necessitates a global response to all Proposers, the City will issue a clarifying memorandum or addendum. **The final day that the City will accept questions will be December 5, 2018 by 1:00 p.m.**

Specifications and Bid documents are available by calling Onvia DemandStar at (800) 711-1712 or by their Internet address at http://www.demandstar.com. Proposers may also pick up Bid documents at the City of Venice Procurement Department, Room 204, 401 West Venice Ave., Venice Florida 34285, **(941) 882-7423** at no charge.

Bids must be submitted in **four sets** and at least one set must bear an original signature, in a sealed envelope marked **"INVITATION TO BID # 3090-18: "Construction of Aircraft Wash Rack Facility"** and mailed or delivered to the City of Venice- Purchasing Department, 401 W. Venice Ave. Room # 204, Venice, FL 34285, no later than the deadline specified. The City assumes no responsibility for bids received after the bid submittal time or at any location other than that specified, no matter what the reason. Late bids will be held unopened and will not be considered for award.

Bid Security in the amount of five (5%) percent of the bid is required.

Performance and Payment Bonds are required in the amount of One Hundred (100%) percent of the contract price once a contract is awarded.

No bid will be received after the specified time for acceptance and no bidder may withdraw his bid within a period of one-hundred and eighty (180) days after the actual date of opening thereof.

Bids will be considered only from bidders who have the applicable license, if a license is required by the City of Venice and/or State of Florida, for the type of work specified. A copy of the applicable license must be submitted with bid if a license is required.

The City reserves the right to reject any or all bids in whole or in part, with or without cause, to waive any requirements, irregularities or technical defects therein, when it is deemed to be in the interest of the City.

Publish: Friday, November 9, 2018

CITY OF VENICE, FLORIDA

INVITATION TO BID
ITB# 3090-18
SECTION 1: GENERAL CONDITIONS & INSTRUCTIONS TO OFFERORS

DEFINED TERMS

Terms used in this solicitation are defined and have the meaning assigned to them. The term "Offeror" means one that submits a proposal directly to CITY as distinct from a Sub-Offeror, who submits a Proposal to the Offeror. The term "Successful Offeror" means the qualified, responsible and responsive Offeror to whom the City of Venice (on the basis of CITY'S evaluation as hereinafter provided) makes an award. The term "CITY" refers to the City of Venice, a municipal corporation of the State of Florida. The term "ITB" refers to this Sealed INVITATION TO BID. The term "solicitation" refers to the entire ITB package and the Offeror's submittal as a response to this ITB. The term "submittal" refers to all documentation and information as submitted by the Offeror in response to this solicitation. The term "Department" refers to the State of Florida Department of Transportation.

1. OFFEROR REGISTRATION

Offerors who obtain solicitation documents from sources other than the City or download from http://www.demandstar.com/ must officially register receipt of the solicitation with the City's Procurement- Finance Department in order to be placed on the notification list for any forthcoming addendum or other official communications. Failure to register as a prospective Offeror may cause your submittal to be rejected as non-responsive if you have submitted a response without acknowledgment of issued addenda. The City of Venice is not responsible for the accuracy of bid documents and information obtained from any source other than http://www.demandstar.com/.

2. CONTACT

All prospective Offerors are hereby instructed not to contact any member of the City of Venice City Council, City Manager, or City of Venice staff member other than the contact person indicated in this ITB regarding this solicitation or their submittal at any time prior to the final evaluation and recommended ranking by the City staff for this project. Any such contact shall be cause for rejection of your submittal.

3. ADDENDA AND INQUIRIES

3.1 If there is any doubt as to the true meaning of the specifications and information provided, Offerors may submit written or faxed inquiries regarding this solicitation to the Procurement- Finance Department, 401 West Venice Avenue, Room # 204 Venice, FL 34285, Fax No. (941) 486-2790. The City will respond to written or faxed inquiries received by the posted deadline for questions. Inquiries must reference the date and time of opening, and the solicitation number. Failure to comply with this condition shall result in the Offeror waiving their right to dispute the specifications and information provided in the solicitation document.

3.2 Any change to this solicitation shall be made by addenda duly issued to each registered Offeror. Receipt of such addenda must be so noted on or within your response. It is the Offeror's responsibility to make contact through the Internet or phone to determine if Addenda have been issued.

3.3 Oral Inquiries: The City will not respond to oral inquiries.

4. PUBLIC OPENING

Submittals shall be received in the Procurement- Finance Department, 401 W. Venice Ave, Venice, FL 34285 by the date and time indicated on these documents. As soon as possible thereafter, the names of the Offerors and their proposed bid amount shall be read off at the specified location.

5. DELAYS

The City, at its sole discretion, may delay the scheduled due dates indicated above if it is to the advantage of the City to do so. The City will notify Offerors of all changes in scheduled due dates by written addenda.

6. PROPOSAL SUBMISSION AND WITHDRAWAL

6.1 Address to send submittal:

Procurement- Finance Department
City of Venice
401 W. Venice Ave, Room # 204.
Venice, FL 34285

6.2 The outside of the envelope/container must be identified with the solicitation number and title as stated above. The envelope/container must also include the Offeror's name and return address.

6.3 Submittals may be withdrawn by an appropriate document duly executed (in the manner that a Submittal must be executed) and delivered to the place where Submittals are to be submitted at any time prior to the deadline for submission. A request for withdrawal or a modification must be in writing and signed by a person duly authorized to do so. Evidence of such authority must accompany the request for withdrawal or modification. Withdrawal of a Submittal will not prejudice the rights of an Offeror to submit a new Submittal prior to the opening date and time. After expiration of the period for receiving Submittals, no Submittal may be withdrawn or modified.

6.4 Withdrawal of Submittals after Opening Date: Submittals, once opened, become the property of the City and will not be returned to the Offerors. Submittals not so withdrawn before the opening constitute an irrevocable offer for a period of one- hundred-eighty (180) days to provide the City the services set forth in these specifications until one or more of the proposals have been accepted by City staff. No Offeror may withdraw their proposal during this one-hundred-eighty (180) day period.

6.5 Number of Submittal Copies: Offerors shall submit four (4) complete sets (one original and three copies) of the submittal complete with all supporting documentation (i.e. photographs, drawings, and exhibits) in a sealed envelope/container marked as noted above.

6.6 Proposal Is Not Binding: The Offeror understands that responding to this solicitation does not constitute an agreement or contract with the Offeror. A submittal is not binding until submittal is reviewed and accepted by the appropriate level of authority and both parties execute a contract.

6.7 Responsibility for getting a submittal to the City on or before the specified date and time is solely and strictly that of the Offeror. The City will not be responsible for any delay, for any reason whatsoever. Submittals by telephone, telegram, facsimile machines, and Internet, will not be acceptable. Submittals must be received and stamped on the outside of the envelope with the time and date, in the Purchasing Department by the date and time specified for opening.

6.8 LATE SUBMITTALS – Submittals received after the date and time of the opening will not be considered and will not be opened. It will be the Offeror's responsibility to make arrangements for the return of their submittal at their expense.

7. PRICES, TERMS AND PAYMENT:

Firm prices shall be bid F.O.B. requesting agency and include packing, handling and shipping charges fully prepaid by the vendor.

7.1 BID PRICE/MISTAKES: The bidder shall show in the proposal both the unit price and the total amount on items when indicated. In the event of discrepancy between the unit price and the extension, THE UNIT PRICE SHALL PREVAIL. Prices shall be extended in decimals.

7.2 INVOICING AND PAYMENT: The vendor shall be paid upon submission of proper certified invoices to the ordering agency at the prices stipulated on the contract. Invoices shall contain the purchase order number. THE VENDOR SHALL ACCEPT NO ORDER WITHOUT A PURCHASE ORDER NUMBER FROM THE CONTRACTING ENTITY. The City reserves the right to pay for purchases made under any agreement resulting from a solicitation through its Purchasing Card Program which utilizes VISA credit cards, check or the ACH (Automated Clearing House) process. When payment is received utilizing the City credit card, an original invoice should not be mailed to the Finance Department. Only the credit card receipt is issued for this charge with the original receipt being provided with the delivery to the individual cardholder placing the order. **No surcharges will be accepted for the use of purchasing cards.**

7.3 TAXES: The purchase of certain items by the Contracting Entity are exempt from the payment of excise, transportation and sales tax imposed by the Federal, State and/or City governments. Such taxes must not be included in proposal prices. Upon request, applicable Federal Excise Exemption certificates will be furnished.

8. CONDITION AND PRICING:

It is understood and agreed that any item offered or shipped as a result of this bid shall be new (current model at the time of this bid). All containers shall be suitable for storage or shipment and all prices shall include standard commercial packaging.

9. SAFETY STANDARDS:

Unless otherwise stipulated in the bid, all manufactured items or fabricated assemblies shall comply with applicable requirements of occupational Safety and Health Act and any standards

10. MANUFACTURER'S NAME AND APPROVED EQUIVALENTS:

Any manufacturer's names, trade names, brand names, information and/or catalog numbers listed in a specification are for information and not intended to limit competition unless otherwise indicated. The bidder may offer any brand for which he/she is an authorized representative, which meets or exceeds the bid specification for any item(s). If bids are based on equivalent products, indicate on the bid form the manufacturer's product name and reference number. Bidder shall submit with his/her proposal, cuts, sketches, and descriptive literature, and/or complete specifications. Reference to literature submitted with a previous bid will not satisfy this provision. The bidder shall explain in detail the reason(s) why the proposed equivalent will meet the specifications and not be considered an exception thereto. Bids that do not comply with these requirements, are subject to rejection. Bids lacking any written indication of intent to quote an alternate brand will be received and considered in complete compliance with the specifications as listed on the bid form. The City's Purchasing Office is to be notified of any proposed changes in (a) materials used, (b) manufacturing process, or (c) construction. However, changes shall not be binding upon the City unless evidenced by a Change Notice issued and signed by the Purchasing Director or designated representative.

11. DELIVERY:
All prices shall be F.O.B. Destination, Venice, Florida.
Delivery date and warranties must be written out and submitted with bids. Delivery dates, as specified, must be met.

12. ADDITIONAL PURCHASES ("PIGGY-BACK") BY OTHER PUBLIC AGENCIES:
The vendor, by submitting a bid, authorizes other Public Agencies to "Piggy-Back" or purchase equipment or services being proposed in this invitation to bid at prices bid unless otherwise noted on the proposal sheet.

13. SUBMITTAL PREPARATION COST

The City shall not be liable for any expense incurred in connection with preparation of a submittal to this document. Offerors should prepare a straightforward and concise description of the Offeror's ability to meet the requirements of this document.

14. ACCURACY OF SUBMITTAL INFORMATION

Any Offeror, who states in their submittal any information that is determined to be substantially inaccurate, misleading, exaggerated, or incorrect, shall be disqualified from consideration.

15. LICENSES

Licensed and Certified: Offeror's, both corporate and individual, must be fully licensed and certified for the type of work to be performed in the state of Florida at the time of submittal and during the entire Contract time.

16. LOCAL PREFERENCE

16.1 Unless otherwise noted in the solicitation, preference shall be given to a "local business" in the awarding of any Invitation to Bid (ITB), Request for Proposal (RFP) or Request for Qualifications (RFQ) in accordance with Section 2-217 of the City of Venice's Code. Local preference shall not apply to other types of solicitations unless explicitly stated in the subject solicitation.

16.2 "Local business" means the vendor has paid a local business tax to either Sarasota, Manatee, DeSoto or Charlotte County, whichever county the Bidder is located, if applicable prior to bid submission that authorizes the Bidder to provide the commodities or services to be purchased, and maintains a permanent physical business address located within the limits of either Sarasota, Manatee, DeSoto or Charlotte County from which the Bidder operates or performs business, and at which at least one full time employee is located.

16.3 In addition, fifty percent (50%) or more of the employees based at the local business location must reside within Sarasota, Manatee, DeSoto or Charlotte County. In the event the local office is not the primary location of the vendor, at least ten percent of the vendor's full-time employees must be based at the local office location, and at least one corporate officer, managing partner or principal owner of the vendor must reside in Sarasota, Manatee, DeSoto or Charlotte County.

16.4 Bidders wishing to be given preference as a local business must submit with their Bid, all of the Local

Preference documentation identified in the "Required Forms Section" of the solicitation.

16.5 For local preference to be granted, the name of the company represented on the required forms must be the same as the name on the Local Preference documentation.

16.6 Information regarding Sarasota County's Local Business Tax can be found at www.sarasotataxcollector.governmax.com.

16.7 Information regarding Sarasota County's Local Business Tax can be found at www.sarasotataxcollector.governmax.com.

16.8 In case of a Bid submitted by more than one entity, any one of those entities can qualify the Bid for the local preference. Sub-contractors or sub-consultants cannot qualify a Bid for local preference.

17. POSTING OF NOTICE OF INTENT

A notice of intent for award will be posted for review by interested parties in City Hall and/or on the City's website prior to submission through the appropriate approval process to the appropriate level for final approval of award.

18. PUBLIC RECORDS/TABULATION

Submittals are not public records, subject to the provisions of Florida State Statutes, Chapters 119 and 120, until such time as notice of a decision or intended decision is provided, or within thirty (30) days after the solicitation opening, whichever is earlier. A copy of the tabulation results will be forwarded upon receipt of a stamped, self-addressed envelope. An electronic tabulation will be posted on Demand Star at their Internet Website at http://www.demandstar.com/.

19. RESERVED RIGHTS

19.1 The City reserves the right to waive formalities in any submittal, and to reject any or all submittals in whole or in part, with or without cause and/or to accept the submittal that in the City's judgment will be in the best interest of the City. The City specifically reserves the right to reject any conditional submittal.

19.2 To the extent permitted by applicable state and federal laws and regulations, City reserves the right to reject any and all submittals, to waive any and all informalities not involving price, time or changes in the work with the Successful Offeror, and the right to disregard all nonconforming, non-responsive, unbalanced or conditional submittals. Submittals will be considered irregular and may be rejected, if they show serious omissions, alterations in form, additions not called for, conditions or unauthorized alterations, or irregularities of any kind.

19.3 City reserves the right to reject the submittal of any Offeror if the City believes that it would not be in the best interest of the City to make an award to that Offeror, whether because the submittal is not responsive or the Offeror is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by City.

19.4 The City reserves the right to terminate the contract with any vendor who fails to meet a deadline or shows incompetency.

20. INDEMNIFICATION/HOLD HARMLESS

The Offeror shall defend, indemnify and hold the City, the City's representatives or agents, and the officers, directors, agents, employees, and assigns of each harmless for and against any and all claims, demands, suits, judgments, damages to persons or property, injuries, losses or expenses of any nature whatsoever arising directly or indirectly from or out of any negligent act or omission of the Offeror, its sub-consultants and their officers, directors, agents or employees; any failure of the elected firm to perform its services hereunder in accordance with generally accepted professional standards; any material breach of the elected firm representations as set forth in the proposal or any other failure of the elected firm's to comply with the obligations on its part to be performed under this contract.

21. PUBLIC ENTITY CRIMES/NON-COLLUSIVE AFFIDAVIT

21.1 Each Offeror shall complete the Non-Collusive Affidavit and the Public Entity Crimes Form and shall submit the forms with the submittal. CITY considers the failure of the Offeror to submit these documents to be a major irregularity and may be cause for rejection of their submittal.

21.2 A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a response on a contract to provide any goods or services to a public entity, may not submit a response on a contract with a public entity for the construction or repair of a public building or public work, may not submit responses on leases of real property to a public entity, may not be awarded or perform work as a Offeror, supplier, Sub-Offeror, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

21.3 Termination for Cause: Any Agreement with the City obtained in violation of this Section shall be subject to termination for cause. A Sub-Offeror who obtains a subcontract in violation of this Section shall be removed from the Project and promptly replaced by a Sub-Offeror acceptable to the City.

22. GRATUITIES AND KICKBACKS

22.1 Gratuities: It is unethical for any person to offer, give, or agree to give any employee or for any employee to solicit, demand, accept or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation of any part of program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, audit, or in any other advisory capacity in any proceeding or application, request for ruling, determination claim or controversy, or other particular matter, pertaining to any program requirement or an Agreement or subcontract, or to any solicitation or proposal therefore.

22.2 Kickbacks: It shall be unethical for any payment, gratuity, or offer of employment to be made by or on behalf of a Sub-Offeror under a Contract to Offeror or higher tier Sub-Offeror any person associated therewith, as an inducement of the award of a subcontract or order.

22.3 Contract Clause: The prohibition against gratuities and kickbacks prescribed in this section shall be conspicuously set forth in every Contract and subcontract and solicitation therefore.

23. EQUAL EMPLOYMENT OPPORTUNITY

Offeror shall be in compliance with Executive Order 11426
Equal Opportunity as amended by Executive Order 11375, and as supplemented by the Department of Labor Regulations as applicable.

24. CONFLICT OF INTEREST

No employee of an agency acting in his or her official capacity as a purchasing agent, or public officer acting in his or her official capacity, shall either directly or indirectly purchase, rent, or lease any realty, goods, or services for his or her own agency from any business entity of which the officer or employee or the officer's or employee's spouse or child is an officer, partner, director, or proprietor or in which such officer or employee or the officer's or employee's spouse or child, or any combination of them, has a material interest. Nor shall a public officer or employee, acting in a private capacity, rent, lease, or sell any realty, goods, or services to the officer's or employee's own agency, if he or she is a state officer or employee, or to any political subdivision or any agency thereof, if he or she is serving as an officer or employee of that political subdivision. The foregoing shall not apply to district offices maintained by legislators when such offices are located in the legislator's place of business or when such offices are on property wholly or partially owned by the legislator. This subsection shall not affect or be construed to prohibit contracts entered into prior to:

October 1, 1975.
Qualification for elective office. Appointment to public office.
Beginning public employment

25. DRUG FREE WORKPLACE:

The City of Venice has adopted a policy in observation of the Drug Free Work Place Act of 1988. Therefore, it is unlawful to manufacture, distribute, disperse, possess, or use any controlled substance in the City of Venice workplace.

The City of Venice requests the attached Drug Free Workplace Affidavit to accompany your response. This form has been adopted by the City in accordance with the Drug Free Workplace Act. The City will not disqualify any respondent who does not concur with the affidavit. The Drug Free Workplace Affidavit is primarily used as tiebreaker when two or more separate entities have submitted proposals at the same price, terms and conditions.

26. APPLICABLE LAWS

Interested parties are advised that all City contracts and/or documentation pertinent to this solicitation are subject in full or in part to all legal requirements provided in applicable City Ordinances, State Statutes, and Federal Regulations. Uniform Commercial Code, Chapter 672, Florida State Statutes shall prevail, as the basis for contractual obligations between the Offeror and the City for any terms and conditions not specifically stated within the context of this contract.

27. COMPETENT PERSONNEL

All interested firms are to warrant that services shall be performed by skilled and competent personnel to the highest professional standards in this scope of work.

28. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

28.1 Before delivering a submittal, each Offeror must (a) consider federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, or performance of the work, (b) study and carefully correlate the Offeror's observations with the solicitation documents; and notify the Purchasing Manager of all conflicts, errors and discrepancies, if any, in the solicitation documents.

28.2 The Offeror, by and through delivering a submittal, agrees that they shall be held responsible for having familiarized themselves with the nature and extent of any local conditions that may affect the services.

29. SPECIFICATIONS

29.1 The apparent silence of the specification as to any detail, or the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and that only material and workmanship of the finest quality are to be used. All interpretations of the Specifications shall be made on the basis of this statement.

29.2 For the purpose of evaluation, the Offeror must indicate any variance or exceptions to the stated Specifications, no matter how slight. Deviations should be explained in detail. Absence of variations and/or corrections will be interpreted to mean that the Offeror meets all the Specifications in every respect.

30. CANCELLATION CLAUSE

Failure to comply with any of the terms, conditions, specifications and/or service requirements will be just cause for termination of this contract by a thirty (30) day written notice of intent forwarded to the successful Offeror.

31. ACCEPTING CONTENT OF PROPOSAL

By delivering a submittal in response to this solicitation document, the Offeror certifies that they have fully read and understand the context of the solicitation document and have full knowledge of the scope, nature, and detailed requirements of services and/or commodities to be provided and performed. Submittals shall be returned in the sequential manner as requested in the "Submittal Format and Requirements" section of this solicitation.

32. TAXES

The negotiated cost shall include all freight, handling, delivery, surcharges or other incidental charges that may be required to provide the services or deliver the commodities. The City of Venice is exempt from the payment of Federal and State taxes, including sales tax. Your cost proposal shall not include sales tax to be collected from the City. The City's sales tax exemption is not available to you for items you purchase, regardless of whether these items will be transferred to the City.

33. ASSIGNMENT

33.1 Successful Offeror shall not assign, transfer or subject the Contract or its rights, title or interests or obligations therein without CITY'S prior written approval.

33.2 Violation of the terms of this paragraph shall constitute a breach of the Contract by Successful Offeror and CITY may, at its discretion, cancel the Contract and all rights, title and interest of Successful Offeror shall thereupon cease and terminate.

34. SOLICITATION FORMS

34.1 If the Proposer cannot meet a service or equipment requirement, then the phrase "not available" should be entered on the Proposal Form for that service requirement. In the case of a "not available" remark, the Offeror may offer an alternative service. Alternate submittals may be submitted for consideration. It will be at the City's sole discretion to accept or reject any and all alternate submittals received.

34.2 This solicitation presents the City's minimum requirements under present methods of operation. Responses to this request should address these requirements, but Offerors are encouraged to suggest any additional services or commodities, which in their opinion, would be in the best interest of the City.

34.3 Submittals may be delivered, which deviate from the requirements herein, providing that they are clearly identified as alternate submittals and providing further that it can be demonstrated that stated requirements are substantially improved or are not compromised or prejudiced by such deviations; and, that it would be clearly in the interest of the City that an alternative proposal be considered. Such alternative proposals will be provisionally accepted for consideration, subject to the reserved right of the City to make the determination whether the above stated conditions for alternate proposals have been satisfied and subject further to the reserved right of the City to accept or reject these proposals upon the basis of the determination.

35. DISCLOSURE – PUBLIC OFFICER, PUBLIC EMPLOYEE OR ADVISORY BOARD MEMBER OF CITY

35.1 Sections 112.313(3) and 112.313(7), Florida Statutes, prohibit any public officer, employee, or advisory board member of the City from holding any employment or contractual relationship with any business entity doing business with the City. Section 112.313(12) provides that a public officer, employee, or advisory board member will not be in violation of the prohibition if all three of the following conditions are met. The filing of the disclosure form with the Supervisor of Elections is the sole responsibility of the Proposer and must be filed prior to or at the time of submission of the proposal. A copy of the filed disclosure form shall be submitted as part of the proposal.

35.2 Bid is awarded under a sealed, competitive Proposal to lowest or best Proposer system. Advisory board member is required to, prior to or at the time of the submission of the proposal, file a statement with the Supervisor of Elections, disclosing his interest and the nature of the intended business. The form is entitled "Form 3A Interest in Competitive Proposal for Public Business," a copy of which is available from the City's Procurement- Finance Department.

35.3 The public officer, employee, or advisory board member, spouse, or child is required to have in no way used or attempted to use his influence to persuade a member of the City or any of its personnel to enter into such a contract other than by the mere submission of the proposal.

35.4 The public officer, employee, or advisory board member, spouse, or child is required to have in no way participated in the determination of the Bid specifications or the determination of the lowest or best Proposer.

36. BID PROTESTS

In any case where a bidder wishes to protest either the results of or the intended disposition of any bid, the bidder must:

36.1 File a written notice to the City Manager of the bidder's intention to protest within one (1) business day of the bid opening or the City's declaration of intent with regard to the disposition. Upon receipt of a protest, the bid process shall be suspended until the Protest procedure herein described has been completed.

36.2 Within five (5) days of filing the written notice of intent to protest, the protester shall file a formal written protest with the City Manager, acting as the bid protest officer, explaining in detail the nature of the protest and the grounds on which it is based. During this five-day period, the protester is encouraged to attempt to resolve the issue with the City's Finance Department.

36.3 The protester must include with the formal written protest a bid protest bond in the form of a certified check, cashier's check or money order made payable to the city in an amount equal to five percent (5%) of the lowest acceptable bid. The bond will be deposited with the Cashier's Office where it will be put into an account and the protester will receive a receipt.

36.4 Upon timely receipt of the formal written protest and protest bond, the City must:

(1) Issue formal findings of fact and a written decision with regard to the validity or non-validity of the formal written protest within ten (10) business days of the City's receipt of the protest.

(2) Within two (2) business days of receipt of the formal findings of fact and written decision, the City shall notify the protester of the decision of the bid protest officer. Such notification shall be transmitted via certified return receipt mail.

36.5 Should the protest be found to be without merit or validity, the bid protest bond shall be forfeited to the City in its entirety, and the bid process may resume. If a decision favorable in whole or in part to the protest is rendered, a check for the full amount of the bond will be returned to the protester.

37. SCRUTINIZED COMPANIES

Pursuant to Section 287.135, F.S., a company that, at the time of bidding or submitting a proposal for a new contract or renewal of an existing contract, is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to Section 215.473, F.S., is ineligible for, and may not bid on, submit a proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services of $1 million or more. Any contract with an agency or local governmental entity for goods or services of $1 million or more entered into or renewed on or after July 1, 2011, must contain a provision that allows for the termination of such contract at the option of the awarding body if the company is found to have submitted a false certification as provided under Subsection 287.135(5), F.S., or has been placed on either of the aforementioned lists. The CITY agrees to comply with the requirements of Section 287.135, F.S. in connection with the implementation of the PROJECT.

END OF SECTION

SECTION 2: INSURANCE INFORMATION

Before performing any work, the Contractor shall procure and maintain, during the life of the Contract, insurance listed below. The policies of insurance shall be primary and written on forms acceptable to the City and placed with insurance carriers approved and licensed by the Insurance Department in the State of Florida and meet a minimum financial AM Best and Company rating of no less than A:VII. No changes are to be made to these specifications without prior written specific approval by the City.

1. The City of Venice is to be specifically included as an ***ADDITIONAL INSURED***.
2. The City of Venice shall be named as Certificate Holder. ***Please Note that the Certificate Holder should read as follows:***

   The City of Venice
   401 W. Venice Avenue
   Venice, FL 34285

   No City Division, Department, or individual name should appear on the certificate.

   NO OTHER FORMAT WILL BE ACCEPTABLE.

3. The "Acord" certification of insurance form shall be used.
4. Required Coverage

   a) **Commercial General Liability:** including but not limited to bodily injury, property damage, contractual liability, products and completed operations, and personal injury with limits of not less than $ 1,000,000 per occurrence, $ 1,000,000 aggregate covering all work performed under this Contract. Include broad form property damage (provide insurance for damage to property under the care custody and control of the contractor)

   b) **Business Auto Policy:** including bodily injury and property damage for all vehicles owned, leased, hired and non-owned vehicles with limits of not less than $1,000,000 combined single limit covering all work performed under this Contract.

   c) **Workers Compensation:** Contractor will provide Workers Compensation Insurance on behalf of all employees, including sub-contractors, who are to provide a service under this Contract, as required under Florida Law, Chapter 440, and Employers Liability with limits of not less than $100,000 per employee per accident; $500,000 disease aggregate; and $100,000 per employee per disease.

d) **Installation Floater/Installation Builders' Risk–Property Coverage:** Policy to cover direct physical loss or damage to materials, supplies, machinery, and equipment being installed, constructed or rigged by the contractor in conjunction with its installation or construction. All items involved in the project including drainage/water sewer pipes, etc. (as included in description of project) need to be insured for the total completed replacement value. Coverage should include perils of fire, theft, vandalism, windstorm/hail, collapse and transit, sewer backup, testing, equipment breakdown, waterborne property. Coverage shall start when the items to be installed are transported to City premises and remain in place until the interest of the contractors ceases or the City accepts possession whichever comes first Coverage should apply to owned property and non-owned property in the contractor's care, custody and control. The installation coverage forms shall provide coverage for building materials and supplies at the construction site, in transit to the site and similar property intended for the construction project at other locations as necessary or because of lack of storage space at the construction site. Coverage should apply on a Primary basis and should include a Waiver of Subrogation. Contractor should be responsible for any deductibles.

5. Policy Form:

a) All policies required by this Contract, with the exception of Workers Compensation, or unless specific approval is given by the City, are to be written on an occurrence basis, shall name the City of Venice, its Elected Officials, Officers, Agents, Employees as additional insured as their interest may appear under this Contract. Insurer(s), with the exception of Workers Compensation, shall agree to waive all rights of subrogation against the City of Venice, its Elected Officials, Officers, Agents, and Employees.

b) Insurance requirements itemized in this Contract, and required of the Contractor, shall be provided on behalf of all subcontractors to cover their operations performed under this Contract. The Contractor shall be held responsible for any modifications, deviations, or omissions in these insurance requirements as they apply to subcontractors.

c) Each insurance policy required by this Contract shall:

(1) apply separately to each insured against whom claim is made and suit is brought, except with respect to limits of the insurer's liability;

(2) be endorsed to state that coverage shall not be suspended, voided or canceled by either party except after thirty (30) calendar days prior written notice by certified mail, return receipt requested, has been given to the City of Venice's Director of Administrative Services.

d) The City shall retain the right to review, at any time, coverage form, and amount of insurance.

e) The procuring of required policies of insurance shall not be construed to limit Contractor's liability nor to fulfill the indemnification provisions and requirements of this Contract.

f) The Contractor shall be solely responsible for payment of all premiums for insurance contributing to the satisfaction of this Contract and shall be solely responsible for the payment of any deductible and/or retention to which such policies are subject, whether or not the City is an insured under the policy. In the event that claims in excess of the insured amounts provided herein are filed by reason of operations under the contract, the amount excess of such claims, or any portion thereof, may be withheld from any payment due or to become due to the Contractor until such time the contractor shall furnish additional security covering such claims as may be determined by the City.

g) Claims Made Policies will be accepted for professional and hazardous materials and such other risks as are authorized by the City. All Claims Made Policies contributing to the satisfaction of the insurance requirements herein shall have an extended reporting period option or automatic coverage of not less than two years. If provided as an option, the Contractor agrees to purchase the extended reporting period on cancellation or termination unless a new policy is affected with a retroactive date, including at least the last policy year.

h) Certificates of Insurance evidencing Claims Made or Occurrence form coverage and conditions to this Contract, as well as the City's Bid Number and description of work, are to be furnished to the City's Director of Administrative Services, 401 West Venice Avenue, Venice, FL 34285, ten (10) business days prior to commencement of work and a minimum of thirty (30) calendar days prior to expiration of the insurance policy.

i) Notices of Accidents and Notices of Claims associated with work being performed under this Contract, shall be provided to the Contractor's insurance company and the City's Director of Administrative Services, as soon as practicable after notice to the insured.

All property losses shall be payable to, and adjusted with, the City.

END OF SECTION

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SECTION 3: SCOPE OF SERVICE

The project includes constructing an aircraft wash rack facility for the Venice Municipal Airport. The project will include a rigid pavement section of 281 SY of 6 inch portland cement concrete pavement and 320 SY of 4 inches recycled concrete aggregate base course P-219 for the aircraft wash pad. The project will include a flexible pavement section of 70 tons of new P-403 asphalt and 378 SY of 6 inches recycled concrete aggregate base course P-219 which will be used to tie-in the existing taxilanes to the new aircraft wash pad.

The project will include 185 lf or 12 inch by 18 inch elliptical reinforced concrete pipe, 3 Type "C" inlets, a type 8 Manhole and a mitered end section for drainage improvements. The project will include a XERXES 1,000 gallon double wall oil/water separator.

The project will include a tap into the existing water main and shall provide a hose bib for potable water use for the aircraft wash rack. A ground mounted hose reel and 75 foot hose will be included for the project.

The project will include an E-One Grinder Pump Station and connection to the existing forcemain a, 2 foot by 2 foot utility box, 4 foot by 4 foot utility box for utility improvements.

A wash rack card reader will be installed to monitor use of the aircraft wash rack. Three (3) electrical valve actuators will be used in the system. In the off position the electrical valve actuator will be in the closed position for the water line and the wastewater line to the oil/water separator and in the open position for storm pipe. When the card reader is activated the electrical valve actuator will be in the closed position for the storm pipe and in the open position for the water line and the wastewater line to the oil/water separator. This will allow the tenants to wash their aircrafts and will direct the runoff from the aircraft wash pad when in use to the existing forcemain. The project will include electrical tie-ins to the existing electrical service to provide power to the wash rack card reader, electrical valve actuators and the E-One Grinder Pump station.

The project will include a conduit run from the wash rack card reader to the existing administration building which will be connected into the existing security system.

The project will also include 895 sf of pavement markings, silt fence for erosion protection, 1,500 SY of sodding.

END OF SECTION

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SECTION 4: BID INFORMATION

BID INFORMATION:

Bids are mailed or delivered to the following address: Procurement- Finance Department
Room # 204
401 W. Venice Avenue
Venice, FL 34285

BID OPENING:

There will be a public bid opening at the date and time stated in the Invitation to Bid.

QUESTIONS AND ANSWERS:

Any and all questions must be submitted in writing and addressed to: Jon Mayes
Procurement- Finance Department
City of Venice
401 W. Venice Avenue
Venice, FL 34285
Tel: 941- 882-7423
Fax: 941-486-2790
E-mail: jmayes@venicegov.com

All questions submitted will be answered in writing and an Addendum will be sent to all prospective bidders.

THE DEADLINE FOR QUESTIONS CONCERNING THIS ITB IS:

December 5, 2018 at 1:00 PM

END OF SECTION

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Required Forms List for ITB No.: 3090-18

- Bid Submittal Form (BF-1)
- "Sub-Contractors and Prime Contractors Work" and Acknowledgement of Addenda (BF-2)
- Bid Price Form (BF-3)
- Bid Form (BF-4 to BF-5)
- Contract Time and Liquidated Damages (BF-6)
- Prime Contractor Work (BF-7)
- Trench Safety Affidavit (BF-8)
- Safety Plan Compliance Document (SPCD) Certification (BF-9)

Forms must be returned with each firm's proposal.
Mark "N/A" if not applicable to your firm.

BID SUBMITTAL FORM

Date: _____

Project: **CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY**
VENICE MUNICIPAL AIRPORT

To: Procurement Finance Department
City of Venice – Purchasing Department
401 W. Venice Ave, Room #204
Venice, FL 34285

From: _____
Bidder's Name

_____
Bidder's Street Address

_____
Bidder's City, State and Zip Code

_____ _____
Bidder's Phone Number Bidder's Fax Number

Having carefully examined the Bid Documents and Drawings entitled **CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY**, **VENICE MUNICIPAL AIRPORT** as well as the premises and conditions affecting the work, and confirming that the sites were visited, as required, the undersigned hereby proposed to furnish all labor and material and to perform all work as required by and in strict accordance with the above-named documents for sums as indicated in this Bid Form entitled "Bid Price Form", which sums include all applicable taxes.

BID SECURITY:

The undersigned acknowledges that it has included with its Bid the required Bid Security for not less than five percent (5%) of the total amount of its Base Bid which, in case the undersigned refuses or fails to accept an award and to enter into a contract and file the required bonds within the prescribed time, shall be forfeited to the City of Venice, as liquidated damages.

ACCEPTANCE OF BID:

The Bidder understands and agrees that the City of Venice (Owner) reserves the right to accept or reject any or all bids submitted within one-hundred and twenty (120) calendar days from date of bid opening. Bidder agrees that it will not withdraw its Bid for said period of time.

The Bidder understands and agrees that the Owner reserves the right to accept or reject any or all Additive or Alternates, without regard to the listed order.

THIS PAGE MUST BE COMPLETED AND SUBMITTED WITH OFFER

SUBCONTRACTORS AND PRIME CONTRACTOR WORK

For work performed by other than the Bidder's own organization, the undersigned has designated on the Bid Form entitled "Designation of Subcontractors" certain firms as its subcontractors for portions of the work and further agrees that said subcontractors may not be changed without written consent of the Owner.

For work performed by the Bidder's own organization, the undersigned has designated on the Bid Form entitled "Prime Contractor Work" that portion of work performed by the bidder's direct hire forces.

ADDENDA:

It is agreed that the undersigned has received all addenda complete as issued by the Owner and that related costs are included in the bid submitted. The undersigned acknowledges receipt of said addenda as follows:

Addendum # _____ dated _____

Addendum # _____ dated _____

Addendum # _____ dated _____

Addendum # _____ dated _____

Addendum # _____ dated _____

TIME:

Time is of the essence. The undersigned Bidder agrees that, if awarded the Contract hereunder it shall commence the work to be performed under the Contract on the date set by the Owner in its written notice to proceed, continuing the work with diligence and shall complete the entire work per this Bid Form. The undersigned agrees that, if awarded the Contract, it will complete said separable portions of work in accordance with such milestone dates.

The lowest, responsive, responsible Bidder will be provided a Notice of Intent to Award and four copies (4) copies of the Contract and its Attachments for execution. Failure of the Bidder to return same, fully executed, with all required insurance certificates within fourteen (14) calendar days may result in contract being awarded to the next lowest, responsive, responsible Bidder and forfeiture of Bid Bond.

If the undersigned is notified of the acceptance of this bid, it agrees to execute within fourteen (14) calendar days, a Contract for the above work, complete with all required insurance certificates and bond forms.

Respectfully Submitted:

_____
Name of Authorized Individual

_____
Authorized Signature

_____
Date

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BID PRICE FORM

Contractor shall provide in the appropriate spaces of the bid form the unit price(s) and lump sum prices(s), based on the description indicated for that item, the Total Amount of each item in numerical figures and the Total Amount Bid for the entire work.

It is the intent of the OWNER to award all schedules of the project. If a contract is to be awarded, it will be awarded to the lowest responsive and responsible Bidder of the combined total of all schedules of work including the bid alternates.

Contractor shall provide prices for all Schedules. Failure to do so may result in the bid being considered non-responsive and rejected.

_____
Name of Authorized Individual

_____
Authorized Signature

_____
Date

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BID FORM
CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY
VENICE MUNICIPAL AIRPORT, VENICE FL

ITB Number: 3090-18

Base Bid

Pay Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Cost
P-100-1	Mobilization	1	LS		
P-102-1	Safety, Security and Maintenance of Airfield Operations	1	LS		
P-152-1	Unclassified Excavation	55	CY		
P-156-1	Silt Fence	340	LF		
P-219-1	(4") Recycled Concrete Aggregate Base Course	320	SY		
P-219-2	(6") Recycled Concrete Aggregate Base Course	380	SY		
P-403-1	(3") Bituminous Surface Course	60	TN		
P-501-1	(6") Portland Cement Concrete Pavement	290	SY		
P-602-1	Bituminous Prime Coat	55	GAL		
P-620-1	Yellow Reflective Runway and Taxiway Marking (100% Application, Type III Beads)	260	SF		
P-620-2	Black Non-Reflective Marking Outlines	680	SF		
D-701-1	12" x 18" Elliptical Reinforced Concrete Pipe (Class V)	185	LF		
D-701-2	4" PVC C900	36	LF		
D-701-3	4" HDPE DR9	10	LF		
D-701-4	4½" HDPE DR9	6	LF		
D-751-1	Type C Inlet	2	EA		
D-751-2	Type 8 Manhole	2	EA		
D-751-3	Mitered End Section	1	EA		
D-751-4	2' × 2' Utility Box	1	EA		
D-751-5	4' × 4' Utility Box	1	EA		
D-751-6	Type F Inlet	1	EA		
T-904-1	Sodding	1,500	SY		
X-1000-1	XERXES 4 foot diameter 1,000 gallon double wall oil/water separator or approved equal	1	EA		
WF-1100-1	E-ONE Grinder Pump Station (Model WH472-77, with hard wired level controls) or approved equal	1	LS		
WF-1100-2	E-ONE 2" Tapping Sleeve, Resilient Gate Valve & Box, 1 1/4" Check Valve or approved equal	1	EA		

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Pay Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Cost
R-1200-1	Ground mounted hose reel (Reelcraft Heavy Duty Dual Pedestal Hose Reel, Part Number D83000 OLP) or approved equal	1	EA		
R-1200-2	10' hose assembly (Reelcraft Part Number S601034-10, ¾ inch by 10 feet in length) or approved equal	1	EA		
R-1200-3	75 foot hose (Reelcraft Part Number S601026-75, ¾ inch by 75 feet in length) or approved equal	1	EA		
B-1300-1	Bollard	5	EA		
W-1400-1	8 inch by 2 inch Tapping Saddle and 2 inch Valve	1	EA		
W-1400-2	¾ inch hose bib	1	EA		
W-1400-3	2 inch by ¾ inch reducer	1	EA		
W-1400-4	¾ inch HDPE SDR 11 water line	15	LF		
W-1400-5	2 inch HDPE SDR 11 water line	32	LF		
W-1400-6	2 inch Backflow Assembly	1	EA		
W-1400-7	2 inch ASAHI/American Electrical Valve Series 92 Actuator and actuator stem or approved equal	1	EA		
W-1400-8	4 inch ASAHI/American Electrical Valve Series 92 Actuator and actuator stem or approved equal	2	EA		
W-1400-9	1 ¼ inch HDPE SDR 11 force main	144	LF		
W-1400-10	3 inch SDR 11 forcemain sleeve by directional drill	45	LF		
16050-5.1	#12 XHHW, 600V, XHHW, installed in new conduit, complete in place	2,900	LF		
16050-5.2	#10 XHHW, 600V, XHHW, installed in new conduit, complete in place	1,750	LF		
16050-5.3	One 3/4" schedule 40 PVC conduit direct buried in earth complete in place	220	LF		
16050-5.4	One 1" schedule 40 PVC conduit direct buried in earth complete in place	40	LF		
16050-5.5	One 3/4" hot dipped rigid galvanized steel conduit surfaced mounted, complete in place	960	LF		
16050-5.6	New Washrack Control Pedestal, complete in place	1	EA		
16050-5.7	New Pump Station Control/Alarm Pedestal, complete in place	1	EA		
16050-5.8	Modify existing Hangar Panel, complete in place	1	EA		
	Card Reader connection to administration building, (Includes directional bore 2" conduit, trenching, fiber (SMFOC), power conductors, NEMA 4X Exclosure and Media Converter)	1	LS		
				Total Contract Bid Amount	**$**

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CONTRACT TIME AND LIQUIDATED DAMAGES

Project Name: **CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY**
VENICE MUNICIPAL AIRPORT

It is a requirement of this contract that items listed below are to be sequenced and scheduled as herein stipulated.

1. The Contractor may not proceed with this project prior to a written **NOTICE TO PROCEED** from the Owner on each phase.

2. The contract time shall commence upon the issuance of a written notice to proceed for each phase from the Owner. The Contractor shall complete all work in each phase as specified below or indicated in the contract documents.

3. The Contractor and Owner agree that time is of the essence regarding the work to be performed and that the Owner will suffer a financial loss if the work is not completed within the contract time specified above. A precise determination of actual damages which would be incurred by the Owner for any delay in the completion of the work would be difficult to ascertain. Accordingly, instead of requiring any such proof, the Contractor and Owner agree that as liquidated damages for delay (but not as a penalty) the Contractor shall pay Owner the following amounts per day for each and every day, or portion thereof, for each phase as shown below:

CONTRACT DAYS AND SCHEDULE OF LIQUIDATED DAMAGES		
Work Item	Calendar Days	Liquidated Damages
Mobilization	30	N/A
Phase 1A	60	$ 500/day
Phase 1B	5	$ 500/day
Phase 1C	2	$ 500/day
Phase 1D	3	$ 500/day
Phase 2	30	$ 500/day
Phase 3	1	$ 500/day
Substantial Completion	91	$1,000/day
Final Completion	121	$1,000/day

_____
Name of Authorized Individual

_____
Authorized Signature

_____
Date

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PRIME CONTRACTOR WORK

Project Name: **CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY**
VENICE MUNICIPAL AIRPORT

THIS FORM MUST ACCOMPANY BID FORM AND MUST BE COMPLETED AS APPLICABLE.

The Prime Contractor shall perform a minimum of **35%** of the work with his own direct hire forces. That portion of the work which will be performed by the General Contractor is as follows:

WORK DESCRIPTION	**CONTRACT AMOUNT**

TOTAL PRIME CONTRACTOR DOLLAR AMOUNT: _____

PERCENT OF PRIME CONTRACTOR PARTICIPATION: _____

_____
Name of Authorized Individual

_____
Authorized Signature

_____
Date

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TRENCH SAFETY AFFIDAVIT

Project Name: **CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY**
VENICE MUNICIPAL AIRPORT

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

The Bidder hereby provides written assurance that the Trench Safety Standards identified in the Occupational Safety & Health Administration's Excavation Safety Standards. (OSHA) 29 C.F.R.S. 1926.650 Subpart P will be adhered to during trench excavation.

The undersigned acknowledges that included in the various items of the proposal and in the Total Bid Price are costs for complying with the Trench Safety Standards (OSHA) 29 C.F.R.S. 1926.650 Subpart P as summarized below: (Attach additional sheets as necessary)

Schedule Item	Trench Safety Measure (Slope, Trench Shield, etc.)	COST PER LINEAR FOOT OF TRENCH, OR PER SQUARE FOOT OF SHORING
		$
		$
		$
		$
		$
	Total:	$

_____
Name of Authorized Individual

_____ _____
Authorized Signature Date

STATE OF FLORIDA

Subscribed and Sworn to (or affirmed) Before me on _____
(date)

by _____.
(name)

He/she is personally known to me or has presented _____
(type of identification) as identification.

_____
Notary Public Signature and Seal Print Notary Name and Commission No.

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SAFETY PLAN COMPLIANCE DOCUMENT (SPCD) CERTIFICATION

Project Name: **CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY**
VENICE MUNICIPAL AIRPORT

The Bidder/offeror acknowledges and agrees to the following:

~~In accordance with the requirements of the Federal Aviation Administration Advisory Circular AC 150/5370-2, The Bidder/offeror certifies, by submission of this proposal or acceptance of this contract, that the Bidder /offeror has read and will abide by the Construction Safety and Phasing Plan (CSPP) that has been included herein.~~ The Bidder/offeror also certifies that upon Contract Award a Safety Plan Compliance Document (SPCD) shall be submitted in compliance of the requirements of the Federal Aviation Administration Advisory Circular AC 150/5370-2, and that the bidder shall abide to the SPCD throughout the contract.

_____
Name of Authorized Individual

_____
Authorized Signature

_____
Date

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REQUIRED FORMS

Required Forms Check List: ITB# 3090-18
Construction of Aircraft Wash Rack Facility

- ☐ Proposal Bond
- ☐ How Do I Determine "LOCAL PREFERENCE"
- ☐ Qualifications Statement
- ☐ Cooperative Procurement with Other Jurisdictions
- ☐ Form 3A- Interest in Competitive Bid for Public Business
- ☐ Indemnification/Hold Harmless
- ☐ FDEP & U.S. EPA Construction Notices of Intent (NOI)
- ☐ Statement of References for Contractor
- ☐ Contractor's Statement of Sub-contractors
- ☐ Drug Free Workplace Certification
- ☐ Non-Collusion Affidavit
- ☐ Public Entity Crime Information
- ☐ Conflict/Non-conflict of Interest and Litigation Statement
- ☐ Certification Regarding Lobbying
- ☐ E-Verification Certification
- ☐ Prohibition of Segregated Facilities
- ☐ Payroll Signature Authorization and DUNS Number
- ☐ Statement of Participation in Contracts Subject to Non-Discrimination
- ☐ Equal Employment Opportunity Certification
- ☐ Bidder Qualification Statement
- ☐ Statement of "No Bid" (if applicable)

All required forms are included in this package. All forms must be filled out and returned with the firm's proposal.

Failure to do so will result in the firm being considered non-responsive and their proposal will be disallowed.

Mark N/A if not applicable to your firm

PROPOSAL BOND

Not to be completed if a certified check is submitted.

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned,

_____ as

Principal, and _____ as

Surety

are held and firmly bound unto the City of Venice, Florida, in the sum of

_____ $_____, 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.

The condition of the above obligation is such that if the attached Proposal of Principal and Surety for work specified as:

_____

all as stipulated in said Proposal, by doing all work incidental thereto, in accordance with the plans and specifications provided heretofore, all within Sarasota County, is accepted and the bidder shall within ten (10) days after notice of said award, enter into a contract, in writing, and furnish the required Performance Bond with surety or sureties to be approved by the Director of Finance, this obligation shall be void; otherwise the same shall be in full force and virtue by law and the full amount of this Proposal Bond will be paid to the City as stipulated or liquidated damages.

Signed this _____ day of _____, 2018.

_____ _____
Principal Surety

Principal must indicate whether corporation, partnership, company, or individual.

The person signing shall, in his own handwriting, sign the Principal's name, his own name, and his title. The person signing for a corporation must, by affidavit, show his authority to bind the corporation.

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

HOW DO I DETERMINE "LOCAL PREFERENCE"

The following questions will help you determine local preference for your company.

Please answer questions 1 through 4 **FIRST**. If you answer **NO** to any questions 1 through 4, local preference does **NOT** apply.
ONLY if you answer **YES** to questions 1 through 4, may you proceed to question 5. If you answer **YES** to any questions 5 through 7, local preference applies.
If you are unsure of how to answer any questions, please contact the City of Venice's Purchasing Department at 941-486-2626.

Questions 1 – 4

1. Has your company paid a local business tax either to Sarasota, DeSoto or Charlotte County (Manatee County does not currently have a local business tax) authorizing your company to provide goods or services described in this solicitation?

YES ___ If "yes", proceed to question 2.

NO ____ If "no", STOP, local preference does not apply.

***** If the name on the local business tax receipt is not the same as the name on the bid/solicitation submittal, local preference does not apply.

2. Does your company maintain a permanent physical business address located within the limits of Sarasota, Manatee, DeSoto or Charlotte County from which your company operates or performs business?

YES ____ If "yes", proceed to question 3.

NO ____ If "no", STOP, local preference does not apply.

3. Does your company's local business office (identified in question 2) have a least one full time employee?

YES ____ If "yes", proceed to question 4.

NO _____ If "no", STOP, local preference does not apply.

4. Do at least fifty percent (50%) of your company's employees who are based in the local business location (identified in question 2) reside within Sarasota, Manatee, DeSoto or Charlotte County?

YES ____ If "yes", proceed to question 5.

NO ____ If "no", STOP, local preference does not apply.

Questions 5 – 6

5. Is your company's local business office (identified in question 2) the primary location (headquarters) of your company?

YES ____ If "yes", STOP, local preference applies.

NO ____ If "no", proceed to question 6.

6. If the local business office (identified in question 2) is not the primary location of your company, are at least ten percent (10%) of your company's entire full-time employees based at the local office location AND does at least one corporate officer, managing partner or principal owner of your company reside in Sarasota, Manatee, DeSoto or Charlotte County?

YES ____ If "yes", STOP, local preference applies.

NO ____ If "no", local preference does not apply.

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QUALIFICATIONS STATEMENT

The undersigned certifies under oath the truth and correctness of all statements and all answers to questions made hereinafter:

SUBMITTED TO: CITY OF VENICE
Procurement- Finance Department
401 W. Venice Avenue
Venice, Florida 34285
☐ Joint Venture

CHECK ONE:
☐ Corporation
☐ Partnership
☐ Individual
☐ Other

SUBMITTED BY:

NAME: _____
ADDRESS: _____

PRINCIPLE OFFICE: _____

State the true, exact, correct and complete legal name of the partnership, corporation, trade or fictitious name under which you do business and the address of the place of business.

The correct name of the Offeror is: _____

The address of the principal place of business is: _____

If the Offeror is a corporation, answer the following:

a. Date of Incorporation: _____

b. State of Incorporation: _____

c. President's Name: _____

d. Vice President's Name: _____

e. Secretary's Name: _____

f. Treasurer's Name: _____

g. Name and address of Resident Agent: _____

If Offeror is an individual or partnership, answer the following:

a. Date of Organization: _____

b. Name, address and ownership units of all partners:

_____

_____

_____

c. State whether general or limited partnership: _____

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If Offeror is other than an individual, corporation partnership, describe the organization and give the name and address of principals:

_____

_____

_____

_____

If Offeror is operating under fictitious name, submit evidence of compliance with the Florida Fictitious Name Statute.

How many years has your organization been in business under its present business name?

_____

a. Under what other former names has your organization operated?

_____

_____

_____

_____

ACKNOWLEDGEMENT

State of _____

County of _____ } SS.

On this the _____ day of _____, 2018, before me, the undersigned Notary Public of the State of

_____, personally appeared _____ and (Name(s) of individual(s)

who appeared before notary) whose name(s) is/are Subscribed to the within instrument, and he/she/they acknowledge that

he/she/they executed it.

_____

NOTARY PUBLIC, STATE OF _____

NOTARY PUBLIC
SEAL OF OFFICE: _____
(Name of Notary Public: Print, stamp, or type as commissioned)

☐Personally known to me, or ☐Produced Identification: _____ ☐ **DID** take an oath, or ☐**DID NOT** take an oath

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COOPERATIVE PROCUREMENT WITH OTHER JURISDICTIONS

The vendor, by submitting a bid, authorizes other Public Agencies to "Piggy-Back" or purchase equipment or services being proposed in this invitation to bid at prices bid unless otherwise noted on the proposal sheet.

Yes_____ No_____

AUTHORIZED SIGNATURE

By submission of the ITB, the undersigned certifies that:

1. He/She has not paid or agreed to pay any fee or commission, or any other thing of value contingent upon the award of this contract, to any City of Venice, Florida employee or official or to any current consultant to the City of Venice, Florida;
2. He/She has not paid or agreed to pay any fee or commission or any other thing of value contingent upon the award of this contract to any broker or agent or any other person;
3. The prices contained in this proposal have been arrived at independently and without collusion, consultation, communication or agreement intended to restrict competition.
4. He/She has the full authority of the Offeror or to execute the proposal and to execute any resulting contract awarded as the result of, or on the basis of, the proposal.

Authorized Representative: _____

Signature: _____

Title: _____

Company Name: _____

Address: _____

City, State, ZIP: _____

Telephone Number: _____

Fax Number: _____

E-mail address: _____

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FORM 3A INTEREST IN COMPETITIVE BID FOR PUBLIC BUSINESS

LAST NAME - FIRST NAME - MIDDLE INITIAL	OFFICE / POSITION HELD
MAILING ADDRESS	AGENCY
CITY ZIP COUNTY	ADDRESS OF AGENCY

WHO MUST FILE THIS STATEMENT

Sections 112.313(3) and 112.313(7), Florida Statutes, prohibit certain business relationships on the part of public officers and employees, their spouses, and their children. *See* Part III, Chapter 112, Florida Statutes, and/or the brochure entitled "A Guide to the Sunshine Amendment and Code of Ethics for Public Officers and Employees" for more details on these prohibitions. However, Section 112.313(12), Florida Statutes, provides certain limited exemptions to the above-referenced prohibitions, including one where the business is awarded under a system of sealed, competitive bidding; the public official has exerted no influence on bid negotiations or specifications; AND where disclosure is made, prior to or at the time of the submission of the bid, of the official's or his spouses's or child's interest and the nature of the intended business. This form has been promulgated by the Commission on Ethics for such disclosure, *if and when applicable* to a public officer or employee.

INTEREST IN COMPETITIVE BID FOR PUBLIC BUSINESS (Required by Section 112.313(12)(b), Fla. Stat.)

1. The competitive bid to which this statement applies has been / will be (strike one) submitted to the following government agency:

2. The person submitting the bid is: **NAME ▼** **POSITION ▼**

3. The business entity with which the person submitting the bid is associated is:

4. My relationship to the person or business entity submitting the bid is as follows:

5. The nature of the business intended to be transacted in the event that this bid is awarded is as follows:

   a. The realty, goods, and / or services to be supplied specifically include: _____

   _____

   b. The realty, goods, and / or services will be supplied for the following period of time: _____

   c. Will the contract be subject to renewal without further competitive bidding? ❑ Yes ❑ No. If so, how often?

6. Additional comments:

7. SIGNATURE	DATE SIGNED	DATE FILED

FILING INSTRUCTIONS

If you are a state officer or employee required to disclose the information above, please file this form with the Commission on Ethics, P.O. Drawer 15709, Tallahassee, FL 32317-5709; physical address: 325 John Knox Road, Building E, Suite 200, Tallahassee, FL 32303. If you are an officer or employee of a political subdivision of this state and are subject to this disclosure, please file the statement with the Supervisor of Elections of the county in which the agency in which you are serving has its principal office.

NOTICE: UNDER PROVISIONS OF FLORIDA STATUTES SECTION 112.317, A FAILURE TO MAKE ANY REQUIRED DISCLOSURE CONSTITUTES GROUNDS FOR AND MAY BE PUNISHED BY ONE OR MORE OF THE FOLLOWING: IMPEACHMENT, REMOVAL OR SUSPENSION FROM OFFICE OR EMPLOYMENT, DEMOTION, REDUCTION IN SALARY, REPRIMAND, OR A CIVIL PENALTY NOT TO EXCEED $10,000.

CE FORM 3A - REV. 1/07 (Refer to Rule 34-7.010(1)(c), F.A.C.)(Rev.9/2013)

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INDEMNIFICATION/HOLD HARMLESS

The elected firm shall (if required by City) defend, indemnify and hold the City, the City's representatives or agents, and the officers, directors, agents, employees, and assigns of each harmless for and against any and all claims, demands, suits, judgments, damages to persons or property, injuries, losses or expenses of any nature whatsoever (including attorneys' fees at trial at appellate level) arising directly or indirectly from or out of any negligent act or omission of the elected firm, its Sub-Offerors and their officers, directors, agents or employees; any failure of the elected firm to perform its services hereunder in accordance with generally accepted professional standards; any material breach of the elected firm's representations as set forth in the proposal or any other failure of the elected firm to comply with the obligations on its part to be performed under this contract.

I, _____, being an authorized representative of the firm of

_____ located at City

_____, State_____, Zip Code_____ Phone:

_____ Fax:_____ Having read and

understood the contents above, hereby submit accordingly as of this Date,

_____, 2018.

_____
Please Print Name

_____
Signature

This signed document shall remain in effect for a period of one (1) year from the date of signature or for the contract period, whichever is longer.

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CITY OF VENICE, FLORIDA
FDEP & U.S. EPA CONSTRUCTION NOTICES OF INTENT (NOI)

The undersigned bidder acknowledges the requirement of the U.S. Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (FDEP) which have published the rules for NPDES General Permits for stormwater discharges from construction sites and said bidder agrees to assist the owner in the preparation of these permits and associated plans. The bidder acknowledges that he has taken these permits and associated construction costs into account in the preparation of his lump sum bid. These permits are mandated under Section 402(p) of the Clean Water Act for "Stormwater Discharge from Construction Activities (including clearing, grading, and excavation activities) that result in the disturbance of five (5) or more acres total land area, including areas that are part of a larger common plan of development or sale." The EPA has published summary guidance for: "Developing Prevention Plans and Best Management Practices" (EPA 833-R-92-001, October 1992).

The EPA permit format is a *Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity to be covered under a NPDES Permit*, and it is to be submitted according to the NOI instructions. The Stormwater Pollution Prevention Plan which must accompany the NOI must be signed by authorized representatives of the contractor and subcontractors as well as the facility Owner. Copies of the EPA NOI must be provided to state and local agencies who have issued stormwater management, grading, or land alteration permits or approvals.

An NOI must also be submitted to the Florida Department of Environmental Protection, NPDES Stormwater Notices Center, MS 2510, 2600 Blair Stone Road, Tallahassee, FL 32399. FDEP forms may be downloaded from the State's web site http://www.dep.state.fl.us/water/stormwater/npdes/ or phone 850-921-9870 if you have questions.

Acceptance of the bid to which this certification and disclosure applies in no way represents the Owner or its Representative has evaluated and thereby determined that the information is adequate to comply with the applicable U.S. EPA or FDEP requirements nor does it in any way relieve the contractor of its sole responsibility to comply with the applicable U.S. EPA and FDEP requirements, including inspection of all control measures at least once each week and following any storm (rainfall) event of 0.5 inches or greater and maintaining reports of each inspection.

Bidder (Company):

Name and Title: _____

Address: _____

_____

Telephone: _____

BY SIGNATURE BELOW OF AUTHORIZED REPRESENTATIVE, CONTRACTOR ACKNOWLEDGES RECEIPT OF A COPY OF CITY ORDINANCES 95-12 and 96-09 AND AGREES TO ABIDE BY THE REQUIREMENTS OF SAID ORDINANCES.

Signature:_____ **Date:**_____

Printed name/title:_____

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ORDINANCE 95-12

AN ORDINANCE OF THE CITY OF VENICE, FLORIDA, AMENDING THE CODE OF ORDINANCES BY AMENDING CHAPTER 9, HEALTH AND SANITATION, ARTICLE IV, DISPOSAL OF EXCRETA, SECTION 9-71, DISCHARGE OF RAW SEWAGE INTO STORMWATER; DELETING ARTICLE V, PROHIBITED STORMWATER DISCHARGES; ADDING CHAPTER 19, WATER AND SEWERS, ARTICLE VI, STORMWATER QUALITY; DELETING CHAPTER 15, STREETS AND SIDEWALKS, ARTICLE IV, EXCAVATIONS, SECTION 15-53, STORM DRAINAGE AND POLLUTION; PROVIDING FOR CONFLICT WITH OTHER ORDINANCES; PROVIDING FOR A SEVERABILITY CLAUSE AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, control of stormwater runoff is necessary from individual lots that do not require a permit from the Southwest Florida Water Management District and requiring compliance with the provisions of the Clean Water Act 33 U.S.C.1251 et.seq., as amended by the Water Quality Act of 1987; and

WHEREAS, the City is desirous of complying with its U.S. Environmental Protection Agency National Pollutant Discharge Elimination System Permit and its Stormwater Master Plan, therefore, stormwater runoff and any discharge to the City storm sewer system will be closely monitored and regulated; and

WHEREAS, the control of stormwater runoff is the responsibility of each individual property owner; and **WHEREAS**, the City is desirous of controlling stormwater runoff and insuring compliance with the Comprehensive Plan.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF VENICE, FLORIDA:

SECTION 1. Chapter 9, Water and Sewers, Article IV, Disposal of Excreta, Section 9-71, Discharge of Raw Sewage into Storm Sewer, is amended to read as follows:

Sec. 9-71. Discharge of raw sewage into storm sewer.

It shall be unlawful for any person to discharge raw sewage or to discharge the effluent of and from any septic tank into the storm sewer system of the city or to construct or maintain any system of drainage, pipes, conduits or other apparatus whereby raw sewage or the effluent of and from any septic tank shall or may be discharged into or through the storm sewer system of the city.

SECTION 2. Chapter 9, Water and Sewers, Article V, Prohibited Stormwater Discharges, is deleted in its entirety.

SECTION 3. Chapter 19, Water and Sewers, Article VI, Stormwater Quality is added to read as follows:

ARTICLE VI. STORMWATER QUALITY

Sec. 19-141.Definitions.

As used in this article "industrial stormwater" means stormwater runoff from a site with industrial activities, as defined under 40 CFR Section 122.26(a)(14) U.S. Environmental Protection Agency regulation.

As used in this article "construction sites" refers to all sites.

As used in this article, "illicit discharge" is any discharge of anything other than stormwater to the municipal separate storm sewer system (MS4) or the waters of the State of Florida or the United States.

As used in this article "industrial wastewater" refers to liquids used by an entity in their course of business, that if discharged to the MS4, would degrade the quality of stormwater.

Sec. 19-142. Disposal of industrial stormwater discharges.

The following types of discharges to the municipal separate storm sewer of the city must be controlled as indicated.

(1) **Industrial wastewater/illicit discharge**: Industrial wastewater/illicit discharge may not be discharged to the city's municipal separate storm sewer system.

(2) **Industrial stormwater**: As required to comply with NPDES regulations, the quality of industrial stormwater which is discharged through the city's municipal separate storm sewer system may be subject to regulation or permitting, and any violation of such regulation or permit may be subject to an order to immediately cease such discharge.

Sec. 19-143. Runoff stormwater and Best Management Practice (BMPs) for construction sites.

BMPs shall be implemented as necessary, to insure that all discharges from construction activities are in compliance with the City of Venice EPA/NPDES Stormwater Permit and the Stormwater Master Plan, or the SWFWMD Permit or EPA's/NPDES Construction Activity General Permit, whichever is most stringent in its requirements.

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Best Management Practices include but are not limited to, the following requirements:

(a) All site grading shall be conducted in such a manner that all stormwater management facilities located adjacent to the site are not altered in any way which will diminish their designated flow or pollutant removal capacity or the shape of the drainage facility.

(b) Maintenance of vegetative buffers or use of a silt fence and/or staked hay bales which minimize erosion and retain sediment on site, shall be implemented prior to any construction activities taking place at sites which discharge to surface water or the municipal separate storm sewer system (MS4). These controls, when utilized, shall be secured and properly maintained during construction activities until the site has been stabilized with sod and/or seed and mulch. A double silt fence may be required as an additional measure to insure that discharges from the site are in compliance with water quality standards as established by the EPA/NPDES Stormwater Permit. Undisturbed vegetative buffers shall be maintained intact to the maximum extent possible to reduce erosion and the discharge of sediment from stormwater runoff. All areas of exposed soil shall be stabilized within 72 hours of attaining final grade.

(c) Storm sewer systems (e.g. inlets, pipes and ditches, etc.) adjacent to the site must be protected by a silt fence and/or staked hay bales during construction, to keep solids from entering conveyance systems.

(d) Vehicles such as concrete or dump trucks and other construction equipment shall not be washed at locations where the runoff will flow directly into a lake, wetland, watercourse or stormwater conveyance system. Special areas must be designated for washing vehicles. In all new subdivisions, a wash area may be established by the owner/developer which can be used by the site contractor and home builders. If established, wash areas shall be located where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Gravel or rock bases are recommended for temporary holding or seepage basins, to minimize mud generation. Underdrains shall be installed where infiltration basins are provided as required by the owner/developer's engineer or the Southwest Florida Water Management District. Upon completion of the project, the wash areas shall be graded and stabilized and any trash or waste shall be collected and disposed of properly.

(e) Fuel, chemicals, cements, solvents, paints, topsoil, or other potential water pollutants shall be stored in areas where they will not cause runoff pollution. Toxic chemicals and materials, such as pesticides, paints, and acids, must be stored in accordance with manufacturer's guidelines. Groundwater resources shall be protected from leaching by placing a plastic mat, packed clay, tar paper, or other impervious material on any areas where toxic liquids are to be opened and stored.

(f) A minimum of one permitted driveway must be established prior to construction and shall be used as the only access for ingress/egress during construction in order to provide minimum disturbance of drainage facilities and vegetative cover on site.

Sec. 19-44. Owner responsibility for stormwater runoff.

(a) The control of stormwater runoff is the responsibility of each individual property owner.

(b) Any property owner constructing or causing to be constructed any building which requires an elevated slab and

the elevation of the building pad is higher than that of adjoining properties, will control stormwater runoff during construction. Likewise, any property that is filled more than twelve inches above the adjacent property must provide additional control measures for stormwater during construction. Upon completion of the work, all stormwater runoff shall flow to its natural preconstruction drainage swale, ditch, etc., or be retained in a retention or detention pond(s) designed and constructed for that purpose.

(c) For any construction where the elevation of the building pad or site fill will be higher than adjoining properties, construction plans certified by a professional engineer registered with the State of Florida, retained by the property owner, will be provided to the City prior to issuance of a building permit.

(d) Any single lot not covered under Southwest Florida Water Management District rules, exceeding forty-five percent in impervious coverage (including buildings, drives, sidewalks, patios, etc.) shall require stormwater retention facilities to be designed by a Florida registered engineer. The design is to meet the City of Venice EPA/NPDES Permit requirements for quantity and quality of treatment.

(e) The property owner's engineer will be required to certify to the City Engineer that construction was completed in accordance with the certified plans, prior to issuance of a Certificate of Occupancy.

(f) All improvements to property affecting stormwater drainage must be done in compliance with the City's

Comprehensive Plan.

Sec. 19-145. Illicit discharges.
It shall be unlawful for any person to discharge anything other than stormwater into the city's municipal separate storm sewer system whether such discharges occur through piping connections, runoff, exfiltration, infiltration, seepage, or leaks. No person may maintain, use, or establish any direct or indirect connection to any storm sewer owned by the city that results in any discharge in violation of any provision of federal, state, city, or other law or regulation. This provision is retroactive to January 1, 1995 and applies to connections made prior to the effective date of this provision, regardless of whether made under a permit, or other authorization, or whether permissible under laws or practices applicable or prevailing at the time the connection was made.
No materials other than those composed entirely of stormwater shall be disposed of, dumped, or spilled into the city's municipal separate storm sewer system, whether such materials are in a solid or liquid form.

Sec. 19-146. Inspections.
It shall be the duty of the city engineer or designee to carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance with this article.

SECTION 4. Chapter 15, Streets and Sidewalks, Article IV, Excavations, Section 15-53, Storm Drainage and Pollution, is deleted in its entirety.

SECTION 5. To the extent of any conflict between the provisions of this Ordinance, and any other Ordinance, Resolution, or Agreement of the City of Venice, Florida, the provisions of this Ordinance shall prevail.

SECTION 6. Severability. If for any reason a provision of this Ordinance or the application thereof to any person, group of persons, or circumstances is held invalid, the invalidity shall not effect other provisions or applications of the Ordinance which can be given effect without the invalid provision or application, and to this end the provisions of the Ordinance are severable.

SECTION 7. Effective Date. This Ordinance shall take effect immediately upon its adoption, as required by law.

PASSED BY THE COUNCIL OF THE CITY OF VENICE, FLORIDA, THIS 23RD DAY OF MAY, 1995.
First Reading: May 9, 1995 - Final Reading: May 23, 1995 - ADOPTION: May 23, 1995

ATTEST: /s/LORI STELZER, CMC,CITY CLERK /S/ MERLE L. GRASER, MAYOR

I, LORI STELZER, City Clerk of the City of Venice, Florida, a municipal corporation in Sarasota County, Florida, do hereby certify that the foregoing is a full and complete, true and correct copy of an Ordinance duly adopted by the Venice City Council, at a meeting thereof duly convened and held on the 23rd day of May, 1995, a quorum being present.

WITNESS my hand and the official seal of said City this 24th day of May, 1995.

/S/ LORI STELZER, CMC, CITY CLERK

Approved as to form: /S/ ROBERT C. ANDERSON, CITY ATTORNEY

ORDINANCE 96-09

AN ORDINANCE OF THE CITY OF VENICE, FLORIDA, AMENDING THE CODE OF ORDINANCES BY AMENDING CHAPTER 19, WATER AND SEWERS, ARTICLE VI, STORMWATER QUALITY, SECTION 19-141, DEFINITION FOR INDUSTRIAL STORMWATER, SECTION 19-146, INSPECTIONS, PROVIDING FOR CONFLICT WITH OTHER ORDINANCES; PROVIDING FOR A SEVERABILITY CLAUSE AND PROVIDING AN EFFECTIVE DATE.
WHEREAS, the City of Venice is responsible for the conservation, management, protection, control, use and enhancement of stormwater within its corporate limits, and for the acquisition, management, maintenance, extension, and improvement of the stormwater systems in the City; and
WHEREAS, the Environmental Protection Agency/National Pollutant Discharge Elimination System (EPA/NPDES)

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permit requires certain amendments to the existing Ordinance and extension of inspection authority on private properties.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF VENICE, FLORIDA:
SECTION 1. Chapter 19, Water and Sewers, Article VI, Stormwater Quality, Section 19-141, Definition, for Industrial Stormwater is amended to read as follows:

Sec. 19-141. Definitions.
As used in this article, "industrial stormwater" means stormwater runoff from a site with industrial activities, as defined under 40 CFR Section 122.26 (~~a~~) (b) (14), U.S. Environmental Protection Agency regulation.

SECTION 2. Chapter 19, Water and Sewers, Article VI, Stormwater Quality, Section 19-146, Inspections, is amended to read as follows:

Sec. 19-146. Inspections.
It shall be the duty of the city engineer or designee to carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance with this article. The city engineer or his duly authorized agents may enter at all reasonable times in or upon any private or public property for the purpose of inspecting and investigating conditions and practices which may be a violation of this ordinance, regulation or permit. The city engineer may, whenever necessary, make an inspection of construction sites to enforce any of the provisions of this ordinance, regulation or permit issued hereunder, or whenever an authorized official has reasonable cause to believe there exists any condition constituting a violation of this ordinance, regulation or permit issued hereunder. The city engineer shall inspect the work and shall require the owner to obtain services to provide adequate on-site inspection. If the city engineer finds that eroded soils are leaving the construction site, the city engineer may direct the owner(s) or his agents or his contractor on the site by written order to install any and all erosion controls that are deemed necessary to prevent said soil erosion from migrating off site. Notwithstanding the existence or pursuit of any other remedy,

the City may maintain an action in its own name in any court of competent jurisdiction for an injunction or other process against any person to restrain or prevent violations of this ordinance.

SECTION 3. To the extent of any conflict between the provisions of this Ordinance, and any other Ordinance, Resolution, or Agreement of the City of Venice, Florida, the provisions of this Ordinance shall prevail.

SECTION 4. Severability. If for any reason a provision of this Ordinance or the application thereof to any person, group of persons, or circumstances is held invalid, the invalidity shall not effect other provisions or applications of the Ordinance which can be given effect without the invalid provision or application, and to this end the provisions of the Ordinance are severable.

SECTION 5. Effective Date. This Ordinance shall take effect immediately upon its adoption, as required by law.

PASSED BY THE COUNCIL OF THE CITY OF VENICE, FLORIDA, THIS 26TH DAY OF MARCH, 1996.
First Reading: March 12, 1996 - Final Reading: March 26, 1996 - ADOPTION: March 26, 1996

ATTEST: /s/LORI STELZER, CMC,CITY CLERK /S/ MERLE L. GRASER, MAYOR

I, LORI STELZER, City Clerk of the City of Venice, Florida, a municipal corporation in Sarasota County, Florida, do hereby certify that the foregoing is a full and complete, true and correct copy of an Ordinance duly adopted by the Venice City Council, at a meeting thereof duly convened and held on the 26th day of March, 1996, a quorum being present.

WITNESS my hand and the official seal of said City this 27th day of March, 1996.

/S/ LORI STELZER, CMC, CITY CLERK

Approved as to form: /S/ ROBERT C. ANDERSON, CITY ATTORNEY.

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STATEMENT OF REFERENCES FOR CONTRACTOR

NAME OF CONTRACTOR:_____

BUSINESS ADDRESS:_____

How many years have you been engaged in the business under the present firm name?_____

List previous business experience:_____

_____

List at least three construction references:

(1) Person to contact:_____

Company Name:_____

Address:_____

Telephone:_____Date work performed:_____

(2) Person to contact:_____

Company Name:_____

Address:_____

Telephone: _____ Date work performed: _____

(3) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

(4) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

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CONTRACTOR'S STATEMENT OF SUBCONTRACTORS TO BE USED FOR THIS WORK

NAME OF CONTRACTOR: _____

BUSINESS ADDRESS: _____

LIST SUBCONTRACTORS TO BE USED IN THE PROJECT:

(1) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet: _____

(2) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet: _____

(3) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

(4) Company Name:_____

Address:_____

Telephone: _____ Phase of Work Sublet _____

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DRUG FREE WORKPLACE CERTIFICATION

If identical tie bids exist, preference will be given to the vendor who submits a certification with their bid/proposal certifying they have a drug-free workplace in accordance with Section 287.087, Florida Statutes. The drug-free workplace preference is applied as follows:

IDENTICAL TIE BIDS: Preference shall be given to businesses with drug-free workplace programs. Whenever two or more bids, which are equal with respect to price, quality, and service, are received by the State of by any political subdivision for the procurement of commodities or contractual services, a bid received from a business that certifies that it has implemented a drug- free workplace program shall be given preference in the award process. Established procedures for processing tie bids will be followed if none of the tied vendors have a drug-free workplace program.

As the person authorized to sign this statement, I certify that this firm complies fully with the following requirements:

1) This firm publishes a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2) This firm informs employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

3) This firm gives each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection (1).

4) In the statement specified in subsection (1), this firm notifies the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

5) This firm imposes a sanction on or requires the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.

6) This firm will continue to make a good faith effort to maintain a drug-free workplace through implementation of this section.

_____

Contractor's Name Signature

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NON-COLLUSIVE AFFIDAVIT

State of _____

County of _____ } SS.

_____ being first duly sworn, deposes and says that:

1. He/she is the _____, (Owner, Partner, Officer, Representative or Agent) of _____ the Offeror that has submitted the attached Proposal;

2. He/she is fully informed respecting the preparation and contents of the attached Proposal and of all pertinent circumstances respecting such Proposal;
3. Such Proposal is genuine and is not a collusive or sham Proposal;
4. Neither the said Offeror nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Offeror, firm, or person to submit a collusive or sham Proposal in connection with the Work for which the attached Proposal has been submitted; or have in any manner, directly or indirectly sought by agreement or collusion, or have in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference with any Offeror, firm, or person to fix the price or prices in the attached Proposal or of any other Offeror, or to fix any overhead, profit, or cost elements of the Proposal price or the Proposal price of any other Offeror, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposal Work.

Signed, sealed and delivered
in the presence of:

_____By: _____
(Witness)

_____ _____
(Witness) (Printed Name, Title)

ACKNOWLEDGEMENT

State of _____

County of _____

On this the _____ day of _____, 2018, before me, the undersigned Notary Public of the State of _____, personally appeared _____ and (Names of individual(s) who appeared before Notary) whose name(s) in/are Subscribed to within instrument, and he/she/they acknowledge that he/she/they executed it.

_____
NOTARY PUBLIC, STATE OF FLORIDA

NOTARY PUBLIC
SEAL OF OFFICE:

_____
(Name of Notary Public: Print, stamp, or type as commissioned)

☐ **Personally, known to me, or** ☐ **Produced Identification**: _____

☐ **DID take an oath, or** ☐**DID NOT take an oath**

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

PUBLIC ENTITY CRIME INFORMATION

Project: Construction of Aircraft Wash Rack Facility

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals, or replies on leases of real property to a public entity; may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in s. 287.017, F.S. for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted vendor list.

I, _____, being an authorized representative of the firm of _____, located at City: _____
State:_____Zip:_____, have read and understand the contents of the Public Entity Crime Information and hereby submit our proposal accordingly.

_____	_____
Authorized Signature	Printed Name, Title
_____	_____
Date	Federal ID No.
_____	_____
Phone	Fax

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

CONFLICT/NON-CONFLICT OF INTEREST AND LITIGATION STATEMENT

CHECK ONE

☐ To the best of our knowledge, the undersigned Offeror has no potential conflicts of interest due to any other clients, contracts, or property interest for this project.

OR

☐ The undersigned Offeror, by attachment to this form, submits information which may be a potential conflict of interest due to other clients, contracts, or property interest for this project.

LITIGATION STATEMENT

IN FLORIDA ONLY, JUDGMENTS AGAINST THE FIRM, AND SUITS AGAINST CITY OF VENICE. INCLUDE ACTIONS AGAINST THE FIRM BY OR AGAINST ANY LOCAL, STATE, OR FEDERAL REGULATORY AGENCY.

CHECK ONE

☐ The undersigned Offeror has had no litigation adjudicated against the Offeror on any projects in the last five (5) years and has filed no litigation against City of Venice in the last five (5) years.

OR

☐ The undersigned Offeror, BY ATTACHMENT TO THIS FORM, submits a summary and disposition of individual cases of litigation in Florida adjudicated against the Offeror during the past five (5) years; all legal actions against City of Venice during the past five (5) years; and actions by or against any Federal, State and local agency during the past five (5) years.

Company Name:
_____

Authorized Signature:
_____

Name (print or type):
_____

Title:
_____

Failure to check the appropriate blocks above may result in disqualification of your proposal. Failure to provide documentation of a possible conflict of interest, or a summary of past litigation, may result in disqualification of your Proposal. Should additional information regarding the above items come to the attention of City of Venice after award, the awarded contract shall be subject to immediate termination.

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

CERTIFICATION REGARDING LOBBYING

The bidder or offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

As the person authorized to sign the statement, I certify that this Firm complies fully with the above requirements.

Firm Name

Name and Title of Authorized Individual

Authorized Signature Date

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

E-VERIFICATION CERTIFICATION

Project: Construction of Aircraft Wash Rack Facility

The Vendor/Contractor acknowledges and agrees to the following:

The Vendor/Contractor certifies, by submission of this proposal or acceptance of this contract, that the Vendor/Contractor:

1. Shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the Vendor/Contractor during the term of the contract; and

2. Shall expressly require any subcontractors performing work or providing services pursuant to the state contract to likewise use the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the contract term.

Further information can be found at the following website: http://www.uscis.gov/e-verify.

_____
Firm Name

_____
Name of Authorized Individual

_____
Authorized Signature Date

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

PROHIBITION of SEGREGATED FACILITIES

Project Name: Construction of Aircraft Wash Rack Facility

The contractor must comply with the requirements of the E.E.O. clause by ensuring that facilities they provide for employees are free of segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin. This clause must be included in all contracts that include the equal opportunity clause, regardless of the amount of the contract.

The Prohibition of Segregated Facilities clause must be incorporated into in any contract containing the Equal Employment Opportunity clause of 41 CFR § 60.1. This obligation flows down to subcontract and sub-tier purchase orders containing the Equal Employment Opportunity clause.

(a) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Opportunity clause in this contract.

(b) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Opportunity clause of this contract.

_____
Firm Name

_____
Name of Authorized Individual

_____
Authorized Signature Date

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

PAYROLL AUTHORIZATION and DUNS NUMBER

Project Name: Construction of Aircraft Wash Rack Facility

Company Name: _____

Type *(e.g. Subcontractor, Prime Engineer, etc.)*: _____

DUNS #: _____

Person(s) Authorized to Sign Payroll Certifications: _____

_____

_____

_____ _____

Name of Authorized Individual ***Title***

_____ _____

Signature ***Date***

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

STATEMENT OF PARTICIPATION IN CONTRACTS SUBJECT TO NON-DISCRIMINATION CLAUSE

Project Name: Construction of Aircraft Wash Rack Facility

The Bidder shall complete the following statement by checking the appropriate boxes:

The Bidder has ( ) has not ( ) participated in a previous contract subject to the non-discrimination clause prescribed by Executive Order 10925, or Executive Order 11114, or Executive Order 11246.

The Bidder has ( ) has not ( ) submitted all compliance reports in connection with any such contract, due under the applicable filing requirements; and that representations indicating submission of required compliance reports signed by proposed subcontractors will be obtained prior to award of subcontracts.

If the Bidder has participated previously in a contract subject to the non-discrimination clause and has not submitted compliance reports due under applicable filing requirements, the Bidder shall submit a compliance report on Standard Form 100, "Employee Information Report, EEO-1" prior to award of the contract.

_____
Name and Title of Authorized Individual

_____
Authorized Signature

_____

_____
Date

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

EQUAL EMPLOYMENT OPPORTUNITY REPORT STATEMENT

Project Name: Construction of Aircraft Wash Rack Facility

The Bidder (Proposer) shall complete the following statement by checking the appropriate boxes. Failure to complete these blanks may be grounds for rejection of the bid:

1. The Bidder (Proposer) has _____ has not _____ developed and has on file at each establishment Affirmative Action Programs pursuant to 41 CFR 60-1.40 and 41 CFR 60-2.

2. The Bidder (Proposer) has _____ has not _____ participated in any previous contract or subcontract subject to the Equal Opportunity Clause prescribed by Executive Order 11246, as amended.

3. The Bidder (Proposer) has _____ has not _____ filed with the Joint Reporting Committee the annual compliance report on Standard Form 100 (EEO-1 Report).

4. The Bidder (Proposer) does _____ does not _____ employ fifty (50) or more employees.

_____
Name and Title of Authorized Individual

_____
Authorized Signature

_____
Date

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

BIDDER QUALIFICATION STATEMENT

(Completion of this statement is required in advance of consideration for award of Contract.)

SUBMITTED TO:

City of Venice
401 West Venice Avenue
Venice, FL 34285

SUBMITTED FOR:

Construction of Aircraft Wash Rack Facility

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

SUBMITTED BY:

Name of Organization: _____
(Print or Type Name of Bidder)

Name of Individual: _____

Title: _____

Business Address: _____

_____

Telephone No.: _____

Fax No.:_____

E-mail Address:_____

Bidder's Website:_____

If address and phone number given above is for a branch office, provide address and phone number of principal home office:

Principal Home Office Address:_____

_____

Principal Home Office Telephone No._____

Ladies and Gentlemen:

The undersigned certifies under oath the truth and correctness of all statements and of all answers to questions made hereinafter.

(Note: Attach additional sheets as required.)

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

1.0 Bidder's General Business Information

1.1 Check if:

☐ Corporation ☐ Partnership ☐ Joint Venture ☐ Other

☐ Limited Liability Company ☐ Sole Proprietorship

If Corporation:

A. Date and State of Incorporation:

_____
_____

B. List of Executive Officers:

Name Title Address

_____
_____
_____
_____

If Partnership:

A. Date and State of Organization:

_____
_____

B. Current General Partners (name and address for each):

_____
_____

C. Type of Partnership

☐ General ☐ Publicly Traded ☐ Limited

☐ Limited Liability ☐ Other (describe): _____

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

If Joint Venture:

A. Date and State of Organization:

_____
_____

B. Name, Address, Form of Organization, and State of Organization of Each Joint Venture Partner: (Indicate with an asterisk (*) the managing or controlling Joint Venture if applicable):

_____
_____
_____
_____
_____

If Limited Liability Company:

A. Date and State of Organization:

_____
_____

B. Members:

Name Address

_____
_____
_____
_____

If Sole Proprietorship:

A. Date and State of Organization:

_____
_____

B. Name and Address of Owner or Owners:

_____
_____
_____

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

If Other Type of Organization:

A. Type of Organization:_____

B. Date and State of Organization:

_____
_____

C. Name and Address of Each Owner or Principal:

_____
_____
_____
_____

1.2 Certifications: In addition to the above categories of business entities, indicate whether Bidder's organization is a:

- ☐ Disadvantaged Business Enterprise, certified by _____
- ☐ Minority Business Enterprise, certified by _____
- ☐ Women's Business Enterprise, certified by _____
- ☐ Historically Underutilized Business Zone Small Business Concern, certified by _____

2.0 How many years has your organization been in business as a general contractor? _____

3.0 If your organizational structure has changed within the past five years, provide data as listed above in Item 1.0 for your previous organization.

4.0 Do you plan to subcontract any part of this project? _____ If so, give details.

5.0 Has any construction contract to which you have been a party been terminated by the owner; have you ever terminated work on a project prior to its completion for any reason; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with a contract for which they furnished a bond on your behalf? If the answer to any portion of this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

6.0 Has any officer or partner of your organization ever been an officer or partner of another organization that had any construction contract terminated by the owner; terminated work on a project prior to its completion for any reason; had any surety which issued a performance bond complete the work in its own name or financed such completion; or had any surety expend any monies in connection with a contract for which they furnished a bond? If the answer to any portion of this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

7.0 In the last five years, has your organization, or any predecessor organization, failed to substantially complete a project in a timely manner? If the answer to this question is “yes”, furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

8.0 On Schedule A, attached, list name, location and description of project, owner, architect or engineer, contract price, percent complete and scheduled completion of the major construction projects your organization has in progress on this date. Provide name, address and telephone number of a reference for each project listed.

9.0 On Schedule B, attached, list name, location and description of project, owner, architect or engineer, contract price, date of completion and percent of work with your own forces of major projects of the same general nature as this project which your organization has completed in the past five years. Provide name, address and telephone number of a reference for each project listed.

10.0 On Schedule C, attached, list name and construction experience of the principal individuals of your organization directly involved in construction operations.

11.0 Licenses and Registrations:

11.1 Indicate the jurisdictions in which your firm is legally qualified to practice. Indicate license or registration number for each jurisdiction, if applicable, and type of license or registration. Attach separate sheet as required.

Jurisdiction	License/Registration No.	Type

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

11.2 In the past five years, has Bidder had any business or professional license suspended or revoked?

☐ No ☐ Yes

If yes, describe on a separate attachment the circumstances, including the jurisdiction and bases for suspension or revocation.

12.0 Provide the following information for your surety:

12.1 Surety Company: _____

12.2 Agent: _____

A. Address: _____

B. Telephone No.:_____

13.0 Provide the following with respect to an accredited banking institution familiar with your organization.

13.1 Name of Bank:_____

13.2 Address:_____

13.3 Account Manager:_____

13.4 Telephone No.:_____

14.0 Provide the name, address and telephone number of an individual who represents a major equipment/material supplier whom the Owner may contact for a financial reference:

15.0 Industry Affiliations, Memberships, Awards, and Honors

15.1 List below the industry organizations with which your organization is affiliated or which your organization is a member:

15.2 List below the industry awards or honors received by your organization and the date for each. Attach supporting documentation as necessary.

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

16.0 Statement of Potential Conflicts of Interest: List below business associations, financial interests, or other circumstances that may create a conflict of interest with the Owner or other entity involved in the Project. Attach additional documentation as required.

17.0 Dated at _____, this _____ day of _____, 2018.

Bidder: _____

(Print or Type Name of Bidder)

By: _____

Title:_____

Attachments A, B and C

(Seal, if corporation)

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

----------(Affidavit for Individual)----------

_____ being duly sworn, deposes and says that:
a) the financial statement, taken from his/her books, is a true and accurate statement of his/her financial condition as of the date thereof; and b) all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Partnership)----------

_____ being duly sworn, deposes and says that:
a) he/she is a member of the partnership of _____;
b) he/she is familiar with the books of said partnership showing its financial condition; c) the financial statement, taken from the books of said partnership, is a true and accurate statement of the financial condition of the partnership as of the date thereof; and d) all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Corporation)----------

_____ being duly sworn, deposes and says that: a) he/she is _____ of _____;
(Full name of Corporation)
b) he/she is familiar with the books of said corporation showing its financial condition; c) the financial statement, taken from the books of said corporation, is a true and accurate statement of the financial condition of said corporation as of the date thereof; and d) that all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Limited Liability Company (LLC))----------

_____ being duly sworn, deposes and says that: a) he/she is _____ of _____;
(Full name of LLC)
b) he/she is familiar with the books of said company showing its financial condition; c) the financial statement, taken from the books of said company, is a true and accurate statement of the financial condition of said company as of the date thereof; and d) that all of the foregoing qualification information is true, complete, and accurate.

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

----------(Affidavit for Joint Venture)----------

Each joint venture shall complete the affidavit appropriate for the joint venture's type of organization and attach said affidavit to the Bidder Qualifications Statement. Submit separate acknowledgement for each joint venture's affidavit.

---------- (Acknowledgment) ----------

_____ being duly sworn, deposes and says

that he/she is _____ of _____;

(Name of Bidder)

that he/she is duly authorized to make the foregoing affidavit and that he/she makes it on behalf of

( ) himself/herself; ( ) said partnership; ( ) said corporation;

( ) said joint venture; ( ) said limited liability company

Sworn to before me this _____ day of _____, 2017, in the County of _____, State of _____.

_____

(Notary Public)

My commission expires _____

(Seal)

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

ATTACHMENT A

SCHEDULE A
PROJECTS IN PROGRESS

Name, Location and Description of Project	Owner	Architect or Engineer	Contract Price	Percent Complete	Scheduled Completion	Reference/Contract Include Address and Phone

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

ATTACHMENT B

SCHEDULE B
PROJECTS COMPLETED

Name, Location and Description of Project	Owner	Architect or Engineer	Date Completed	Contract Price	Percent with Own Forces	Reference/Contract Include Address and Phone

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

ATTACHMENT C

SCHEDULE C
PERSONNEL

Name	Position	Date Started With This Organization	Date Started In Construction	Prior Positions and Experience In Construction

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

STANDARD FORMS

City of Venice
401 West Venice Ave., Venice, FL 34285
941-486-2626
DEVELOPMENT SERVICES - ENGINEERING/STORMWATER

PERMIT APPLICATION

Date _____

Property Owner _____ Phone _____

Project Name _____ Building Permit # _____

Project Address _____

Contractor _____ License # _____ Phone _____

Engineer _____ Phone _____

Surveyor _____ Phone _____

On-site superintendent _____ Phone _____

Fax _____ Mobile or Construction Site Phone _____

Agent _____ Phone _____

Agent Address _____

Individual responsible for maintenance of erosion controls _____

Phone _____ Mobile _____ Fax _____

Total Impervious Area _____ Lot size _____ Acres _____

Scope of improvements

Commencement Date _____ Completion Date _____ Not valid after _____

	PERMIT TYPE:	Account #	Fees *payable at Cashier's Counter*	Extension
	Construction Permit (review)	001-0000-329.11-01	$200.00	
	Construction Permit (modification)	001-0000-329.11-02	$50.00	
	Site Prep Permit Minor	001-0000-329.11-03	$25.00	
	Site Prep Permit Other	001-0000-329.11-03	$100.00	
	Property Addition		No charge	
	Right of Way Use Minor	001-0000-329.11-04	$50.00	
	Right of Way Use Other	001-0000-329.11-04	$200.00	
	Right of Way Use Building Permit	001-0000-329.11-04	$20.00	
	License Application Required	001-0000-329.11-05	$150.00	
			TOTAL	

☐ Acknowledgement of paver guideline (if applicable)

I certify that the foregoing information is accurate and that all work will be done in accordance with all applicable laws including Section 74 of the Venice City Ordinances, Municipal Code Sec. 62-1 through 62-126, 86-423 and all other applicable City Ordinances. I understand that improvements must be constructed in accordance with applicable City Standard Details and that I am responsible for the maintenance and replacement of all improvements that are installed in the City of Venice ROW.

Applicant Signature _____

Permit Approved Date _____ Authorized by City Rep. _____

SEE REVERSE SIDE FOR REQUIREMENTS

Revised 4/7/14

REQUIREMENTS

CONSTRUCTION PERMIT (review/modification)

In accordance with Municipal Code; "A Florida registered professional engineer shall be employed to design and inspect the installation of all required improvements such as streets, sidewalks, drainage structures, bridges, bulkheads, and water and sewerage (waste water and reclaimed water) facilities. All plans for improvements shall be prepared by such engineer and approved by the city engineer prior to construction. All survey monuments shall be installed as required in F.S. ch177."

Complete cover sheet and submit with all plans, specifications, information and data necessary to determine the character of the improvements; including but not limited to:

- Construction plans in accordance with City Standard Details
- Construction schedule

Copies of all applicable permits and approved plans from agencies, such as SWFWMD, FDEP, NPDES NOI Letter & SWPPP, County or FDOT must be submitted to the City Engineer prior to commencement of any construction activities.

A representative of the City Engineer's Office will inspect/verify installation of items that will be turned over to the City for operation and maintenance. The Owner/ Developer will be billed for inspection services. The City Utilities Department will TV sanitary sewer lines and report to the City Engineer. The Owner/ Developer will be billed for the TV inspection.

SITE PREP PERMIT

Municipal Code Section 74-264 Best Management Practices for Construction Sites, specifies that before any activity such as removal of vegetation, site grading, delivery of fill, or ground breaking, the property owner or his agent will meet certain requirements. These requirements apply to all construction sites, regardless of size.

1. In all cases, an erosion and sediment control plan is required. The plan must include a description of controls that will be used at the site, e.g., erosion/sediment controls and vehicle tracking controls; a description of maintenance and inspection procedures; contact person and phone #. (Single family residences are exempt from this item)

2. Copies of all applicable permits and approved plans from agencies, such as SWFWMD, FDEP, NPDES NOI Letter & SWPPP, County or FDOT must be submitted to the City Engineer prior to commencement of any construction activities.

3. Per City Code Sec. 74-265 a completed Certificate of Construction must be provided to the Engineering Dept. prior to receiving a certificate of occupancy.

Locates are required per Florida statutes. Copy of County tree permit required.

PROPERTY ADDITIONS

1. A topographic survey with improvements signed and sealed by a Florida licensed professional land surveyor is required. The required topographic survey shall include the proposed finished floor of the addition, the elevations of the adjacent lots, and the finished floor elevation of any existing structures located on the subject parcel and adjacent lots.

2. A site and drainage plan signed and sealed by a Florida licensed professional engineer must be submitted for review and approval by the city engineering department if the elevation of the building pad or site fill will be higher than adjoining properties.

3. Any single lot, not covered under Southwest Florida Water Management District rules, exceeding 45 percent in impervious coverage (including buildings, drives, sidewalks, patios, pools, pavers, etc.) shall require stormwater retention facilities to be designed by a Florida licensed professional engineer. The design shall meet the city EPA/NPDES permit requirements for quantity and quality of treatment.

RIGHT OF WAY USE RIGHT OF WAY USE AUTHORIZATION (minor/other)

The following affected utilities will be notified (required by Florida Statutes):

1. SUNSHINE ONE CALL: 1-800-432-4770 2. CITY OF VENICE PUBLIC WORKS: (941) 486-2422 or (941) 486-2626

MINIMUM 24 HOURS NOTICE REQUIRED FOR INPECTION REQUESTS

Inspection of concrete forms is required prior to concrete pour.

***Minor**: **Single Family Residential:** curb cuts, landscaping (homeowner), driveways.*

LICENSE APPLICATION REQUIRED

License agreement cannot be processed without the following:

- ❖ **Completed Right-of-Way Application – (**additional fee required)
- ❖ **Completed License Agreement Section**
  - The city easement / right-of-way being encroached upon must be specifically described.
  - The improvements to be constructed within the easement / right-of-way must be specifically described (for example, a four foot high masonry wall twenty-two feet in length).
  - The property owner(s) as stated on the deed must sign the agreement.

Property owner should provide:

- ❖ **3** copies of each of the following for both residential and commercial projects:
  - **Deed**
  - **Construction Plans**
  - **Certificate of Insurance showing liability coverage –**
    Insurance Accord for:
    - ***Residential:*** $100,000
    - ***Commercial:*** $1 million and name City of Venice as additional insured

❖ **2** copies of the **As-built / record drawings** (signed and sealed by a Florida licensed professional engineer, landscape architect or land surveyor) of the improvements (within 30 days of completion of the construction)

City of Venice

401 West Venice Ave., Venice, FL 34285
941-486-2626

DEVELOPMENT SERVICES - ENGINEERING/STORMWATER

APPLICANT'S ACKNOWLEDGEMENT OF COMPLETION

Date _____

Property Owner _____ Phone _____

Project Name _____ Building Permit # _____

Project Address _____

APPLICANT'S ACKNOWLEDGEMENT OF COMPLETION:
I have examined the work site for which this authorization was issued. The work has been completed in accordance with approved plans. The work site and all other affected property have been restored to the condition existing prior to construction.

Signature (applicant) _____ Date _____

Signature (city inspector) _____ Date _____

Comments: _____

REQUEST FOR INFORMATION

PROJECT: _____ **NUMBER:** _____

TO: _____ **FROM:** _____

RE: _____ **DATE:** _____

Specification Section: _____ Paragraph: _____ Drawing Reference: _____ Detail: _____

Request:

Signed by: _____ Date: _____

Response:

Attachments

Response From: _____ To: _____ Date Rec'd: _____ Date Ret'd: ___

Signed by: _____ Date: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ _____ ☐ File

FIELD INSTRUCTION

PROJECT: _____ **NUMBER:** _____
TO: _____ **FROM:** _____
RE: _____ **DATE:** _____

FI DESCRIPTION: _____
APPLICABLE DRAWING(S): _____
APPLICABLE SPECIFICATION(S): _____
APPLICABLE SHOP DRAWING(S): _____

This field instruction is interpreted to be within the scope of the referenced contract and as such is not an authorization for additional work or time.

☐ Response to RFI
☐ Field Observation
☐ Other (Contractor Requested Information)

Reason for Instructions:

Instructions:

Design Professional: _____

Signed: _____ Date: _____

Contractor Acknowledgment: _____

Signed: _____ Date: _____

FIELD BULLETIN

PROJECT: _____ **NUMBER:** _____
TO: _____ **FROM:** _____
RE: _____ **DATE:** _____

FB DESCRIPTION: _____
APPLICABLE DRAWING(S): _____
APPLICABLE SPECIFICATION(S): _____
APPLICABLE SHOP DRAWING(S): _____

This bulletin is not a change in the above contract nor an authorization to the contractor to perform work, other than contract work, or to stop or suspend work unless specifically authorized by this bulletin. However, it covers certain proposed modifications to the work covered by said contract.

Cause:

Detailed Description:

A/E Firm: ☐ Name (Architectural) ☐ Name (Civil) ☐ Name (Structural)
☐ Name (Mechanical) ☐ Name (Electrical) ☐ Name (Plumbing)

Originator: _____ Signature: _____ Date: _____

Remarks: _____

Response by: _____ Signature: _____ Date: _____

CONSTRUCTION CHANGE PROPOSAL

PROJECT: _____ **NUMBER:** _____
TO: _____ **FROM:** _____
RE: _____ **DATE:** _____

KEYWORD DESCRIPTION: _____
DATE QUOTATION REQUIRED: _____

The following modification to the contract has been identified. Pursuant to the General Conditions, please provide a proposal as described in Item 1. The proposal should include an itemized breakdown of contractor and subcontractor costs, including labor, materials, rentals, approved services, overhead, and profit as required in General Provisions SP 9. This request shall not be considered authorization to proceed with the work herein described.

To be completed by Initiator of Request:

1. Scope of Work: (include list of attachments)

2. Reason(s) for Modification: ☐ Owner ☐ Unforeseen Conditions (site, weather, etc.) ☐ Other

3. Approval of Request:

Owner: _____ Date: _____

Engineer: _____ Date: _____

To be completed by Contractor:

4. Total cost of modification (attach detailed breakdown) $ _____

5. Will a modification to the contract time be required? ☐ Yes ☐ No

If so, trade(s): _____

No. of personnel: _____

Duration: _____ (calendar days)

6. Attachment identification: (list) _____

7. Quotation is in effect until: (date) _____

8. Approval of Quotation: _____

Contractor: _____ Date: _____

Complete and attach Proposal Worksheet Detail for each element of Work. Enter Worksheet Information below.

CONSTRUCTION CHANGE PROPOSAL CONT.
PROPOSAL WORKSHEET SUMMARY

***Labor shall be broken down by classification**

ADDITIONS:

Item	Sheet	Description	Material		
			Unit Qty	Unit Price	**Subtotal**
			Subtotal Material		
			***Labor**		
			Hours	Rate	**Subtotal**
			Subtotal Labor		
		Subtotal:			

DEDUCTIONS:

Item	Sheet	Description	Material		
			Unit Qty	Unit Price	**Subtotal**
			Subtotal Material		
			***Labor**		
			Hours	Rate	**Subtotal**
			Subtotal Labor		
		Subtotal:			

Subcontractor's Net: _____

Subcontractor's OH&P: _____

Subcontractor's Bond: _____

Subcontractor's Total: $ -

Contractor's OH&P: _____

Contractor's Bond: _____

Insurance: _____

Tax: _____

Worksheet Total: $ -

City on the Gulf
Venice, Florida

CHANGE ORDER

CONTRACT: _____ **CHANGE ORDER NO:** _____

CONTRACTOR: _____ **BID NO:** _____

_____ **PROJECT NO:** _____

_____ **CONTRACT DATE:** _____

☐ TIME CHANGE ☐ EXTRA WORK ☐ CREDIT ☐ OTHER

The CONTRACTOR is hereby authorized and directed to make the following changes and modifications to the aforesaid Contract in accordance with all requirements applicable thereto.

DESCRIPTION OF CHANGE:	**COST IMPACT**	**DAYS**
1.		

The original Contract Sum (TOTAL BID PRICE) was . . . . . $_____
Net change by previous Change Orders . . . . . $_____
The Contract Sum prior to this Change Order was . . . . . $_____

The Contract Sum will be _____ by this Change Order . . . . . $_____
(increased, decreased or unchanged)
The new Contract Sum including this Change Order will be . . . . . $_____

The Final Completion Milestone prior to this Change Order was ____ calendar days.
The time for the Final Completion Milestone for the entire project, inclusive of this change order, will be extended by - - calendar days.

The Final Completion Milestone as of this Change Order is therefore _____.

The Contractor waives any and all claims to additional time extension and/or additional monetary compensation resulting from these changes and all cost associated with the change order as herein addressed.

Excepting those terms and provisions conflicting with this Change Order which are hereby changed to conform hereto, the aforesaid Contract as amended by all previous change orders hereto is otherwise reaffirmed in its entirety.

IN WITNESS WHEREOF, this **Change Order No.X** to _____, has been executed by the parties hereto or their duly authorized representatives.

ATTEST: Lori Stelzer, City Clerk

CITY OF VENICE

BY: _____

BY: _____
John Holic, Mayor

_____
Date of Approval

ATTEST:

CONTRACTOR:

_____
Witness

BY: _____
Authorized Signature (SEAL)

TITLE: _____

DATE: _____

(ACKNOWLEDGEMENT OF CONTRACTOR, IF A CORPORATION)

STATE OF _____)
SS

COUNTY OF _____)

On this _____ day of _____, 20____, before me, the undersigned authority, personally appeared _____, to me known to be the individual described in and who executed the foregoing instrument as _____, of _____, a _____ corporation, and who severally and duly acknowledged the execution of such instrument as such an officer aforesaid, for and on behalf of and as the act and deed of said corporation, pursuant to the powers conferred upon said officer by the corporation's Board of Directors or other appropriate authority of said corporation, and who, having knowledge of the several matters stated in said foregoing instrument, certified the same to be true in all respects.

WITNESS my hand and official seal the date aforesaid.

_____ (Signature of Notary Public – State of Florida)

_____ (Print, Type, or Stamp Commissioned Name of Notary Public)

Personally known _____ or produced identification _____

Type of identification produced _____ (NOTARY'S SEAL)

CONSTRUCTION CHANGE DIRECTIVE (CCD)

PROJECT: _____ **NUMBER:** _____
TO: _____ **FROM:** _____
RE: _____ **DATE:** _____

PROJECT NUMBER: _____
CONTRACT NUMBER: _____

Proceed with the following work on a time and material basis per Special Provision 9.

Cause for the Directive:

Description of Work:

Notification must be given to Owner prior to work commencing and work tickets must be signed daily by Owner's Representative.

Issued By: _____

Design Professional

By: _____ Date: _____

NOTE: The Contractor shall submit all documentation for payment of this work within 21 calendar days of the completion of the above referenced CCD.

CITY OF VENICE
Owner's Representative

_____ Date: _____

NOTICE OF NON-COMPLIANCE

PROJECT: _____ **NUMBER:** _____
TO: _____ **FROM:** _____
RE: _____ **DATE:** _____

KEYWORD DESCRIPTION: _____
SHOP DRAWING/SPECIFICATION REFERENCE: _____

The following item(s) is/are in non-compliance with the Contract Documents. Corrective action is to be undertaken immediately. If applicable, until corrective action is completed, no monies may be paid for the item(s) and the cost of all
corrective action shall be borne by the Contractor. Contractor corrective action applicable: YES ___ NO ___

Description of Non-Compliance:

Contractor's Corrective Action Proposal:

Approval of Corrective Action:

☐ Proposal is acceptable ☐ Need more backup data ☐ Is not acceptable/Resubmit
☐ See attached comments ☐ Submit sketch/drawings/materials/calculations
Owner: _____ Date: _____
Engineer: _____ Date: _____

Additional Action Required by Contractor:

Approval of Corrective Action:

☐ Proposal is acceptable ☐ Need more backup data ☐ Is not acceptable/Resubmit
☐ See attached comments ☐ Submit sketch/drawings/materials/calculations
Owner: _____ Date: _____
Engineer: _____ Date: _____

DAILY REPORT

PROJECT: _____ **NUMBER:** _____
TO: _____ **FROM:** _____
RE: _____ **DATE:** _____

OWNER: _____ PHONE: _____ FAX: ___
ADDRESS: _____ HOURS WORKED: _____ TO: ___

Company: _____ Day: _____
Report Period: Daily Job: _____
Temperature: _____ Precipitation: _____ Sky: _____ Wind: _____

Activity:

Equipment:

Description	Source	Type	Work Area	Remarks

Field Force Labor:

Category	Source	Supv. Frmn. Jrny. Appr.	Work Area	Remarks

Totals: _____

Visitors:

Time	Company	Visitor Name	Remarks

Materials Delivered:

Time	Material Name	Ticket No	Description	Remarks

Certified By: _____ Date: _____
Signed: _____

WEEKLY / MONTHLY PROGRESS REPORT

PROJECT: _____ **NUMBER:** _____
TO: _____ **FROM:** _____
RE: _____ **DATE:** _____

CONTRACT COMPLETION DATE/TIME: _____ APPROVED TIME EXTENSION (DAYS): _____
DATE CONSTRUCTION STARTED: _____ CONTRACT COMPLETION DATE/DAYS: _____
REVISED COMPLETION DATE: _____ PERCENT OF PROJECT COMPLETION: _____
PERCENT OF TIME USED: _____ DAYS ELAPSED: _____
IS PROJECT ON SCHEDULE? _____ IF NOT, WHY? _____

Summary of Construction Activities Since Last Report:

☐ Attachments

Signed by: _____ Date: _____

Copies: ☐ Owner ☐ ENGR ☐ Contractor ☐ Consultants ☐ ___ ☐ ___ ☐ File

SUBSTITUTION REQUEST

PROJECT: _____ **NUMBER:** _____
TO: _____ **FROM:** _____
RE: _____ **DATE:** _____

SPECIFICATION TITLE: _____ DESCRIPTION: _____
SECTION: _____ PAGE: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name:: _____ Model No: ____
Installer: _____ Address: _____ Phone: ____
History: ☐ New product ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old
Differences between proposed substitution and specified product:

☐ Point-by-point comparative data attached

Reason for not providing specified item:

Similar Installation

Project: _____ Engineer: _____
Address: _____ Owner: _____
_____ Date Installed: _____
Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain:

Savings to Owner for accepting substitution: _____ ($ ____)

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] ____ Days

Supporting Data attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports

SUBSTITUTION REQUEST CONT.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

Engineer's Review and Action:

☐ Substitution approved.

☐ Substitution approved as noted.

☐ Substitution rejected – Use specified materials.

☐ Substitution Request received too late – Use specified materials.

Signed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ ENGR

_____

_____

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT NO. BID NO.

PROJECT:

CONTRACTOR: CONTRACT DATE:

CONTRACT FOR - Construction in accordance with specifications

Project or Specified Part Shall Include: work per Bid Specifications book, plus Addenda, Field Orders and Change Orders (if any)

DEFINITION OF SUBSTANTIAL COMPLETION

The date of substantial completion of a project or specified part of a project is the date when the work is sufficiently completed, in accordance with the Contract Documents, so that the project or specified part of the project can be utilized for the purpose for which it was intended.

TO: (Contractor)

DATE OF SUBSTANTIAL COMPLETION: _____

The work performed under this contract has been inspected by authorized representatives of the City of Venice and the contractor, and the project or specified part of the project, is hereby declared to be substantially completed on the above date.

A tentative list of items to be completed or corrected is appended hereto. This list may not be exhaustive, and the failure to include an item on it does not alter the responsibility of the contractor to complete all the work in accordance with the contract documents. These items shall be completed by the contractor within _____ days of Substantial Completion.

The date of Substantial Completion is the date upon which all guarantees and warranties begin, except as noted below. The responsibilities between the Owner and the Contractor for maintenance shall be as set forth below.

CITY OF VENICE

By: _____

_____

Date: _____

_____

The contractor accepts the foregoing Certification of Substantial Completion and agrees to complete and correct the items on the tentative list within the time indicated.

_____ _____

Contractor Authorized Representative

Date:_____

RESPONSIBILITIES:

OWNER:

CONTRACTOR:

EXCEPTIONS AS TO GUARANTEES AND WARRANTIES:

ATTACHMENTS (Identify):

CONTRACTOR'S RELEASE OF LIEN

BEFORE ME, the undersigned authority in said County and State, appeared _____, who being first duly sworn, deposes and says that he is _____ of _____ a company and/or corporation authorized to do business under the laws of Florida, which is the contractor on Project known as City of Venice Bid No. _____ located at City of Venice in the City of Venice, County of Sarasota, Florida, under contract with the City of Venice, dated the _____ day of _____, 201__, that the said deponent is duly authorized to make this affidavit by resolution of the Board of Directors of said company and/or corporation; that deponent knows of his own knowledge that said contract has been complied with in every particular by said contractor and that all parts of the work have been approved by the City Engineer; that there are no bills remaining unpaid for labor, material or otherwise, in connection with said contract and work, and that there are no suits pending against the undersigned as contractor or anyone in connection with the work done and materials furnished or otherwise, under said contract.

DEPONENT further says that the final estimate which has been submitted to the City simultaneously with the making of this affidavit, constitutes all claims and demands against the City on account of said contract or otherwise, and that acceptance of the sum specified in said final estimate will operate as a full and final release and discharge of the City from any further claims, demands or compensation by contractor under the above contract.

DEPONENT further agrees that all guarantees under this contract shall start and be in full force from the date of this release as spelled out in the contract documents.

Signature:_____
Printed Name:

STATE OF FLORIDA)
COUNTY OF)

Signed before me this _____ day of _____, 201__, by_____ who is personally known to me or has produced _____ as identification.

_____
Notary Public

My Commission Expires:
Commission Number:

CONTRACTOR'S RELEASE OF LIEN (continued)

WE, the _____, having heretofore executed a performance bond and a payment bond for the above named contractor covering project and section as described above in the sum of ($_____)_____Dollars, hereby agree that the Owner may make full payment of the final estimate, including the retained percentage, to said contractor.

IT IS fully understood that the granting of the right to make the payment of the final estimate to said contractor and/or his assigns, shall in no way relieve this surety company of its obligations under its bonds, as set forth in the specifications, contract, and bonds pertaining to the above project.

IN WITNESS WHEREOF, the _____has caused this instrument to be executed on its behalf by its_____, and/or its duly authorized attorney in fact, and its corporate seal to be hereunto affixed, all on this _____ day of _____, A.D., 201__.

_____
Surety Company

_____
Attorney in Fact

Power of Attorney must be attached if executed by Attorney in Fact.

STATE OF)
COUNTY OF)

BEFORE ME, the undersigned authority, appeared_____,
who is personally known to me or has produced _____ as identification, and who executed the foregoing instrument in the name of _____ _____ as its _____ and the said _____ acknowledged that he executed said instrument in the name of _____ as its _____ and/or_____, for the purpose therein expressed and that he had due and legal authority to execute the same on behalf of said _____, a corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal at _____ this _____ day of _____,20___.

_____
Notary Public

My Commission Expires:
Commission Number:

CONTRACTOR'S APPLICATION FOR PAYMENT

Payment Request No.	Engineering No.
Project –	Bid No. Purchase Order No.
Finance Acct No.	Completion Date
Contractor	Period Ending

STATEMENT OF WORK

Original Contract Price	Work to Date
Net Change Order	10% Retainage
Current Contract Price	Sub Total
Work to Date	Previous Payments
Work to be Done	Due This Payment

The undersigned Contractor hereby swears under penalty of perjury that (1) all previous payments received from the Owner on account of work performed under the contract referred to above, have been applied by the undersigned to discharge in full, all obligations of the undersigned incurred in connection with work covered by prior Application for Payment under said contract, being Application for Payment numbered 1 through _____, inclusive; and (2) all materials and equipment incorporated in said project or otherwise listed in or covered by, this Application for Payment, are free and clear of all liens, claims, security interests and encumbrances.

Date:_____ CONTRACTOR - BUSINESS NAME

_____

By:_____

Name & Title:

State of Florida)
County of)

Before me, this _____ day of _____, 20___, appeared _____, who is personally known to me or has produced _____ as identification, who being duly sworn did depose and say that he is the (office)_____ of the Contractor above named; that he executed the above Application for Payment and statement on behalf of said Contractor, and that all of the statements contained therein are true, correct, and complete.

My Commission Expires: _____

Commission No. Notary Public

Payment Approved:

By:_____ Public Works Date: _____
By:_____ Engineering Date: _____
By:_____ Purchasing Date: _____
By:_____ Finance Date: _____

INTENTIONALLY LEFT BLANK

SAMPLE CONTRACT

THIS CONTRACT, is made and entered into this_____ day of _____, 2018, by and between the City of Venice, Florida, hereinafter referred to as the City, and _____, hereinafter referred to as the Contractor.

W I T N E S S E T H:

THAT FOR and in consideration of the mutual covenants and obligations hereafter set forth, the parties hereto agree as follows:

(1) The Contract Documents consist of this Contract, Performance and Payment Bonds attached hereto as composite Attachment A and, the City's Invitation to Bid (ITB) # **3090-18: TBD**, including: standard general conditions, supplemental conditions, special conditions, technical specifications, drawings, Contractor's bid proposal for ITB 3090-18, all of which are incorporated herein by reference. All of the Contract Documents are made a part of this Contract.

(2) The Contractor shall perform all the work required by the Contract Documents and shall include installation of the listed items per the bid specifications.

(3) The work to be performed under this Contract shall be completed within one-hundred twenty-one **(121)** days of the issuance of the Notice to Proceed by the City.

(4) The City shall pay the Contractor for the performance of the work, in accordance with Exhibit B, subject to the terms and conditions of the Contract Documents and any written change orders, the contract sum not to exceed: _____ **Dollars & 00/100s ($xxxx.00).**

(5) Time is of the essence in this contract. In the event that the work is not completed within the required time as specified in Section 3 herein, then from the compensation otherwise to be paid to the Contractor, the City may retain the sum of _____ **dollars and 00/100s ($xxx.00) per day** for each calendar day that the work remains incomplete beyond the time limit, which sum shall represent the actual damage which the City will have sustained per day by failure of the Contractor to complete the work within the required time, said sum not being a penalty but being the stipulated damages the City will have sustained in the event of such default by the Contractor.

(6) In connection with the performance of work under this Contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, sex, religion, color, or national origin. The aforesaid provision shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, lay-off or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post hereafter in conspicuous places, available for employees or applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause. The Contractor further agrees to insert the foregoing provisions in all contracts hereunder, including contracts or agreements with labor unions and/or workers' representatives, except subcontracts for standard commercial supplies or raw materials.

(7) Contractor must secure and maintain any and all permits and licenses required to complete the work under this Contract, unless the Contract Documents provide otherwise.

(8) Throughout the term of this Contract the Contractor must maintain insurance in at least the amounts and coverage required as shown in Exhibit C. The Contractor must provide a Certificate of Insurance to the City evidencing such coverage prior to issuance of the Notice to Proceed by the City.

(9) Contractor agrees to comply with Florida’s public records law by keeping and maintaining public records that ordinarily and necessarily would be required by the public agency in order to perform the services of this contract; upon the request of the City’s Custodian of Public Records, by providing the City with copies of or access to public records on the same terms and conditions that City would provide the records and at a cost that does not exceed the cost provided by Florida law; by ensuring that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed excepts as authorized by law for the duration of the term of the Contract and following completion of the Contract if the Contractor does not transfer the records to the City; and upon completion of the Contract by transferring, at no cost, to City all public records in possession of Contractor or by keeping and maintaining all public records required by the City to perform the services . If the Contractor transfers all public records to the City upon completion of the Contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of the Contract, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City, upon request from the City’s custodian of public records, in a format that is compatible with the information technology systems of the City.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CITY'S CUSTODIAN OF PUBLIC RECORDS LORI STELZER, MMC, CITY CLERK, AT 401 W. VENICE AVENUE, VENICE, FLORIDA 34285, (941) 882-7390, LSTELZER@VENICEGOV.COM.

(10) Contractor shall indemnify, pay the cost of defense, including attorneys' fees, and hold harmless the City from all suits, actions, or claims of any kind brought on account of any injuries or damages received or sustained b any person or property by or from the Contractor or in consequence of any neglect in safeguarding the work; or by the use of any unacceptable materials related to the work; or on account of any act or omission, neglect or misconduct of the Contractor; or on account of any claim or amounts received under the "Workers' Compensation Law" or any other laws or ordinances, except only such injury or damage as shall have been caused by the negligence of the City. The first ten dollars ($10.00) of compensation received by the Contractor represents specific consideration for this indemnification obligation.

(11) Contractor shall be responsible for compliance with the requirements under Chapter 556, Florida Statutes, the "Underground Facility Damage Prevention and Safety Act." Contractor's obligations to defend, indemnify, and hold harmless the City, as provided for under Section 10 of this Contract, shall specifically apply to any violations alleged against the City under the Underground Facility Damage Prevention and Safety Act related to the performance of the work under this Contract. Contractor acknowledges that included in the various items of the proposal and in the total bid price, are costs for complying with the Florida Trench Safety Act (90-96 Laws of Florida) effective October 1, 1990.

(12) Termination. This Contract may be terminated by the City without cause, by giving thirty (30) days prior written notice to contractor of the intention to cancel. or with cause at any time contractor fails to fulfill or abide by any of the terms or conditions specified. Failure of contractor to comply with any of the provisions of this agreement shall be considered a material breach of contract and shall be cause for immediate termination of the agreement at the discretion of the city. This Contract may be terminated by the Contractor only by mutual consent of both parties. If this Contract is terminated before performance is completed, the Contractor shall be paid only for that work satisfactorily performed for which costs can be substantiated.

(13) The laws of the State of Florida shall govern all provisions of this Contract. Venue for any dispute shall be Sarasota County, Florida. If any court proceeding or other action occurs between the parties as a result of this Contract or any other document or act required by this Contract, the prevailing party shall be entitled to recover attorney's fees and all court costs, including attorney's fees and court costs incurred in any pre-trial, trial, appellate, and/or

bankruptcy proceedings, as well as, attorney's fees and costs incurred in determining entitlement to and reasonableness of fees and costs.

(14) This Contract and the Contract Documents constitute the entire agreement of the parties and may not be changed or modified, except by a written document signed by both parties hereto. This Contract shall be binding upon the successors and assigns of the parties.

Signature Page to Follow:

IN WITNESS WHEREOF, the parties to the agreement have hereunto set their hands and seals and have executed this agreement, the day and year first above written.

ATTEST: (Company Name)

_____ BY:_____

_____ _____

Signed by (typed or printed) Signed by (typed or printed)

(SEAL)

CITY OF VENICE

ATTEST: IN SARASOTA COUNTY, FLORIDA

_____ BY:_____

CITY CLERK MAYOR JOHN HOLIC

Approved as to Form and Correctness

_____

David Persson, City Attorney

ATTACHMENT A

REQUIRED FEDERAL PROVISIONS

The following provisions apply to this Project, which does not include the expenditure of federal funds:

C-01 GENERAL CIVIL RIGHTS PROVISIONS:

The Contractor agrees to comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

C-02 TITLE VI SOLICITATION NOTICE:

The City of Venice, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders or offerors that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair 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.

C-03 Compliance with Nondiscrimination Requirements:

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 (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, 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, will 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 will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
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 will be notified

by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.

4. **Information and Reports:** The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a Contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

    a. Withholding payments to the Contractor under the contract until the Contractor complies; and/or
    b. Cancelling, terminating, or suspending a contract, in whole or in part.

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

C-04 TITLE VI LIST OF PERTINENT NONDISCRIMINATION ACTS AND AUTHORITIES

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 USC § 2000d et seq., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 USC § 794 et seq.), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended (42 USC § 6101 et seq.) (prohibits

discrimination on the basis of age);

- Airport and Airway Improvement Act of 1982 (49 USC § 471, Section 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (PL 100-209) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 USC §§ 12131 – 12189) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration's Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC 1681 et seq).

C-05 FEDERAL FAIR LABOR STANDARDS ACT

All contracts and subcontracts that result from this Solicitation incorporate by reference the provisions of 29 CFR part 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part time workers.

The contractor has full responsibility to monitor compliance to the referenced statute or regulation. The contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

C-06 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of

the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

C-07 CONTRACTOR RESPONSIBILITY

Contractor and all subcontractors shall insert these Required Federal Provisions in each lower tier contract (e.g. subcontract or sub-agreement).

Contractor shall incorporate all of the applicable requirements of these Required Federal Provisions by reference for work done under any purchase orders, rental agreements and other agreements for supplies or services.

Contractor shall be responsible for compliance with these Required Federal Provisions by any subcontractor, lower-tier subcontractor or service provider.

SPECIAL PROVISIONS

1.0 PROJECT COORDINATION AND DOCUMENTATION

Contractor's and subcontractors' key personnel shall attend the Pre-Construction Meeting to review project safety, security, phasing, and schedule.
Contractor shall conduct a daily project safety meeting with his/her employees and subcontractors and address any safety concerns from the previous work period.
Contractor shall attend a weekly progress meeting with the Owner and Engineer to review current and projected activities, review such items as pavement test results, safety issues, airfield closure schedules, in addition to updating the schedule.
Engineer will prepare the agenda and the minutes for the meetings and distribute to the attendees. Contractor shall review the minutes and address any discrepancy he/she may find between minutes and discussions at the meeting prior to the next weekly progress meeting.
Contractor shall prepare and submit daily construction reports to the Owner on a monthly basis. The report shall include, as a minimum, the list of equipment used on site, materials delivered to the site, list of Contractors and subcontractors personnel at the site, high and low temperatures, stoppage and delays, emergency procedures, accidents, weather delays, aircraft delays, field directives, change orders, inspections, and testing.

2.0 SEQUENCE OF CONSTRUCTION

The work will be performed in accordance with the sequential steps on the Plans or modified as directed by the Owner. Before commencing any work and prior to issuance of the Notice-To-Proceed under this Contract, the contractor shall prepare and obtain the Owner's approval of a detailed work schedule. The contractor's schedule shall be framed generally as specified herein. This schedule shall, unless otherwise authorized or directed by the Owner, be in conformance with the conditions and requirements of the Plans and Contract Documents. The work will be accomplished in Phases as specified in the Contract Documents. The Owner reserves the right to revise, without limit, the sequence of construction.

3.0 UTILITIES AND TEMPORARY SERVICE

UTILITIES CONNECTIONS:

The Contractor shall determine all temporary service connection and supply costs. Such costs shall be incidental to the project and included in the bid.

Immediately after the award of contract, the Contractor shall consult and reach agreement with the authorized representatives of each utility company as to details of service installation.

TEMPORARY SERVICES:

ELECTRICAL POWER: The Contractor shall pay all costs for permanent and temporary power connections; all meter deposits and the costs of permanent and temporary electrical energy sufficient to provide all power needs throughout the construction period.

TEMPORARY ELECTRICAL SERVICES: Contractor is responsible for providing and maintaining temporary wiring systems for light and power for the use of all trades throughout the construction period.

Systems shall be solidly grounded. Over current protection shall be limited to 20 amperes on No. 12 conductors.

Where the Contractor contemplates working after dusk, he shall provide adequate flood lighting of no less than 5 candle power at the work area, unless provided for in the specifications.

WATER: The Contractor shall be responsible for all water used in the construction and all temporary and permanent connections. Temporary connections shall be removed upon completion of work.

SANITARY: The Contractor shall provide serviced chemical toilets. Privies will not be permitted.

TELEPHONE: The Contractor shall maintain telephone service as required for his personnel and local telephone service for the Engineer (as requested).

4.0 PROTECTION OF AIRPORT, CABLES, CONTROLS, NAVAIDS AND WEATHER BUREAU FACILITIES

4.1 The Contractor is hereby informed that there are installed on the Airport FAA NAVAIDS, U.S. Weather Bureau facilities; airfield lighting systems; electric cables and controls relating to such NAVAID and facilities. Such NAVAIDS, weather bureau and other facilities, and electric cables must be fully protected during the entire construction time. Work under this contract can be accomplished in the vicinity of these facilities and cables only at approved periods of time.

4.2 Approval is subject to withdrawal at any time because of change in the weather, emergency conditions on the existing airfield areas, anticipation of emergency conditions, and for any other reason determined by the Engineer acting under the orders and instructions of the Owner and the designated FAA representative. Any instructions to this Contractor to clear any given area, at any time, by the Engineer, the Owner or the FAA (by radio or other means) shall be immediately executed. Construction work will be commenced in the cleared area only when additional instructions are issued by the Engineer.

4.3 Power and control cables leading to and from any FAA NAVAIDS, Weather Bureau and other facilities, will be marked in the field by the local FAA Airway Facilities Sector personnel before any work in their general vicinity is started by the contractor. Thereafter, through the entire time of this construction, the Contractor shall not allow any construction equipment to cross these cables without first protecting the cable with steel boiler plate, or similar structural devices, on three (3') feet either side of the marked cable route. All excavation within three (3') feet of existing cables shall be accomplished by hand digging only.

4.4 This Special Provision intends to make perfectly clear the need for protection of FAA NAVAID, Weather Bureau and other facilities, and cables by this Contractor at all times.

4.5 The Contractor shall immediately repair, at his own expense, with identical material by skilled workmen, any underground cables serving FAA NAVAIDS, Weather Bureau and other airport facilities, which are damaged by his workmen, equipment, or work. Prior approval of the FAA must be obtained for the materials, workmen, time of day or night, method of repairs, and for any temporary or permanent repairs the Contractor proposed to make to any FAA NAVAID and facilities damaged by the Contractor. Prior approval of the Engineer must be obtained for the materials, workmen, time of day or night, and for the method of repairs for any temporary or permanent repairs the Contractor proposes to make to any other airport facilities and cables damaged by this Contractor. Should the repair require splicing, it shall be spliced at the discretion of the local FAA Airway Facilities Sector Manager as to who shall perform the work. Where the FAA performs the work, it shall be at the Contractor's expense. No work shall be backfilled or covered prior to approval by the Airway Facilities Sector Manager.

5.0 TERMINATION

This Contract may be canceled by the Contractor upon (30) calendar days' prior written notice to the Owner's representative in the event of substantial failure to perform in accordance with the terms of this Contract through no fault of the Contractor. It may also be terminated, in whole or in part, by the Owner, with or without cause, at any time by written notice thereof to the Contractor whether or not Contractor is in default in accordance with GENERAL PROVISIONS entitled GP 80-09 DEFAULT AND TERMINATION OF CONTRACT. Unless the Contractor is in breach of this Contract, the Contractor shall be paid for services rendered to the Owner's satisfaction through the date of termination. Upon any termination, Contractor hereby waives any claims for damages from the termination, including loss of anticipated profits, on account thereof. After receipt of a Termination Notice and except as otherwise directed by the Owner the Contractor and its Surety shall:

Stop work on the date and to the extent specified.
Terminate and settle all orders and subcontracts relating to the performance of the terminated work.
Transfer all work in process, completed work, and other materials related to the terminated work to the Owner.
Continue and complete all parts of the work that have not been terminated.

6.0 EXTENSION OF TIME/NO DAMAGES FOR DELAY

If the Contractor's performance of this Contract is delayed, which delay is beyond the reasonable control and without the fault or negligence of the Contractor or its subcontractors, or by changes ordered in the Work and in either event where such delay or change in the work impacts the CRITICAL PATH, then the Contract time shall be extended by Change Order as determined by the Owner.

The Contractor must request the extension of time in writing and must provide the following information within the time periods stated hereafter. Failure to submit such information and in compliance with the time requirements hereinafter stated, shall constitute a waiver by the Contractor and a denial of the claim for extension of time:

Nature of the delay or change in the work;
Dates of commencement/cessation of the delay or change in the work;
Activities on the progress schedule current as of the time of the delay or change in the work affected by the delay or change in the work;
Identification and demonstration that the delay or change in work impacts the CRITICAL PATH (submittal of CPM schedule);
Identification of the source of delay or change in the work;
Anticipated impact extent of the delay or change in the work; and
Recommended action to minimize the delay.

The Contractor acknowledges and agrees that the evaluation of time extensions will be based upon the following criteria:

All schedule updates, submittals and other requirements of this General Condition have been met;
The delay must be beyond the control of the Contractor and subcontractors and due to no direct or indirect fault of the Contractor;
The delay which is the subject of the time extension must result in a direct delay to the Critical Path;
The schedule must clearly display that the Contractor has used, in full, all the float time, except for Owner initiated changes. Float time is not for the exclusive use of either the Contractor or the Owner; and
If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be submitted within thirty (30) calendar days of occurrence and shall be documented by data substantiating that weather conditions were abnormal for the period of time required for completion of the Work, could not have been reasonably anticipated, and that weather conditions had an adverse effect on the scheduled construction.

The Owner’s determination as to the total number of days of contract extension will be based upon the computer produced construction schedule current at the time of the delay event.

The Contractor shall not be entitled to any extension of time for delays resulting from any cause unless it shall have notified the Owner in writing within twenty-four hours (24) after the commencement of such delay or 96 hours of knowledge of a potential delay, whichever is earlier. In any event, within seven (7) days of commencement of the delay, the Contractor shall provide in writing the information stated in Part 6.2.

Except for delays described in Section 6.7, the Contractor shall not be entitled to and hereby waives, any and all damages which it may suffer by reason of Act of God, unforeseen condition, delay, acceleration, cardinal changes, loss of efficiency or any other impacts to the work or time of performance and further, hereby waives all damages which it may suffer by reason of these events, including, but not limited to lost profits, overhead, increased insurance costs, loss of bonding capacity or lost profits on alternate or unperformed contracts, supervision, or home office expense. Contractor hereby affirms that the extension of time granted herein is the Contractor's sole and exclusive remedy. Apart from extension of time, no payment of claim for damages shall be made to the Contractor

as compensation for damages for any delays or hindrances from any cause whatsoever in the progress of the work whether such delay is avoidable or unavoidable.

For all changes in the Work in which the Contractor claims entitlement to a time extension, the Contractor shall provide to the Owner the same information as required above within seven (7) days of the issuance of the request for change order or direction to change the scope of the work and the Contractor's failure to provide such information shall constitute a waiver by the Contractor and a denial of any time extension for that change in the work. Further, upon execution by the Owner and Contractor of any Change Order where no time extension has been requested or granted, that Change Order shall constitute a complete waiver of all claims for dollars or for any extension of time related to that work, or any work impacted by the change.

7.0 ACCESS AND AUDITS

The Contractor shall maintain adequate records to justify all charges, expenses, and costs incurred in estimating and performing the work for at least three (3) years after final completion of this Contract. The Owner shall have access to such books, records, and documents as required in this section for the purpose of inspection or audit during normal business hours, at the Contractor’s place of business.

8.0 PUBLIC ENTITY CRIMES

By entering into this contract or performing any work in furtherance hereof, the contractor certifies that it, its affiliates, suppliers, subcontractors and consultants who will perform hereunder, have not been placed on the convicted vendor list maintained by the State of Florida within 36 months immediately preceding the date hereof.

9.0 CHANGES

Owner may, at any time, without invalidating the Contract and without notice to the Surety(ies), make changes in the work by issuing a Change Order. In the event that additive change Orders increase the total Contract amount of a Bond Waiver Contract over the Bond Waiver limit of $200,000, the Contract will continue to be exempt from the bonding requirements. In the event deductive change orders decrease the total contract amount of a bonded contract below the Bond Waiver limit of $200,000, bonding will continue to be required.

Owner will issue written orders to Contractor for any changes except that in the event of an emergency which Owner determines endangers life or property. Owner may issue oral orders to Contractor for any work required by reason of such emergency. Such orders will be confirmed in writing as soon as practicable. Such orders, whether written or oral, may be accompanied by drawings and data as are necessary to show the extent of such ordered work.

Contractor shall commence such changed work so that all dates set forth in Contractor's current construction schedule as accepted by Owner will be met. In the event of an emergency, which Owner determines endangers life or property, Contractor shall immediately commence such changes as required by Owner in order to mitigate or remove the emergency condition. Failure to commence any such change in timely fashion shall entitle Owner to invoke the provisions of the GENERAL PROVISIONS entitled GP 80-09 DEFAULT AND TERMINATION OF CONTRACT.

Unless otherwise required, Contractor shall, within twenty-one (21) calendar days following receipt of a written notification (Field Bulletin) by the Owner, submit in writing to Owner a Contract Change Proposal for accomplishing such change, which proposal shall reflect the increase or decrease, if any, in cost to Owner of performing the change under the Contract in comparison to what the cost would have been, had such change not been offered.

The proposal shall state the Contractor's added and/or deleted compensation in detail, including but not limited to:

Material quantities and unit prices;
Labor man-hours and wages by craft;
Equipment type and size and rental rate;
Overhead and profit percentage;
Subcontract costs with back-up detail as specified in items above;
Time extension, if any;
A detailed description of any impacts this change will have on any activities on the Critical Path which would affect any of the Milestone Dates;
Proof of payment of any tax liability resulting from a specific change (if requested by Owner).

Under no circumstances shall Contractor apply for or be entitled to recover extended home office overhead costs associated with a change in the work, whether or not calculated in accordance with the Eichleay Formula. Any time extension request shall be submitted in accordance with SP 6.0 Extension of Time.

If Contractor does not propose the method of compensation for such change or any part thereof within the time required, or if any proposed method is not acceptable, or if a method of compensation for such change, or any part thereof cannot be agreed upon, Owner may direct and Contractor shall proceed upon direction (Construction Change Directive) with such change.

Construction Change Directive (CCD) is a written order prepared by the Engineer and signed by the Owner, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. A CCD may be used in the absence of total agreement on the terms of Change Order or to complete work which, if not accomplished, could adversely affect a critical path activity. Upon receipt of the CCD, the Contractor shall promptly proceed with the change in the Work involved and advise the Engineer of the Contractor's agreement or disagreement with the method, if any, provided in the CCD for determining the proposed adjustment in the Contract Sum or Contract time. When the Owner and Contractor agree with the determination made by the Engineer or Record concerning the adjustments in the Contract Sum and/or Time, or otherwise reach agreement upon the adjustments, such agreement shall be recorded by the preparation of a Change Order. The Contractor shall not seek payment for work performed pursuant to a CCD until it has been converted to a Change Order.

If, at any time after Contractor commences such change, a method of compensation other than time and material is agreed upon, such compensation will be made in accordance with such agreement. In any event, Contractor shall keep accurate records of the actual cost to Contractor for such change. Costs for which Contractor shall be entitled to compensation on a time and material basis as described above, are as follows:

Direct Labor Cost - Payment will be made for all manual classifications up to and including foremen, but shall not include superintendents, assistant superintendents, general foremen, office personnel, time-keepers and maintenance mechanics. The time charged to changes will be subject to the daily approval of Owner and no charges shall be accepted unless evidence of such approval is submitted by Contractor with its billing.

Labor rates used to calculate the direct labor costs shall be those rates in effect during the accomplishment of the change. In addition to the direct payroll costs, the direct labor costs shall include payroll taxes and insurance, vacation allowance, subsistence, travel time and overtime premium and any other payroll additives required to be paid by Contractor by law or collective bargaining agreements. Copies of certified pertinent payrolls shall be submitted to Owner.

Equipment Costs - Payment for the rental and operation of the equipment furnished and used by Contractor shall be made for all construction and automotive equipment or tools with a new cost at point of origin of one thousand dollars or less each. Equipment time charged to changes will be subject to daily written approval of Owner and no charges will be accepted unless evidence of such approval is submitted with Contractor's billing.

The equipment rental and operation rates include costs for rental, fuel, oil, grease, repair parts, service and maintenance of any kind, and necessary attachments. Such charges do not include costs for operating labor and transportation to and from the location of the change. Equipment rental rates for Contractor-owned equipment used

in this Contract shall be those contained in the RENTAL RATE BLUE BOOK as published by Equipment Watch 1735 Technology Drive, Suite 410 San Jose, CA 95110-1333 and current at the time work for any specific change is performed. When equipment is used for time and a material change which does not reasonably resemble Blue Book rental rates, the rental rate shall be negotiated and agreed upon in writing.

If Contractor-owned equipment is not available and equipment is rented from outside sources, payment will be computed on the basis of actual invoice cost. Rental rates for non-owned equipment must be approved in advance by Owner.

When the operated use of equipment is infrequent and, as determined by Owner, such equipment need not remain at the site of the work continuously, payment shall be limited to actual hours of use. Equipment not operating but retained at the location of changes at Owner's direction shall be paid for at a standby rate.

Unless otherwise provided in the Contract, all equipment rental rates shall be agreed upon in writing before commencing any change. When a specific piece of rental equipment, normally used to perform unchanged contract work is used for time and material changed work, the applicable rental rate shall be the actual rate paid by the Contractor at the time the work is performed.

Transportation costs for bringing equipment to the jobsite and for returning equipment to the point of origin, exclusively for use on time and material work, will be reimbursed to Contractor based on invoices, provided that prior written approval has been given to Contractor.

Overtime shall be paid as per Method 2 described in said RENTAL RATE BLUE BOOK.

No compensation will be made to the Contractor for equipment repair or equipment maintenance.

Material Costs - Payment for the cost of materials furnished by Contractor for use in performing the change will be made, provided such furnishing and use of materials was as specifically authorized and the actual use was verified by Owner. Payment will be the net cost to Contractor delivered at the job and vendor's invoice shall accompany the billing along with the verification by Owner of such use of such materials.

Contract and Outside Service Costs - Payment for work and services subcontracted by Contractor in the performance or completion of the change will be made only when both the subcontractor and the terms of payment to such subcontractor have been approved in writing by Owner before the subcontractor starts to work on the change.

Tools and Equipment - Payment will be made for tools and equipment with a new cost of One Thousand Dollars, or less, each, only upon approval by the Owner.

For purposes of any and all changes made pursuant to this provision (whether lump sum or time and material) as to all supplies, overhead, supervision and profit, the Contractor is entitled to a maximum of fifteen percent (15%) of the total direct labor and material costs pertaining to each change. The maximum percentage, including but not limited to overhead and profit, which may be added to actual cost for changes in the work shall be as follows:

For all work done by the General Contractor's own forces, the Contractor may add up to15% of his actual costs.

For all work done by subcontractors, the respective subcontractors may add up to 10% of their actual costs. The general contractor may add up to 5% of the subcontractors' total.

No additional percentage markup in connection with any change will be allowed. However, if at any time the cumulative change order value exceeds ten percent (10%) of the awarded value of this Contract, the overhead and profit percentage set forth above is subject to renegotiation at the Contractor's request unless the change order is a result of the Owner choosing to exercise its right to accept a Bid Additive. Any subsequent renegotiated overhead and profit percentage will apply only for those changes made after the current contract value has exceeded One hundred and ten percent (110%) of its awarded value.

For any changes involving deductive items, the following shall apply to the amount of allowable overhead and profit:

For deductive changes only (those which contain no additive items), there will be no reduction in overhead and profit and, likewise, no addition by the Contractor for processing.

For changes containing both additions and deductions covering related work or substitutions, the overhead and profit shall be figured on the net increase if any, with respect to that change.

No change order or CCD shall be valid until approved and signed by the Owner. The Engineer is not authorized to bind the Owner to changes relative to changes in contract cost and or time. The Engineer may only recommend acceptance or rejection. If a proposed change is deemed beneficial to the project and is within the limits set forth in the contract, the Owner may cause to be issued an appropriate change order to the Contract with or without the Contractor's signature.

The Engineer will have the authority to order minor changes in the work which do not involve adjustment to the Contract sum or time and are not inconsistent with the intent of the Contract documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly, and the Contractor shall receive no additional compensation therefore, nor there be any change in the Contract time. The Engineer shall immediately provide notices of all minor changes in the Work to the Owner.

Execution of change order acknowledges final settlement of, and releases, all claims for costs and time associated, directly or indirectly, with the stated modification(s), including all claims for cumulative delays or disruptions resulting from, caused by, or incident to such modification(s), and including any claim that the modification(s) constitutes, in whole or part, a cardinal change to the contract.

10.0 CONSTRUCTION TIME AND LIQUIDATED DAMAGES

The construction plans and contract documents describe the scope of work and the time allowed for construction. The start of construction is based on midnight of the day and date of the "Notice to Proceed".

All construction of each phase shall be completed within the number of calendar days as indicated in the construction time and liquidated damages shown in the Bid Form. The contractor will be assessed Liquidated damages in the amount shown for failure to complete each phase. A calendar day as defined in General Provisions Section 10 Definition of Terms, Paragraph 10-11 is “Every Day Shown on the Calendar”. This definition is applicable to this project. General Provisions Section 80 “Prosecution and Progress” paragraph 80-07 “Determination and Extension of Contract Time” and Special Provision Paragraph 6.0 “Extension of Time” shall be used should the contract time require extension for reasons beyond the contractor’s control.

All construction shall be completed within the applicable number of calendar days indicated or liquidated damages in the amounts stated in the schedule below will become applicable. Actual dates are to be used as general reference and are subject to change.

~~Contractor shall also be subjected to liquidated damages based on every minute for 15 minutes beyond the time designated for the re-opening of the runway and for every 15 minutes beyond the first 15 minutes as shown in the Bid Form. Contractor shall hand over a safe and operational runway to the Owner at the required time to allow aircraft activity. Failure to complete this task will result in assessing liquidated damages as shown in the Bid Form.~~

Issuance of the Notice-To-Proceed will be contingent on approval of the Schedule of Values, and submittal of the Preliminary Baseline Construction Schedule.

11.0 INSURANCE

Insurance shall be provided in accordance with the Section titled: “City Terms, Conditions, and Insurance”.

12.0 SCHEDULING

All work performed pursuant to this contract will be completed in accordance with the Bid Form Milestones and Damages Data. If the time required to perform the work in any of the phases and/or sub phases is increased for whatever reason due to any cause not the fault of the contractor or any privities with the contractor, the Owner may direct the contractor to reschedule its work so that all dates set forth in the Bid Form are met. Whenever such rescheduling is required and a Contract Change Request is issued, the Contractor will incorporate all costs for performing such changes into its proposal in order to complete all contract work on time. Unless directed by the Owner, there will be no extensions of time in connection with any changes to the work under any of the Phases in the Bid Form. Therefore, the Contractor should reflect this in pricing all requested changes relating to the Phases.

The Contractor shall furnish at the Pre Construction Conference and at weekly progress meetings a detailed three (3) week rolling schedule in bar chart format, indicating all activities scheduled in the next two (2) weeks.

All activities and work items shown shall be used in the approved Schedules, and shall incorporate all contract milestones, submittal dates, access dates, and work constraints. Float time is not for the exclusive use or benefit of either Owner or Contractor but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

The Contractor shall employ, for the length of the project, at least one qualified scheduling specialist whose responsibility will be to prepare, plan and draft the Construction Schedule, monitor the progress, analyze scheduling problems for resolution, update the schedules as required in the Contract, and maintain updated information as required regarding the interface with other contracts. The updated Schedule shall be submitted with each and every Contractor pay request and the construction activities shall mirror the payment application breakdown.

Prior to the Pre-Construction Conference and issuance of Notice To Proceed, the Contractor shall submit to the Owner and Engineer a complete and detailed "Schedule of Values" defining all work items, their associated costs, and descriptions for their review and approval. Schedule of Values shall be submitted with each and every Contractor pay request with each item completed.

13.0 PERMITS AND FEES

Refer to Section 70-02 of the General Provisions.

14.0 PROGRESS PAYMENT PROCEDURES

The Contractor shall prepare a schedule of values by phases of work to show a breakdown of the Contract Sum corresponding to the payment request breakdown and progress schedule line items. The schedule of values must also show dollar value for each unit of work scheduled. Change Orders shall be added as separate line items. The schedule of values shall be submitted to the Owner and Engineer for review and approval prior to issuance of the Notice –To-Proceed to commence the work.

Mobilization is included as a lump sum line item. Payment for Mobilization will be made to the Contractor with each Pay Application in the amount in accordance to General Provisions, Section 105 and Technical Specifications, P-100.
Prior to initial payment request, the following must be submitted and approved by the Engineer and the Owner.

List of principal subcontractors and suppliers
List of key project staff and Organization chart
Schedule of values
Safety Plan
Contractor's Quality Control Plan
Shop drawing log
Project Baseline Construction Schedule

The Contractor will prepare and submit three (3) original copies of monthly invoices for work completed during the one-month period. Pay Applications shall be submitted in standard AIA Document G702 or similar. All information must be completed for the pay application to be accepted. These payment applications will be reviewed by all parties in attendance at the monthly pay application meetings. Prior to formal submission of the Application, the Contractor shall submit a rough draft plus two extra copies for the Owner and Engineer to review. Submit final approved copies (3) to: the Engineer, whose approval is required prior to submission to the Owner.

If the pay estimate and support data are not approved, the Contractor is required to submit new, revised or missing information according to the Owner's instructions. Otherwise, the Contractor shall prepare and submit to Owner an invoice in accordance with the estimate as approved. Retainage, in the amount of 10%, will be withheld on the calculated value of any work plus any other applicable taxes, with the exception of stored materials, which may be paid at the supplier's invoiced cost.

Each application for payment shall be accompanied by the following:

A notarized "Affidavit of Disbursement of Previous Periodic Payments to Subcontractors" from the General Contractor for the portion of work up to the date of that particular pay application,
Daily Construction Activity Report (copy will be available at Pre-Construction Meeting,)
DBE Payment Certification (copy will be available at Pre-Construction Meeting,)
Certified Payrolls for Contractor and Subcontractors for the most recent 30-day period,
An Owner approved construction schedule update,
Contractors Daily Reports,
Copy of progress (redlined) markups of plans.

If one or more "Notice of Non-Payment" is received by the Owner, no further payments will be approved until non-payment(s) have been satisfied and a "Release of Claim" for each "Notice" has been submitted to the Owner. Upon request, Contractor shall furnish acceptable evidence that all such claims or liens have been satisfied. On bonded projects only, the Owner may allow, with consent of Surety and indemnification of the Owner against any claims, payment for work, which there is an outstanding Notice of Non-Payment.

Any amount otherwise payable under the Contract may be withheld, in whole or in part if:

Any claims are filed against Contractor by Owner or third parties, or if reasonable evidence indicates the probability of filing any such claim, or
Contractor is in default of any Contract condition, or
There is reasonable doubt that this Contract can be completed within the time specified or for the balance then unpaid,
Defective work or material is not remedied,
Contractor persistently fails to carry out the work in accordance with the Contract Documents,
Contractor fails to submit the information required by this Contract, or
Contractor fails to submit an owner approved updated Schedule with each Application for Payment.

If claims or liens filed against Contractor or property of Owner connected with performance under this Contract are not promptly removed by Contractor after receipt of written notice from Owner to do so, Owner may remove such claims or liens and all costs in connection with such removal shall be deducted from withheld payments or other monies due, or which may become due, to Contractor. If the amount of such withheld payments or other monies due Contractor under the Contract is insufficient to meet such cost, or if any claim or lien against Contractor is discharged by Owner after final payment is made, Contractor and its surety or sureties shall promptly pay Owner all costs (including attorney's fees) incurred thereby regardless of when such claim or lien arose.

Following issuance, by the Engineer, of a Certificate of Substantial Completion, Contractor may submit special payment request, provided the following have been completed:

Obtain permits, certificates of inspection and other approvals and releases by governing authorities, required for the Owner's occupancy and use of the project.
Complete final cleaning of the Work.

Submit record documents (record drawings).
Submit listing of work to be completed before final acceptance.
Settle liens and other claims.
Obtain Consent of Surety for partial release of retainage.
Settle Liquidated Damages due to Owner, if any.

Upon receipt by Owner of Contractor's written Notice of Final Completion of its work under this Contract, in accordance with General Provisions Section 50, Owner shall verify all work has been completed on the project. When all work has been verified as complete, and the Contractor completes and submits the items listed below, the Contractor may submit a final invoice.

Complete work listed as incomplete at the time of Substantial Completion and obtain Engineer certification of completed Work.
Submit proof of payment on fees, taxes or similar obligations.
Transfer operational, access, security and similar provisions to Owner; remove temporary facilities, tools and similar items.
Obtain Consent of Surety for final payment and/or partial release of retainage.
All information required by SP 17.0 Project Closeout.
Obtain certification of as-built (record) drawings from Engineer

15.0 ENVIRONMENTAL PROTECTION

The Contractor shall comply with all applicable federal and local regulations regarding environmental protection and shall adhere to the following specific requirements. Unless otherwise noted, no direct payment shall be made for any work under this section. It shall be considered incidental to the various other contract items.

Air Quality

Burning will not be permitted on airport property.
The Contractor shall adhere to the applicable techniques for control of dust and other air pollutants described in Section 2-14 of FAA Advisory Circular (AC) 150/5370-2E.
The Contractor shall conduct his activities so as to minimize wind erosion of graded areas and prevent, to the maximum extent feasible, blowing soil including dust and sand particles. Newly graded areas shall be paved, turfed and/or mulched, as applicable, as soon as possible after grading operations are complete to minimize exposure of the soil. The Contractor shall submit a proposed method of controlling air pollution to the Owner at least two week prior to commencement of grading operations.

Water Quality

The Contractor will comply with the intent of FAA AC 150/5370-2E and shall prevent water pollution caused by construction to the maximum extent possible.
Construction shall include temporary pollution control measures to ensure that soil erosion and other factors which might cause water pollution are kept to a minimum. Such measures may be ordered by the Engineer and may consist of construction of berms, dikes, dams, drains and sediment basins, or use of filter mats, woven plastic filter cloths, gravel, mulches, quick-growing grasses, sod, bituminous spray, and other erosion control devices or methods. Drains, channels, and filter cloths are described in AC 150/5320-5C, “Surface Drainage Design”.
The contractor shall comply with any or all pollution control requirements as included in the plans and specifications and with any additional requirements as may be imposed by local jurisdictional agencies as a result of project permitting. Fines for failure to control water pollution shall be the sole responsibility of the Contractor.

Spill Prevention Control and Counter Measures

The Contractor shall take all necessary precautions to prevent spill or leaks of fuels, oils, greases, hydraulic fluids and other significant materials to comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) during project construction. Should spills or leaks occur, the Contractor shall be fully and solely responsible for containment and cleanup, and shall report the spill to the Engineer, in addition to other notification

requirements. This report shall be filed even if the spill does not reach surface waters, since wells in the area may be contaminated by spills that infiltrate to the ground water. The Contractor shall include the following minimum steps in his Best Management Practices and Pollution Prevention Plan.

Execute periodic cleaning to keep the work, site and adjacent properties free from accumulations of waste materials, rubbish, windblown debris, and dust resulting from construction operations.
Provide on-site containers for the collection of waste materials, debris and rubbish. Shield any containers holding significant materials such as oil, grease, oily rags, from storm water
Remove waste materials, debris and rubbish from the site periodically and dispose of at approved locations.
Conduct cleaning and disposal operations to comply with all local, state and federal codes, ordinances, regulations, and anti-pollution laws, including NPDES requirements. Prior to beginning work, prepare and maintain on-site, a Disposal Plan for the satisfactory disposal of all waste materials and debris
Stop the source of the spill immediately, remembering to follow personal safety and protective measures and requirements.
Contain the liquid until cleanup is complete using appropriate barriers.
Notify the fire department or other designated response team immediately if the spill is larger than can be cleaned using dry methods, or if the spill is not immediately and safely contained. Report possible ground water contamination immediately to the Owner and the Health Department.
Use dry methods to clean up the spill if possible. Do not use emulsifiers or dispersant or wash the spill into surface or ground water.
Place the contaminated material from cleanup operations in sealed and labeled drums protected against storm, surface or ground water contact. Arrange for a properly licensed waste disposal firm to collect and dispose of the contaminated materials.
Provide documentary evidence, including test results as applicable, of successful cleanup and disposal of spills of significant or hazardous materials.
All disposals of waste materials, excess excavation and debris shall be offsite. Disposal locations are subject to approval by the Engineer. Contractor shall be responsible for arranging for and obtaining off-site disposal areas, including payment for all costs associated with such disposal.

Prosecution and Maintenance. In case of failure on the part of the Contractor to control air, water, or the environmental pollution, the right is reserved by the Owner to employ outside assistance to provide the necessary corrective measures. Such incurred costs, plus related consultant costs, will be charged to the Contractor and appropriate deductions made from the Contractor's progress payments. Temporary pollution control features shall be installed and acceptably maintained by the Contractor during the construction period and removed by him upon completion of the project or after permanent measures are functionally operational.

Hazardous Materials. Should the Contractor encounter unlabeled drums, materials with evident petroleum contamination, or other potentially significant or hazardous materials he shall immediately take measures to protect workers and nearby residents from exposure. The Contractor shall notify the Engineer and the appropriate hazardous materials (Hazmat) response team. The Engineer will issue instructions on proceeding or suspending construction after such notification. No delay costs will be paid if work may proceed in the area or elsewhere on the project without exceeding the available float time owned by the Owner or if contamination is the fault of the Contractor. Delay costs will be paid at the unit bid price per day otherwise.

Conflict with Other Controls. In the event of conflict between these requirements and applicable laws, rules or regulations of Federal, state or local agencies, the more restrictive laws, rules or regulations shall apply. The Contractor shall be responsible for assuring compliance to the extent that construction practices, operations and work are involved.

16.0 DISPUTES

In addition to the requirements of General Provision GP 50-11, any dispute relating to a question of fact arising under this Contract shall be resolved through good faith efforts upon the part of Contractor and Owner or its representatives. At all times, Contractor shall carry on the work and maintain his progress schedule in accordance with the requirements of the Contract and the determination of the Owner or its representatives, pending resolution of any dispute. Any dispute that is not disposed of by mutual agreement shall be decided by the Owner or its

representatives who shall reduce such decision to writing. The decision of the Owner or its representatives shall be final and conclusive. Contractor's failure to protest Owner's determinations, instructions, clarifications or decisions within fourteen (14) calendar days after receipt thereof shall constitute a waiver by Contractor of all its rights to further protest, judicial or otherwise.

17.0 PROJECT CLOSEOUT

Progress Records. During construction, Contractor shall keep a marked-up, up-to-date set of plans and specifications showing as-is conditions on the site annotated to clearly indicate all substitutions that are incorporated into the work. Where selection of more than one product is specified, annotation shall show which product was installed. These plans and specifications shall be available to the Owner for inspection at any time but will be inspected prior to acceptance of application for payment.

Final Records. Upon completion of work, the Contractor shall furnish to the Owner a complete set of marked-up, as-built plans and specifications with RECORD clearly printed on cover. Contractor shall accurately and neatly transfer all annotations from progress as-builts to final as-builts. Label each document "PROJECT RECORD" in neat, large, printed letters. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of construction; field changes of dimension and detail; details not on original contract drawings; in addition to the following information shall be submitted to the Owner:

Complete set of ~~Mylar~~ as-built drawings - hard copy and electronic
Documentation relative to disposition of punch list
As-built shop drawings
Guarantees/warranties/certifications
Operation and maintenance manuals (3 Sets submitted in 3-Ring Binder)
Back-up documentation for outstanding and unresolved contract modifications/ claims
Final DBE/EEO compliance documentation
Outstanding materials delivery/inspection tickets
Stored materials reconciliation and final disposition
Reimbursement of failed tests and inspections.
Affidavit of Release of Liens/Consent of Surety for Final Payment

Endorsement. Contractor shall sign and date the cover of the record plans and specifications and shall note thereon that deviations and annotations are complete and accurate.

Contractor shall, at its expense, and unless not later than thirty (30) calendar days from and after Notice of Final Acceptance and before Final Payment, furnish to Owner final above required documentation.

18.0 STAGING AREAS

All Contractor's work areas on the jobsite will be assigned by Owner. Contractor shall confine its office, shops, storage, assembly and equipment and vehicle parking to the areas so assigned. Before commencing work, the Contractor shall provide a temporary office on or in the vicinity of the site of the work, which shall have a telephone where a representative of the Contractor may be reached at all times during normal working hours if required. In addition a temporary office shall also be provided for the Engineer, as specified under General Provisions, Section 60. Should Contractor find it necessary or advantageous to use any additional land outside the Project site for any purpose whatever, Contractor shall, at its expense, provide and make its own arrangements for the use of such additional land. The Contractor shall be responsible for costs of electrical, telephone, and other services to these staging areas, as well as any locally required building construction or temporary use permits. Refer to Special Provision SP 4.0 for additional requirements.

All on-site Contractor equipment and plant shall meet and be safely operated in accordance with applicable local and federal environmental regulations.

19.0 SCRUTINIZED COMPANIES – APPLICABLE TO CONTRACTS VALUED OVER ONE MILLION DOLLARS

19.1 As provided in F.S. 287.135, by entering into this Contract or performing any work in furtherance hereof, the CONTRACTOR certifies that it, its affiliates, suppliers and subcontractors who will perform hereunder, have not been placed on the Scrutinized Companies With Activities in Sudan List or Scrutinized Companies With Activities in The Iran Petroleum Energy Sector List created pursuant to F.S. 215.473.

If the City determines, using credible information available to the public, that a false certification has been submitted by CONTRACTOR, this Contract may be terminated and a civil penalty equal to the greater of $2 million or twice the amount of this Contract shall be imposed, pursuant to F.S. 287.135.

END OF SPECIAL PROVISIONS

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GENERAL PROVISIONS

SECTION 10
DEFINITION OF TERMS

Whenever the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be interpreted as follows:

10-01 AASHTO. The American Association of State Highway and Transportation Officials, the successor association to AASHO.

10-02 ACCESS ROAD. The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public highway.

10-03 ADVERTISEMENT. A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.

10-03A ADVISORY CIRCULAR. A document issued by the FAA containing informational material and guidance. When referred to in the drawings (plans) and specifications, advisory circulars shall have the same force as supplemental specifications.

10-04 AIRPORT IMPROVEMENT PROGRAM (AIP). A grant-in-aid program, administered by the Federal Aviation Administration.

10-05 AIR OPERATIONS AREA (AOA). For the purpose of these specifications, the term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.

10-06 AIRPORT. Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; and airport buildings and facilities located in any of these areas, and includes a heliport.

10-07 ASTM INTERNATIONAL (ASTM). Formerly known as the American Society for Testing and Materials (ASTM).

10-08 AWARD. The Owner's notice to the successful bidder of the acceptance of the submitted bid.

10-09 BIDDER. Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.

10-10 BUILDING AREA. An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.

10-11 CALENDAR DAY. Every day shown on the calendar.

10-11a CERTIFICATION. When "certification" is used to describe that which is to be submitted for approval from the Contractor, jointly with a supplier or by himself for his own materials, whether manufactured or purchased by the Contractor, will be construed to mean compliance in individual or completed form with the drawings (plans), specifications and/or intent of the design.

10-12 CHANGE ORDER. A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for the work affected by such changes. The work, covered by a change order, shall be within the scope of the contract.

10-13 CONTRACT. ~~The written agreement covering the work to be performed. The awarded contract shall include, but is not limited to: The Advertisement; The Contract Form; The Proposal; The Performance Bond; The Payment Bond; any required insurance certificates; The Specifications; The Plans, and any addenda issued to bidders.~~ **The written agreement between the Owner and Contractor, covering the work to be performed. The awarded Contract shall include, but is not limited to: The Advertisement; The Contract Form; The Proposal; The Performance Bond and Payment Bond; any required insurance certificates; The General Provisions; The General Requirements, The Special Provisions; The Specifications; Standard Forms; The Drawings (Plans), any addenda issued to bidders, Change Orders, Terms and Conditions, and agreements which are required to complete the construction of the work in an acceptable manner, including authorized extensions thereof, all of which constitute one instrument.**

10-14 CONTRACT ITEM (PAY ITEM). A specific unit of work for which a price is provided in the contract.

10-15 CONTRACT TIME. The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.

10-16 CONTRACTOR. The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.

10-17 CONTRACTOR'S LABORATORY. The Contractor's quality control organization in accordance with the Contractor Quality Control Program.

10-18 CONSTRUCTION SAFETY AND PHASING PLAN (CSPP). The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the Invitation for Bids and becomes part of the project specifications.

10-19 DRAINAGE SYSTEM. The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.

10-20 ENGINEER. The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering inspection of the contract work and acting directly or through an authorized representative.

10-21 EQUIPMENT. All machinery, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work.

10-22 EXTRA WORK. An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Engineer to be necessary to complete the work within the intended scope of the contract as previously modified.

10-23 FAA. The Federal Aviation Administration of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or his/her duly authorized representative.

10-24 FEDERAL SPECIFICATIONS. The Federal Specifications and Standards, Commercial Item Descriptions, and supplements, amendments, and indices thereto are prepared and issued by the General Services Administration of the Federal Government.

10-25 FORCE ACCOUNT. Force account construction work is construction that is accomplished through the use of material, equipment, labor, and supervision provided by the Owner or by another public agency pursuant to an agreement with the Owner.

10-26 INSPECTOR. An authorized representative of the Engineer or Owner assigned to make all necessary inspections and observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.

10-27 INTENTION OF TERMS. Whenever, in these specifications or on the plans, the words ``directed,'' ``required,'' ``permitted,'' ``ordered,'' ``designated,'' ``prescribed,'' or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer is intended; and similarly, the words ``approved,'' ``acceptable,'' ``satisfactory,'' or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer, subject in each case to the final determination of the Owner.

Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.

10-28 LABORATORY. The official testing laboratories of the Owner or such other laboratories as may be designated by the Engineer. Also referred to as "Engineer's Laboratory" or "quality assurance laboratory."

10-29 LIGHTING. A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.

10-30 MAJOR AND MINOR CONTRACT ITEMS. A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20 percent of the total amount of the award contract. All other items shall be considered minor contract items.

10-31 MATERIALS. Any substance specified for use in the construction of the contract work.

10-32 NOTICE TO PROCEED (NTP). A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.

10-33 OWNER. The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. For AIP contracts, the term "sponsor" shall have the same meaning as the term "Owner." Where the term "Owner" is capitalized in this document, it shall mean airport owner or sponsor only.

10-34 PASSENGER FACILITY CHARGE (PFC). Per 14 CFR Part 158 and 49 USC § 40117, a PFC is a "charge imposed by a public agency on passengers enplaned at a commercial service airport it controls."

10-35 PAVEMENT. The combined surface course, base course, and subbase course, if any, considered as a single unit.

10-36 PAYMENT BOND. The approved form of security furnished by the Contractor and his/her surety as a guaranty that he will pay in full all bills and accounts for materials and labor used in the construction of the work.

10-37 PERFORMANCE BOND. The approved form of security furnished by the Contractor and his/her surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.

10-38 PLANS. The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications.

10-39 PROJECT. The agreed scope of work for accomplishing specific airport development with respect to a particular airport.

10-40 PROPOSAL. The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.

10-41 PROPOSAL GUARANTY. The security furnished with a proposal to guarantee that the bidder will enter into a contract if his/her proposal is accepted by the Owner.

10-42 RUNWAY. The area on the airport prepared for the landing and takeoff of aircraft.

10-42a SPECIAL PROVISIONS. The specific clauses setting forth conditions or requirements peculiar to the project under consideration.

10-43 SPECIFICATIONS. A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.

10-44 SPONSOR. ~~See definition above of "Owner."~~ A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.

10-45 STRUCTURES. Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; flexible and rigid pavements; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.

10-45a SUBCONTRACTOR. The pre-qualified (where required) individual, partnership or corporation, or a combination thereof, undertaking the execution of a part of the work under the terms of the Contract, by virtue of an agreement with the contractor approved by the Owner.

10-46 SUBGRADE. The soil that forms the pavement foundation.

10-47 SUPERINTENDENT. The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the Engineer, and who shall supervise and direct the construction.

10-48 SUPPLEMENTAL AGREEMENT. A written agreement between the Contractor and the Owner covering (1) work that would increase or decrease the total amount of the awarded contract, or any major contract item, by more than 25 percent, such increased or decreased work being within the scope of the originally awarded contract; or (2) work that is not within the scope of the originally awarded contract.

10-49 SURETY. The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.

10-50 TAXIWAY. For the purpose of this document, the term taxiway means the portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas and terminal areas.

10-51 WORK. The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.

10-52 WORKING DAY. A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least 6 hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work, requiring the presence of an inspector, will be considered as working days.

END OF SECTION 10

SECTION 20
PROPOSAL REQUIREMENTS AND CONDITIONS

20-01 ADVERTISEMENT Notice to Bidders is an official published advertisement that states the time and place for submitting sealed proposals; a description of the proposed work; instructions to bidders as to obtaining proposal forms, plans, and specifications; proposal guaranty required; and the Owner's right to reject any and all bids.

20-02 QUALIFICATIONS OF BIDDERS. To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five (5) calendar days of Owner's request for written evidence, such as financial data, previous experience, present commitments and other such data as may be called for. By submission of a bid, each bidder certifies the Bidder's qualification to do business in the State of Florida where the Project is located or covenants to obtain such qualification prior to award of the Contract. A list of all proposed subcontractors and similar qualification data for each subcontractor must also be submitted.

20-02.1 SUBCONTRACTORS AND SUPPLIERS. The contractor shall not employ any subcontractor or supplier or other person or organization whether initially or as a substitute, against whom the Owner or Engineer may have reasonable objection. Contractor shall not be required to employ any subcontractor, supplier or other person or organization to furnish or perform any of the work against whom the Contractor has reasonable objection.
If contractor has submitted a list of proposed subcontractors and suppliers as required in Section 20-02 and Owner or Engineer has reasonable objection after due investigation to any such subcontractor or supplier, contractor shall submit an acceptable substitute without adjustment of the Contract price.

20-03 CONTENTS OF PROPOSAL FORMS. The Owner shall furnish bidders with proposal forms. All papers bound with or attached to the proposal forms are necessary parts and must not be detached.

The plans, specifications, and other documents designated in the proposal form shall be considered a part of the proposal whether attached or not.

20-04 ISSUANCE OF PROPOSAL FORMS. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder should such bidder be in default for any of the following reasons:

a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.

b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force (with the Owner) at the time the Owner issues the proposal to a prospective bidder.

c. Documented record of Contractor default under previous contracts with the Owner.

d. Documented record of unsatisfactory work on previous contracts with the Owner.

20-05 INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract. The Owner does not expressly or by implication agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as hereinafter provided in the subsection titled ALTERATION OF WORK AND QUANTITIES of Section 40 without in any way invalidating the unit bid prices.

20-06 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. He shall satisfy himself as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed contract, plans, and specifications.

Boring logs and other records of subsurface investigations and tests are available for inspection of bidders. It is understood and agreed that such subsurface information, whether included in the plans, specifications, or otherwise made available to the bidder, was obtained and is intended for the Owner's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that each bidder is solely responsible for all assumptions, deductions, or conclusions which he may make or obtain from his/her examination of the boring logs and other records of subsurface investigations and tests that are furnished by the Owner.

20-07 PREPARATION OF PROPOSAL. The bidder shall submit his/her proposal on the forms furnished by the Owner. All blank spaces in the proposal forms must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals for which he proposes to do each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall sign his/her proposal correctly and in ink. If the proposal is made by an individual, his/her name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state under the laws of which the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of his/her authority to do so and that the signature is binding upon the firm or corporation.

20-08 RESPONSIVE AND RESPONSIBLE BIDDER. A responsive bid conforms to all significant terms and conditions contained in the Sponsor's Invitation for Bid. It is the Sponsor's responsibility to decide if the exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

A responsible bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 49 CFR § 18.36(b)(8). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

20-09 IRREGULAR PROPOSALS. Proposals shall be considered irregular for the following reasons:

a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.

b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.

c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.

d. If the proposal contains unit prices that are obviously unbalanced.

e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

20-10 BID GUARANTEE. Each separate proposal shall be accompanied by a ~~certified check, or other specified acceptable collateral, in the amount specified in the proposal form~~ **bid guarantee equivalent to five percent of the bid price. It shall consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of the bid, execute such contractual documents as may be required within the time specified**. Such ~~check, or collateral~~ **guarantee,** shall be made payable to the Owner.

20-12 WITHDRAWAL OR REVISION OF PROPOSALS. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner in writing or by fax/email before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-13 PUBLIC OPENING OF PROPOSALS. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-14 DISQUALIFICATION OF BIDDERS. A bidder shall be considered disqualified for any of the following reasons:

a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.

b. Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the Owner until any such participating bidder has been reinstated by the Owner as a qualified bidder.

c. If the bidder is considered to be in ``default'' for any reason specified in the subsection titled ISSUANCE OF PROPOSAL FORMS of this section.

END OF SECTION 20

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SECTION 30
AWARD AND EXECUTION OF CONTRACT

30-01 CONSIDERATION OF PROPOSALS. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit price written in words shall govern.

Until the award of a contract is made, the Owner reserves the right to reject a bidder's proposal for any of the following reasons:

a. If the proposal is irregular as specified in the subsection titled IRREGULAR PROPOSALS of Section 20.

b. If the bidder is disqualified for any of the reasons specified in the subsection titled DISQUALIFICATION OF BIDDERS of Section 20.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

30-02 AWARD OF CONTRACT. The award of a contract, if it is to be awarded, shall be made within 90 calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

Award of the contract shall be made by the Owner to the lowest, qualified bidder whose proposal conforms to the cited requirements of the Owner. ~~**Unless otherwise specified in this subsection, no award shall be made until the FAA has concurred in the Owner's recommendation to make such award and has approved the Owner's proposed contract to the extent that such concurrence and approval are required by 49 CFR Part 18.**~~

30-03 CANCELLATION OF AWARD. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with the subsection titled APPROVAL OF CONTRACT of this section.

30-04 RETURN OF PROPOSAL GUARANTY. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the Owner has made a comparison of bids as hereinbefore specified in the subsection titled CONSIDERATION OF PROPOSALS of this section. Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner receives the contracts bonds as specified in the subsection titled REQUIREMENTS OF CONTRACT BONDS of this section.

30-05 REQUIREMENTS OF CONTRACT BONDS. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 EXECUTION OF CONTRACT. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return such signed contract to the owner, along with the fully executed surety bond or bonds specified in the subsection titled REQUIREMENTS OF CONTRACT BONDS of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder. If the contract is mailed, special handling is recommended.

30-07 APPROVAL OF CONTRACT. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract

to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.

30-08 FAILURE TO EXECUTE CONTRACT. Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the 15 calendar day period specified in the subsection titled ~~REQUIREMENTS OF CONTRACT BONDS~~ EXECUTION OF CONTRACT of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidation of damages to the Owner.

END OF SECTION 30

SECTION 40
SCOPE OF WORK

40-01 INTENT OF CONTRACT. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 ALTERATION OF WORK AND QUANTITIES. The owner reserves and shall have the right to make such alterations in the work as may be necessary or desirable to complete the work originally intended in an acceptable manner. Unless otherwise specified herein, the Engineer shall be and is hereby authorized to make such alterations in the work as may increase or decrease the originally awarded contract quantities, provided that the aggregate of such alterations does not change the total contract cost or the total cost of any major contract item by more than 25 percent (total cost being based on the unit prices and estimated quantities in the awarded contract). Alterations that do not exceed the 25 percent limitation shall not invalidate the contract nor release the surety, and the Contractor agrees to accept payment for such alterations as if the altered work had been a part of the original contract. These alterations that are for work within the general scope of the contract shall be covered by ``Change Orders" issued by the Engineer. Change orders for altered work shall include extensions of contract time where, in the Engineer's opinion, such extensions are commensurate with the amount and difficulty of added work.

Should the aggregate amount of altered work exceed the 25 percent limitation hereinbefore specified, such excess altered work shall be covered by supplemental agreement. If the owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

~~**All supplemental agreements shall be approved by the FAA and shall include valid wage determinations of the U.S. Secretary of Labor when the amount of the supplemental agreement exceeds $2,000.**~~ **However, if the Contractor elects to waive the limitations on work that increase or decrease the originally awarded contract or any major contract item by more than 25 percent, the supplemental agreement shall be subject to the same U.S. Secretary of Labor wage determination as was included in the originally awarded contract.**

All supplemental agreements shall require consent of the Contractor's surety and separate performance and payment bonds.

40-03 OMITTED ITEMS. The Engineer may, in the Owner's best interest, omit from the work any contract item, except major contract items. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with the subsection titled PAYMENT FOR OMITTED ITEMS of Section 90.

40-04 EXTRA WORK. Should acceptable completion of the contract require the Contractor to perform an item of work for which no basis of payment has been provided in the original contract or previously issued change orders or supplemental agreements, the same shall be called “Extra Work.” Extra Work that is within the general scope of the contract shall be covered by written change order. Change orders for such Extra Work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the Engineer's opinion, is necessary for completion of such Extra Work.

When determined by the Engineer to be in the Owner's best interest, he may order the Contractor to proceed with Extra Work by force account as provided in the subsection titled PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK of Section 90.

Extra Work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a Supplemental Agreement as hereinbefore defined in the subsection titled SUPPLEMENTAL AGREEMENT of Section 10.

Any claim for payment of Extra Work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 MAINTENANCE OF TRAFFIC. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration.

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas of the airport with respect to his/her own operations and the operations of all his/her subcontractors as specified in the subsection titled LIMITATION OF OPERATIONS of Section 80. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in the subsection titled CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS in Section 70.

b. With respect to his/her own operations and the operations of all his/her subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying: personnel; equipment; vehicles; storage areas; and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport.

c. When the contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to accommodate traffic. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices (MUTCD) (http://mutcd.fhwa.dot.gov/), unless otherwise specified herein. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways.

The Contractor shall make his/her own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of aircraft and vehicular traffic as specified in this subsection.

The cost of maintaining the aircraft and vehicular traffic specified in this subsection shall not be measured or paid for directly, but shall be included in the various contract items.

40-06 REMOVAL OF EXISTING STRUCTURES. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Engineer shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the Engineer in accordance with the provisions of the contract.

Except as provided in the subsection titled RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK of this section, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be utilized in the work as otherwise provided for in the contract and shall remain the property of the Owner when so utilized in the work.

40-07 RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be either embankment or waste, he may at his/her option either:

a. Use such material in another contract item, providing such use is approved by the Engineer and is in conformance with the contract specifications applicable to such use; or,

b. Remove such material from the site, upon written approval of the Engineer; or

c. Use such material for his/her own temporary construction on site; or,

d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., he shall request the Engineer's approval in advance of such use.

Should the Engineer approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at his/her own expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for his/her use of such material so used in the work or removed from the site.

Should the Engineer approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of his/her exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 FINAL CLEANUP. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. He shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of such property owner.

END OF SECTION 40

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SECTION 50
CONTROL OF WORK

50-01 AUTHORITY OF THE ENGINEER. The Engineer shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the manner of performance and rate of progress of the work. The Engineer shall decide all questions that may arise as to the interpretation of the specifications or plans relating to the work. The Engineer shall determine the amount and quality of the several kinds of work performed and materials furnished which are to be paid for the under contract.

The Engineer does not have the authority to accept pavements that do not conform to FAA specification requirements.

50-02 CONFORMITY WITH PLANS AND SPECIFICATIONS. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans or specifications.

If the Engineer finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications but that the portion of the work affected will, in his/her opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, he will advise the Owner of his/her determination that the affected work be accepted and remain in place. In this event, the Engineer will document his/her determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. The Engineer's determination and recommended contract price adjustments will be based on good engineering judgment and such tests or retests of the affected work as are, in his/her opinion, needed. Changes in the contract price shall be covered by contract modifications (change order or supplemental agreement) as applicable.

If the Engineer finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the Engineer's written orders.

For the purpose of this subsection, the term ``reasonably close conformity'' shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the Engineer's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's prosecution of the work, when, in the Engineer's opinion, such compliance is essential to provide an acceptable finished portion of the work.

For the purpose of this subsection, the term ``reasonably close conformity'' is also intended to provide the Engineer with the authority, after consultation with the FAA, to use good engineering judgment in his/her determinations as to acceptance of work that is not in strict conformity but will provide a finished product equal to or better than that intended by the requirements of the contract, plans and specifications.

For the purpose of this subsection, the term “reasonably close conformity” is also intended to provide the Engineer with the authority, after consultation with the FAA, to use sound engineering judgment in his or her determinations as to acceptance of work that is not in strict conformity, but will provide a finished product equal to or better than that intended by the requirements of the contract, plans and specifications.

The Engineer will not be responsible for the Contractor’s means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 COORDINATION OF CONTRACT, PLANS, AND SPECIFICATIONS. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or

testing, and cited FAA advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited standards for testing occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the Engineer for an interpretation and decision, and such decision shall be final.

50-04 COOPERATION OF CONTRACTOR. The Contractor will be supplied with five copies each of the plans and specifications. He shall have available on the work at all times one copy each of the plans and specifications. Additional copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and he shall cooperate with the Engineer and his/her inspectors and with other contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as his/her agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the Engineer or his/her authorized representative.

50-05 COOPERATION BETWEEN CONTRACTORS. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct his/her work so as not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with his/her contract and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced by him because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange his/her work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. He shall join his/her work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-06 CONSTRUCTION LAYOUT AND STAKES. The Engineer shall establish horizontal and vertical control only. The Contractor must establish all layout required for the construction of the work. Such stakes and markings as the Engineer may set for either his/her own or the Contractor's guidance shall be preserved by the Contractor. In case of negligence on the part of the Contractor, or his/her employees, resulting in the destruction of such stakes or markings, an amount equal to the cost of replacing the same may be deducted from subsequent estimates due the Contractor at the discretion of the Engineer.

The Contractor will be required to furnish all lines, grades and measurements from the control points necessary for the proper prosecution and control of the work contracted for under these specifications.

The Contractor must give copies of survey notes to the Engineer for each area of construction and for each placement of material as specified to allow the Engineer to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. All surveys must be provided to the Engineer prior to commencing work items that will cover or disturb the survey staking as set by the Contractor’s surveyor. Survey(s) and notes shall be provided in the following format(s): AutoCAD 2014 or newer and hand notes. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

The Contractor must give weekly copies of the survey notes to the Engineer so that the Engineer may check them as to accuracy and method of staking. All areas that are staked by the Contractor must be checked by the Engineer prior to beginning any work in the area. The Engineer will make periodic checks of the grades and alignment set by the Contractor. In case of error on the part of the Contractor, or his/her employees, resulting in establishing grades and/or alignment that are not in accordance with the plans or established by the Engineer, all construction not in accordance with the established grades and/or alignment shall be replaced without additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses therewith. The cost thereof shall be included in the price of the bid for the various items of the Contract.

Construction Staking and Layout includes but is not limited to:

a. Clearing and Grubbing perimeter staking

b. Rough Grade slope stakes at 100-foot (30-m) stations

c. Drainage Swales slope stakes and flow line blue tops at 50-foot (15-m) stations

Subgrade blue tops at 25-foot (7.5-m) stations and 25-foot (7.5-m) offset distance (maximum) for the following section locations:

a. Runway – minimum five (5) per station

b. Taxiways – minimum three (3) per station

c. Holding apron areas – minimum three (3) per station

d. Roadways – minimum three (3) per station

Base Course blue tops at 25-foot (7.5-m) stations and 25-foot (7.5-m) offset distance (maximum) for the following section locations:

a. Runway – minimum five (5) per station

b. Taxiways – minimum three (3) per station

c. Holding apron areas – minimum three (3) per station

Pavement areas:

a. Edge of Pavement hubs and tacks (for stringline by Contractor) at 100-foot (30-m) stations.

b. Between Lifts at 25-foot (7.5-m) stations for the following section locations:

(1) Runways – each paving lane width

(2) Taxiways – each paving lane width

(3) Holding areas – each paving lane width

c. After finish paving operations at 50-foot (15-m) stations:

(1) All paved areas – Edge of each paving lane prior to next paving lot

d. Shoulder and safety area blue tops at 50-foot (15-m) stations and at all break points with maximum of 50-foot (15-m) offsets.

e. Fence lines at 100-foot (30-m) stations minimum.

f. Electrical and Communications System locations, lines and grades including but not limited to duct runs, connections, fixtures, signs, lights, Visual Approach Slope Indicators (VASIs), Precision Approach Path Indicators (PAPIs), Runway End Identifier Lighting (REIL), Wind Cones, Distance Markers (signs), pull boxes and manholes.

g. Drain lines, cut stakes and alignment on 25-foot (7.5-m) stations, inlet and manholes.

h. Painting and Striping layout (pinned with 1.5 inch PK nails) marked for paint Contractor. (All nails shall be removed after painting).

i. Laser, or other automatic control devices, shall be checked with temporary control point or grade hub at a minimum of once per 400 feet (120 m) per pass (that is, paving lane).

The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor.
Controls and stakes disturbed or suspect of having been disturbed shall be checked and/or reset as directed by the Engineer without additional cost to the Owner.

50-07 AUTOMATICALLY CONTROLLED EQUIPMENT. Whenever batching or mixing plant equipment is required to be operated automatically under the contract and a breakdown or malfunction of the automatic controls occurs, the equipment may be operated manually or by other methods for a period 48 hours following the breakdown or malfunction, provided this method of operations will produce results which conform to all other requirements of the contract.

50-08 AUTHORITY AND DUTIES OF INSPECTORS. Inspectors employed by the Owner shall be authorized to inspect all work done and all material furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the contract. Inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

Inspectors employed by the Owner are authorized to notify the Contractor or his/her representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the Engineer for his/her decision.

50-09 INSPECTION OF THE WORK. All materials and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the Engineer requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Any work done or materials used without supervision or inspection by an authorized representative of the Owner may be ordered removed and replaced at the Contractor's expense unless the Owner's representative failed to inspect after having been given reasonable notice in writing that the work was to be performed.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the Engineer as provided in the subsection titled CONFORMITY WITH PLANS AND SPECIFICATIONS of this section.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of the subsection titled CONTRACTOR'S RESPONSIBILITY FOR WORK of Section 70.

No removal work made under provision of this subsection shall be done without lines and grades having been given by the Engineer. Work done contrary to the instructions of the Engineer, work done beyond the lines shown on the plans or as given, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply forthwith with any order of the Engineer made under the provisions of this subsection, the Engineer will have authority to cause unacceptable work to be remedied or removed and replaced and unauthorized work to be removed and to deduct the costs (incurred by the Owner) from any monies due or to become due the Contractor.

50-11 LOAD RESTRICTIONS. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor shall be responsible for all damage done by his/her hauling equipment and shall correct such damage at his/her own expense.

50-12 MAINTENANCE DURING CONSTRUCTION. The Contractor shall maintain the work during construction and until the work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 FAILURE TO MAINTAIN THE WORK. Should the Contractor at any time fail to maintain the work as provided in the subsection titled MAINTENANCE DURING CONSTRUCTION of this section, the Engineer shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the Engineer's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be deducted from monies due or to become due the Contractor.

50-14 PARTIAL ACCEPTANCE. If at any time during the prosecution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, he may request the Engineer to make final inspection of that unit. If the Engineer finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, he may accept it as being completed, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 FINAL ACCEPTANCE. Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be completed in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The Engineer shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions **(punch list items)** for correction of same and the Contractor shall immediately comply with and execute such instructions**. The punch list items shall be corrected by the Contractor within 30 calendar days and prior to any request for Final Inspection and Acceptance.** Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the Engineer will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 CLAIMS FOR ADJUSTMENT AND DISPUTES. If for any reason the Contractor deems that additional compensation is due him for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, he shall notify the Engineer in writing of his/her intention to claim such additional compensation before he begins the work on which he bases the claim. If such notification is not given or the Engineer is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the Engineer has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within l0 calendar days, submit his/her written claim to the Engineer who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

50-17 COST REDUCTION INCENTIVE. The provisions of this subsection will apply only to contracts awarded to the lowest bidder pursuant to competitive bidding.

On projects with original contract amounts in excess of $100,000, the Contractor may submit to the Engineer, in writing, proposals for modifying the plans, specifications or other requirements of the contract for the sole purpose of reducing the cost of construction. The cost reduction proposal shall not impair, in any manner, the essential functions or characteristics of the project, including but not limited to service life, economy of operation, ease of maintenance, desired appearance, design and safety standards. This provision shall not apply unless the proposal submitted is specifically identified by the Contractor as being presented for consideration as a value engineering proposal.

Not eligible for cost reduction proposals are changes in the basic design of a pavement type, runway and taxiway lighting, visual aids, hydraulic capacity of drainage facilities, or changes in grade or alignment that reduce the geometric standards of the project.

As a minimum, the following information shall be submitted by the Contractor with each proposal:

a. A description of both existing contract requirements for performing the work and the proposed changes, with a discussion of the comparative advantages and disadvantages of each;

b. An itemization of the contract requirements that must be changed if the proposal is adopted;

c. A detailed estimate of the cost of performing the work under the existing contract and under the proposed changes;

d. A statement of the time by which a change order adopting the proposal must be issued;

e. A statement of the effect adoption of the proposal will have on the time for completion of the contract; and

f. The contract items of work affected by the proposed changes, including any quantity variation attributable to them.

The Contractor may withdraw, in whole or in part, any cost reduction proposal not accepted by the Engineer, within the period specified in the proposal. The provisions of this subsection shall not be construed to require the Engineer to consider any cost reduction proposal that may be submitted.

The Contractor shall continue to perform the work in accordance with the requirements of the contract until a change order incorporating the cost reduction proposal has been issued. If a change order has not been issued by the date

upon which the Contractor's cost reduction proposal specifies that a decision should be made, or such other date as the Contractor may subsequently have requested in writing, such cost reduction proposal shall be deemed rejected.

The Engineer shall be the sole judge of the acceptability of a cost reduction proposal and of the estimated net savings from the adoption of all or any part of such proposal. In determining the estimated net savings, the Engineer may disregard the contract bid prices if, in the Engineer's judgment such prices do not represent a fair measure of the value of the work to be performed or deleted.

The Owner may require the Contractor to share in the Owner's costs of investigating a cost reduction proposal submitted by the Contractor as a condition of considering such proposal. Where such a condition is imposed, the Contractor shall acknowledge acceptance of it in writing. Such acceptance shall constitute full authority for the Owner to deduct the cost of investigating a cost reduction proposal from amounts payable to the Contractor under the contract. If the Contractor's cost reduction proposal is accepted in whole or in part, such acceptance will be by a contract change order that shall specifically state that it is executed pursuant to this subsection. Such change order shall incorporate the changes in the plans and specifications which are necessary to permit the cost reduction proposal or such part of it as has been accepted and shall include any conditions upon which the Engineer's approval is based. The change order shall also set forth the estimated net savings attributable to the cost reduction proposal. The net savings shall be determined as the difference in costs between the original contract costs for the involved work items and the costs occurring as a result of the proposed change. The change order shall also establish the net savings agreed upon and shall provide for adjustment in the contract price that will divide the net savings equally between the Contractor and the Owner.

The Contractor's 50 percent share of the net savings shall constitute full compensation to the Contractor for the cost reduction proposal and the performance of the work.

Acceptance of the cost-reduction proposal and performance of the cost-reduction work shall not extend the time of completion of the contract unless specifically provided for in the contract change order.

50-18 RETEST OF WORK. When as provided for in the Contract documents, the Owner performs sampling tests of the work and the tests show a failure to meet the requirements of the Contract documents, the expense of retesting, after reworking or substitution by the Contractor will be at the expense of the Contractor and such costs will be deducted from the payments otherwise due to the Contractor.

50-19 CORRECTION OF WORK AFTER FINAL PAYMENT. Neither the final certificate, nor payment, nor any provision in the Contract documents shall relieve the Contractor of responsibility for faulty materials or workmanship and, unless otherwise specified, he shall remedy any defect due thereto and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from date of final acceptance.

The Owner shall give notice of observed defects with reasonable promptness. Wherever the word "acceptance" occurs, it shall be understood to mean final acceptance.

50-20 WARRANTY AND GUARANTEE. The Contractor warrants to the Owner that all materials furnished under this Contract shall be new unless otherwise specified and that all Work, including without limitation all materials, will be of good quality, free from faults and defects and in conformance with contract requirements. Any work not so conforming to these standards may be considered defective.

If, within one year after the date of final acceptance of the Work, or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract, any of the Work is found to be defective or not in accordance with Contract requirements, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so.

The obligations of the Contractor in this paragraph entitled WARRANTY AND GUARANTEE shall be in addition to and not in limitation of any obligations imposed upon him by special guarantees required by the contract or otherwise prescribed by law.

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SECTION 60
CONTROL OF MATERIALS

60-01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS. The materials used on the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish complete statements to the Engineer as to the origin, composition, and manufacture of all materials to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the Engineer's option, materials may be approved at the source of supply before delivery is stated. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that conforms to the requirements of cited materials specifications. In addition, where an FAA specification for airport lighting equipment is cited in the plans or specifications, the Contractor shall furnish such equipment that is:

a. Listed in FAA Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program, and Addendum that is in effect on the date of advertisement; and,

b. Produced by the manufacturer as listed in the Addendum cited above for the certified equipment part number.

The bid schedule contains airport lighting equipment is required for this contract and is to be furnished by the Contractor in accordance with the requirements of this subsection.

60-02 SAMPLES, TESTS, AND CITED SPECIFICATIONS. Unless otherwise designated, all materials used in the work shall be inspected, tested, and approved by the Engineer before incorporation in the work. Any work in which untested materials are used without approval or written permission of the Engineer shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the Engineer, shall be removed at the Contractor's expense. Unless otherwise designated, tests in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), Federal Specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids, will be made by and at the expense of the Engineer.

The testing organizations performing on site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel, including the Contractor's representative at his/her request. Unless otherwise designated, samples will be taken by a qualified representative of the Engineer. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at his/her request. **In the event that any tests show a failure to meet the requirements of the Contract Documents, the expense of retesting, after substitution or modification, shall be paid by the Contractor. The Contractor shall furnish the required samples without charge and shall give sufficient notification of the placing of orders for materials to permit testing.**

The Contractor shall employ a testing organization to perform all Contractor required Quality Control tests. The Contractor shall submit to the Engineer resumes on all testing organizations and individual persons who will be performing the tests. The Engineer will determine if such persons are qualified. All the test data shall be reported to the Engineer after the results are known. A legible, handwritten copy of all test data shall be given to the Engineer daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the Engineer showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

60-03 CERTIFICATION OF COMPLIANCE. The Engineer may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the

manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified.

Certification alone will not relieve the Contractor from his responsibility to provide materials that comply fully with the provisions of these specifications and that acceptable to the Engineer.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the Engineer.

When a material or assembly is specified by ``brand name or equal" and the Contractor elects to furnish the specified ``brand name," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

a. Conformance to the specified performance, testing, quality or dimensional requirements; and,

b. Suitability of the material or assembly for the use intended in the contract work.

Should the Contractor propose to furnish an ``or equal" material or assembly, he shall furnish the manufacturer's certificates of compliance as hereinbefore described for the specified brand name material or assembly. However, the Engineer shall be the sole judge as to whether the proposed ``or equal" is suitable for use in the work.

The Engineer reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 PLANT INSPECTION. The Engineer or his/her authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for his/her acceptance of the material or assembly.

Should the Engineer conduct plant inspections, the following conditions shall exist:

a. The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.

b. The Engineer shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

c. If required by the Engineer, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Office or working space should be conveniently located with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The Engineer shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 ENGINEER'S FIELD OFFICE. An engineer’s field office is not required.

60-06 STORAGE OF MATERIALS. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Engineer. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the Engineer. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses

for the storage of materials on private property. Upon request, the Contractor shall furnish the Engineer a copy of the property owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at his/her entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.

60-07 UNACCEPTABLE MATERIALS. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the Engineer.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the Engineer has approved its used in the work.

60-08 OWNER FURNISHED MATERIALS. The Contractor shall furnish all materials required to complete the work, except those specified herein (if any) to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified herein.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

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SECTION 70
LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

70-01 LAWS TO BE OBSERVED. The Contractor shall keep fully informed of all Federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all his/her officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his/her employees.

70-02 PERMITS, LICENSES, AND TAXES. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the work.

70-03 PATENTED DEVICES, MATERIALS, AND PROCESSES. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, he shall provide for such use by suitable legal agreement with the patentee or owner. The Contractor and the surety shall indemnify and save harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the prosecution or after the completion of the work.

70-04 RESTORATION OF SURFACES DISTURBED BY OTHERS. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work.

Except as listed ~~**above**~~ **on the plans or contract documents**, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the Engineer.

Should the owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such owners by arranging and performing the work in this contract so as to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the Engineer, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 FEDERAL AID PARTICIPATION. For AIP contracts, the United States Government has agreed to reimburse the Owner for some portion of the contract costs. Such reimbursement is made from time to time upon the Owner's request to the FAA. In consideration of the United States Government's (FAA's) agreement with the Owner, the Owner has included provisions in this contract pursuant to the requirements of Title 49 of the United States Code (USC) and the Rules and Regulations of the FAA that pertain to the work.

As required by the USC, the contract work is subject to the inspection and approval of duly authorized representatives of the Administrator, FAA, and is further subject to those provisions of the rules and regulations that are cited in the contract, plans, or specifications.

No requirement of the USC, the rules and regulations implementing the USC, or this contract shall be construed as making the Federal Government a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 SANITARY, HEALTH, AND SAFETY PROVISIONS. The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his/her employees as may be necessary to comply with the requirements of the state and local Board of Health, or of other bodies or tribunals having jurisdiction.

Attention is directed to Federal, state, and local laws, rules and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions that are unsanitary, hazardous, or dangerous to his/her health or safety.

70-07 PUBLIC CONVENIENCE AND SAFETY. The Contractor shall control his/her operations and those of his/her subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to his/her own operations and those of his/her subcontractors and all suppliers in accordance with the subsection titled MAINTENANCE OF TRAFFIC of Section 40 hereinbefore specified and shall limit such operations for the convenience and safety of the traveling public as specified in the subsection titled LIMITATION OF OPERATIONS of Section 80 hereinafter.

70-08 BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS. The Contractor shall furnish, erect, and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work. When used during periods of darkness, such barricades, warning signs, and hazard markings shall be suitably illuminated. Unless otherwise specified, barricades, warning signs, and markings for hazards that are in the air operations area (AOAs) shall be a maximum of 18 inches high. Unless otherwise specified, barricades shall be spaced not more than ~~25~~ 4 feet apart. Barricades, warning signs, and markings shall be paid for **as specified** under Section 40-05.

For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office).

When the work requires closing an air operations area of the airport or portion of such area, the Contractor shall furnish, erect, and maintain temporary markings and associated lighting conforming to the requirements of AC 150/5340-1, Standards for Airport Markings.

The Contractor shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stock piles, and his/her parked construction equipment that may be hazardous to the operation of emergency fire-rescue or maintenance vehicles on the airport in reasonable conformance to AC 150/5370-2, Operational Safety on Airports During Construction.

The Contractor shall identify each motorized vehicle or piece of construction equipment in reasonable conformance to AC 150/5370-2.

The Contractor shall furnish and erect all barricades, warning signs, and markings for hazards prior to commencing work that requires such erection and shall maintain the barricades, warning signs, and markings for hazards until their dismantling is directed by the Engineer.

Open-flame type lights shall not be permitted.

70-09 USE OF EXPLOSIVES. **Use of explosives is not allowed.**

70-10 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the prosecution of the work, resulting from any act, omission, neglect, or misconduct in his/her manner or method of executing the work, or at any time due to defective work or materials, and said responsibility will not be released until the project shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, he shall restore, at his/her own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or he shall make good such damage or injury in an acceptable manner.

Work that is to remain in place which is damaged or defaced by reasons of work performed under this Contract, shall be restored at no additional cost to the Owner.

Items removed, indicated to be salvaged for Owner or reused in new work, which are damaged beyond repair, shall be replaced with equal new materials under this Contract at no additional cost to the Owner.

Existing pavement or other existing work not specified for removal which is temporarily removed, damaged or in any way disturbed or altered by work under this Contract shall be repaired, patched, or replaced to the complete satisfaction of the Engineer at no additional cost to the Owner.

Where it is necessary to cut, alter, remove, or temporarily remove and replace existing property or equipment, the cost shall be included in the Contract price for the item creating such work.

70-11 RESPONSIBILITY FOR DAMAGE CLAIMS. The Contractor shall indemnify and save harmless the Engineer and the Owner and their officers, and employees from all suits actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the ``Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of his/her contract as may be considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, his/her surety may be held until such suit(s), action(s), or claim(s) for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he is adequately protected by public liability and property damage insurance.

70-12 THIRD PARTY BENEFICIARY CLAUSE. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create the public or any member thereof a third party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 OPENING SECTIONS OF THE WORK TO TRAFFIC. Should it be necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such ``phasing" of the work shall be specified herein and indicated on the plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified. The Contractor shall make his/her own estimate of the difficulties involved in arranging his/her work to permit such beneficial occupancy by the Owner as described ~~**below**~~ **on the plans.**~~:~~

Upon completion of any portion of the work listed above, such portion shall be accepted by the Owner in accordance with the subsection titled PARTIAL ACCEPTANCE of Section 50.

No portion of the work may be opened by the Contractor for public use until ordered by the Engineer in writing. Should it become necessary to open a portion of the work to public traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the Engineer, such portion of the work is in an acceptable

condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at his/her expense.

The Contractor shall make his/her own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

Contractor shall be required to conform to safety standards contained AC 150/5370-2, Operational Safety on Airports During Construction (See Special Provisions.)

Contractor shall refer to the approved Construction Safety Phasing Plan (CSPP) to identify barricade requirements and other safety requirements prior to opening up sections of work to traffic.

70-14 CONTRACTOR'S RESPONSIBILITY FOR WORK. Until the Engineer's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with the subsection titled PARTIAL ACCEPTANCE of Section 50, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at his/her expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding furnished under his/her contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS. As provided in the subsection titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control his/her operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans.

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of his/her responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the owners of all utility services or other facilities of his/her plan of operations. Such notification shall be in writing addressed to THE PERSON TO CONTACT as provided hereinbefore in this subsection and the subsection titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section. A copy of each notification shall be given to the Engineer.

In addition to the general written notification hereinbefore provided, it shall be the responsibility of the Contractor to keep such individual owners advised of changes in his/her plan of operations that would affect such owners.

Prior to commencing the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such owner of his/her plan of operation. If, in the Contractor's opinion, the owner's assistance is needed to locate the utility service or facility or the presence of a representative of the owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's PERSON TO CONTACT no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the Engineer.

The Contractor's failure to give the two days' notice hereinabove provided shall be cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use excavation methods acceptable to the Engineer within 3 feet of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, he shall immediately notify the proper authority and the Engineer and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the Engineer continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to his/her operations whether or not due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or his/her surety.

70-15.1 FAA FACILITIES AND CABLE RUNS. The Contractor is hereby advised that the construction limits of the project include existing facilities and buried cable runs that are owned, operated and maintained by the FAA. The Contractor, during the prosecution of the project work, shall comply with the following:

a. The Contractor shall permit FAA maintenance personnel the right of access to the project work site for purposes of inspecting and maintaining all existing FAA owned facilities.

b. The Contractor shall provide notice to the FAA Air Traffic Organization (ATO)/Technical Operations/System Support Center (SSC) Point-of-Contact through the airport Owner a minimum of seven (7) calendar days prior to commencement of construction activities in order to permit sufficient time to locate and mark existing buried cables and to schedule any required facility outages.

c. If execution of the project work requires a facility outage, the Contractor shall contact the FAA Point-of-Contact a minimum of 72 hours prior to the time of the required outage.

d. If prosecution of the project work results in damages to existing FAA equipment or cables, the Contractor shall repair the damaged item in conformance with FAA standards to the satisfaction of the above named FAA Point-of-Contact.

e. If the project work requires the cutting or splicing of FAA owned cables, the above named FAA Point-of-Contact shall be contacted a minimum of 72 hours prior to the time the cable work commences. The FAA reserves the right to have a FAA representative on site to observe the splicing of the cables as a condition of acceptance. All cable splices are to be accomplished in accordance with FAA specifications and require approval by the above named FAA Point-of-Contact as a condition of acceptance by the Owner. The Contractor is hereby advised that FAA restricts the location of where splices may be installed. If a cable splice is required in a location that is not permitted by FAA, the Contractor shall furnish and install a sufficient length of new cable that eliminates the need for any splice.

70-16 FURNISHING RIGHTS-OF-WAY. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 PERSONAL LIABILITY OF PUBLIC OFFICIALS. In carrying out any of the contract provisions or in exercising any power or authority granted to him by this contract, there shall be no liability upon the Engineer, his/her

authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 NO WAIVER OF LEGAL RIGHTS. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or his/her surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill his/her obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the owner's rights under any warranty or guaranty.

70-19 ENVIRONMENTAL PROTECTION. The Contractor shall comply with all Federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

In the event of conflict between Federal, State or local laws, codes, ordinances, rules and regulations concerning pollution control, the most restrictive applicable ones shall apply.

The Contractor shall pay special attention to the pollution control requirements of the several specifications. Work items, which may cause excessive pollution and shall be closely controlled by the Contractor, are:

a) Clearing, grubbing, burning or other disposal.
b) Stripping, excavation, and embankment.
c) Drainage and ditching.
d) Aggregate production, handling and placing.
e) Cement, lime or other stabilization.
f) Concrete and bituminous materials handling, production and paving.
g) Seeding, fertilizing, mulching and use of herbicides or insecticides.
h) Contractor's own housekeeping items; haul roads; sanitary facilities; water supply; equipment fueling, servicing and cleaning; job clean up and disposal.

When the Contractor submits his tentative progress schedule in accordance with PROSECUTION and PROGRESS, Section 80, he shall also submit for acceptance of the Owner, his schedules for accomplishment of temporary and permanent erosion control work, as are applicable for clearing, grading, structures at water courses, construction, and paving, and his proposed methods of erosion control on haul roads and borrow pits and his plan for disposal of waste materials. No work shall be started until the erosion control schedules and methods of operations have been accepted by the Owner.

All bituminous and portland cement concrete proportioning plants shall meet state requirements.
The following listed stipulations shall apply to this Contract unless more restrictive ones are specified by the plans, special provisions, laws, codes, ordinances, etc. Cost of pollution control shall be incidental to the appropriate work items unless otherwise specified.

1. Control of Water Pollution and Siltation.

(a) All work of water pollution and siltation control is subject to inspection by the local and/or state governmental enforcing agent.
(b) All applicable regulations of fish and wildlife agencies and statutes relating to the prevention and abatement of pollution shall be complied with in the performance of the Contract.
(c) Construction operations shall be conducted in such manner as to reduce erosion to the practicable minimum and to prevent damaging siltation of water courses, streams, lakes or reservoirs. The surface area of erodible land, either on or off the airport site, exposed to the elements by clearing, grubbing or grading operations, including gravel pits, waste or disposal areas and haul roads, at any one time, for this Contract, shall be subject to approval of the

Owner and the duration of such exposure prior to final trimming and finishing of the areas shall be held to the minimum practical. The Owner shall have full authority to order the suspension of grading and other operations pending adequate and proper performance of finishing and maintenance work or to restrict the trimming of erodible land exposed to the elements.

(d) Materials used for permanent erosion control measures shall meet the requirements of the applicable specifications. Gravel or stone, consisting of durable particles of rock and containing only negligible quantities of fines, shall be used for construction pads, haul roads and temporary roads in or across streams.

(e) Where called for on the plans, a stilling basin shall be constructed to prevent siltation in the stream from construction operations.

(f) The disturbance of lands and waters that are outside the limits of construction as staked is prohibited, except as found necessary and approved by the Owner.

(g) The Contractor shall conduct his work in such manner as to prevent the entry of fuels, oils, bituminous materials, chemicals, sewage or other harmful materials into streams, rivers, lakes or reservoirs.

(h) Water from aggregate washing or other operations containing sediment shall be treated by filtration, by use of a settling basin or other means to reduce the sediment content to a level acceptable to the local and/or state governmental enforcing agent.

(i) All waterways shall be cleared as soon as practicable of falsework, piling, debris or other obstructions placed during construction operations and not a part of the finished work. Care shall be taken during construction and removal of such barriers to minimize the muddying of a stream.

(j) The Contractor shall care for the temporary erosion and siltation control measures during the period that the temporary measures are required and for the permanent erosion control measures until the Contract has been completed and accepted. Such care shall consist of the repair of areas damaged by erosion, wind, fire or other causes.

(k) Permanent and temporary erosion control work that is damaged due to the Contractor's operations or where the work required is attributed to the Contractor's negligence, carelessness, or failure to install permanent controls at the proper time, shall be repaired at the Contractor's expense.

2. Control of Other Air Pollutants.

(a) Minimum possible areas of open grading, borrow or aggregate excavation shall be exposed at one time, consistent with the progress of the work.

(b) Grading areas shall be kept at proper moisture conditions.

(c) Sand or dust blows shall be temporarily mulched, with or without seeding, or otherwise controlled with stabilizing agents.

(d) Temporary roads, haul roads, traffic or work areas shall be stabilized with dust palliative, penetration asphalt, or wood chips or other approved measures to prevent dust pollution.

(e) Cements, fertilizers, chemicals, volatiles, etc., shall be stored in proper containers or with proper coverings to prevent accidental discharge into the air.

(f) Aggregate bins, cement bins, and dry material batch trucks shall be properly covered to prevent loss of material to the air.

(g) Drilling, grinding and sand blasting apparatus shall be equipped with water, chemical, or vacuum dust controlling systems.

(h) Applications of chemicals and bitumens shall be held to recommended rates.

(i) Bituminous mixing plants shall be equipped with dust collectors as noted in the specifications.

(j) Quarrying, batching, and mixing operations and the transfer of materials between trucks, bins, or stockpiles shall be properly controlled to minimize dust diffusion.

(k) When necessary, certain operations shall be delayed until proper wind or climatic conditions exist to dissipate or inhibit potential pollutants to the satisfaction of the Owner.

70-20 ARCHAEOLOGICAL AND HISTORICAL FINDINGS. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during his/her operations, any building, part of a building, structure, or object that is incongruous with its surroundings, he shall immediately cease operations in that location and notify the Engineer. The Engineer will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume his/her operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract modification (change order or supplemental agreement) as provided in the subsection titled EXTRA WORK of Section 40 and the subsection titled PAYMENT FOR EXTRA WORK AND FORCE ACCOUNT WORK of Section 90. If appropriate, the contract modification shall include an extension of contract time in accordance with the subsection titled DETERMINATION AND EXTENSION OF CONTRACT TIME of Section 80.

END OF SECTION 70

SECTION 80
PROSECUTION AND PROGRESS

80-01 SUBLETTING OF CONTRACT. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Engineer.

Should the Contractor elect to assign his/her contract, said assignment shall be concurred by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner. In case of approval, the Contractor shall file copies of all subcontracts with the Engineer.

The Contractor shall perform, with his organization, an amount of work equal to at least **35** percent of the total contract cost.

Should the Contractor elect to assign his or her contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner.

80-02 NOTICE TO PROCEED. The notice to proceed shall state the date on which it is expected the Contractor will begin the construction and from which date contract time will be charged. The Contractor shall begin the work to be performed under the contract within 10 **calendar** days of the date set by the Engineer in the written notice to proceed, but in any event, the Contractor shall notify the Engineer at least 24 hours in advance of the time actual construction operations will begin. The Contractor shall not commence any actual construction prior to the date on which the notice to proceed is issued by the owner.

80-03 EXECUTION AND PROGRESS. Unless otherwise specified, the Contractor shall submit his/her progress schedule for the Engineer's approval within 10 days after the effective date of the notice to proceed. The Contractor's progress schedule, when approved by the Engineer, may be used to establish major construction operations and to check on the progress of the work. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the Engineer's request, submit a revised schedule for completion of the work within the contract time and modify his/her operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the prosecution of the work be discontinued for any reason, the Contractor shall notify the Engineer at least 24 hours in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the notice to proceed is issued by the Owner.

80-04 LIMITATION OF OPERATIONS. The Contractor shall control his/her operations and the operations of his/her subcontractors and all suppliers so as to provide for the free and unobstructed movement of aircraft in the AIR OPERATIONS AREAS (AOA) of the airport.

When the work requires the Contractor to conduct his/her operations within an AOA of the airport, the work shall be coordinated with airport operations (through the Engineer) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the Engineer and until the necessary temporary marking and associated lighting is in place as provided in the subsection titled BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS of Section 70.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA, the Contractor shall maintain constant communications as hereinafter specified; immediately obey all instructions to vacate the AOA; immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of

the Contractor's operations in the AOA until the satisfactory conditions are provided. ~~The following AIR OPERATIONS AREA cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:~~

Refer to the CSPP for specific areas to be closed, and areas allowed for aircraft operations.

Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction (See Special Provisions).

80-04.1 OPERATIONAL SAFETY ON AIRPORT DURING CONSTRUCTION. All Contractors' operations shall be conducted in accordance with the project Construction Safety and Phasing Plan (CSPP) and the provisions set forth within the current version of Advisory Circular 150/5370-2. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a Safety Plan Compliance Document that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks of the safety plan measures to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP unless approved in writing by the Owner or Engineer.

80-05 CHARACTER OF WORKERS, METHODS, AND EQUIPMENT. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations and, in the opinion of the Engineer, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Engineer, be removed forthwith by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the Engineer.

Should the Contractor fail to remove such persons or person, or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Engineer may suspend the work by written notice until compliance with such orders.

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall be such that no injury to previously completed work, adjacent property, or existing airport facilities will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of equipment other than specified in the contract, he may request authority from the Engineer to do so. The request shall be in writing

and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this subsection.

80-06 TEMPORARY SUSPENSION OF THE WORK. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods as he may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the prosecution of the work, or for such time as is necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the Engineer's order to suspend work to the effective date of the Engineer's order to resume the work. Claims for such compensation shall be filed with the Engineer within the time period stated in the Engineer's order to resume work. The Contractor shall submit with his/her claim information substantiating the amount shown on the claim. The Engineer will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather, for suspensions made at the request of the Owner, or for any other delay provided for in the contract, plans, or specifications.

If it should become necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. He shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 DETERMINATION AND EXTENSION OF CONTRACT TIME. The number of calendar or working days allowed for completion of the work shall be stated in the proposal and contract and shall be known as the CONTRACT TIME.

Should the contract time require extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

~~a. CONTRACT TIME based on WORKING DAYS shall be calculated weekly by the Engineer. The Engineer will furnish the Contractor a copy of his/her weekly statement of the number of working days charged against the contract time during the week and the number of working days currently specified for completion of the contract (the original contract time plus the number of working days, if any, that have been included in approved CHANGE ORDERS or SUPPLEMENTAL AGREEMENTS covering EXTRA WORK).~~

~~The Engineer shall base his/her weekly statement of contract time charged on the following considerations:~~

~~(1) No time shall be charged for days on which the Contractor is unable to proceed with the principal item of work under construction at the time for at least 6 hours with the normal work force employed on such principal item. Should the normal work force be on a double shift, 12 hours shall be used. Should the normal work force be on a triple-shift, 18 hours shall apply. Conditions beyond the Contractor's control such as strikes, lockouts, unusual delays in transportation, temporary suspension of the principal item of work under construction or temporary suspension of the entire work which have been ordered by the Owner for reasons not the fault of the Contractor, shall not be charged against the contract time.~~

~~(2) The Engineer will not make charges against the contract time prior to the effective date of the notice to proceed.~~

~~(3) The Engineer will begin charges against the contract time on the first working day after the effective date of the notice to proceed.~~

~~(4) The Engineer will not make charges against the contract time after the date of final acceptance as defined in the subsection titled FINAL ACCEPTANCE of Section 50.~~

~~(5) The Contractor will be allowed 1 week in which to file a written protest setting forth his/her objections to the Engineer's weekly statement. If no objection is filed within such specified time, the weekly statement shall be considered as acceptable to the Contractor.~~

~~The contract time (stated in the proposal) is based on the originally estimated quantities as described in the subsection titled INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES of Section 20. Should the satisfactory completion of the contract require performance of work in greater quantities than those estimated in the proposal, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in contract time shall not consider either the cost of work or the extension of contract time that has been covered by change order or supplemental agreement and shall be made at the time of final payment.~~

b. CONTRACT TIME based on CALENDAR DAYS shall consist of the number of calendar days stated in the contract counting from the effective date of the notice to proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

At the time of final payment, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

c. When the contract time is a specified completion date, it shall be the date on which all contract work shall be substantially completed.

If the Contractor finds it impossible for reasons beyond his/her control to complete the work within the contract time as specified, or as extended in accordance with the provisions of this subsection, he may, at any time prior to the expiration of the contract time as extended, make a written request to the Engineer for an extension of time setting forth the reasons which he believes will justify the granting of his/her request. Requests for extension of time on calendar day projects, caused by inclement weather, shall be supported with National Weather Bureau data showing the actual amount of inclement weather exceeded which could normally be expected during the contract period. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Engineer finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, he may extend the time for completion in such amount as the conditions justify. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

80-08 FAILURE TO COMPLETE ON TIME. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in the subsection titled DETERMINATION AND EXTENSION OF CONTRACT TIME of this Section) the sum specified in the contract and proposal as liquidated damages will be deducted from any money due or to become due the Contractor or his/her surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

~~The maximum construction time allowed for Schedules [ ] will be the sum of the time allowed for individual schedules but not more than [ ] days. (Note: this paragraph will be modified for each project.)~~

Liquidated damages will be assessed as provided in the Bid Submittal Form. Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time

for completion may have been extended, will in no way operate as a wavier on the part of the Owner of any of its rights under the contract.

80-09 DEFAULT AND TERMINATION OF CONTRACT. The Contractor shall be considered in default of his/her contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons if the Contractor:

a. Fails to begin the work under the contract within the time specified in the ``Notice to Proceed,'' or

b. Fails to perform the work or fails to provide sufficient workers, equipment or materials to assure completion of work in accordance with the terms of the contract, or

c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or

d. Discontinues the prosecution of the work, or

e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or

f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or

g. Allows any final judgment to stand against him unsatisfied for a period of 10 days, or

h. Makes an assignment for the benefit of creditors, or

i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Engineer consider the Contractor in default of the contract for any reason hereinbefore, he shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the Engineer of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the prosecution of the work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Engineer will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

80-10 TERMINATION FOR NATIONAL EMERGENCIES. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the prosecution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the Engineer.

Termination of the contract or a portion thereof shall neither relieve the Contractor of his/her responsibilities for the completed work nor shall it relieve his/her surety of its obligation for and concerning any just claim arising out of the work performed.

80-11 WORK AREA, STORAGE AREA AND SEQUENCE OF OPERATIONS. The Contractor shall obtain approval from the Engineer prior to beginning any work in all areas of the airport. No operating runway, taxiway, or Air Operations Area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate his/her work in such a manner as to insure safety and a minimum of hindrance to flight operations. All Contractor equipment and material stockpiles shall be stored a minimum or **200** feet from the centerline of an active runway. No equipment will be allowed to park within the approach area of an active runway at any time. No equipment shall be within **200** feet of an active runway at any time.

END OF SECTION 80

SECTION 90
MEASUREMENT AND PAYMENT

90-01 MEASUREMENT OF QUANTITIES. All work completed under the contract will be measured by the Engineer, or his/her authorized representatives, using United States Customary Units of Measurement or the International System of Units.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet (0.8 square meter) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the Engineer.

Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

In computing volumes of excavation the average end area method or other acceptable methods will be used.

The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inches.

The term ``ton'' will mean the short ton consisting of 2,000 pounds avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, approved scales by competent, qualified personnel at locations designed by the Engineer. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the Engineer directs, and each truck shall bear a plainly legible identification mark.

Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable to the Engineer, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.

When requested by the Contractor and approved by the Engineer in writing, material specified to be measured by the cubic yard may be weighed, and such weights will be converted to cubic yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Bituminous materials will be measured by the gallon or ton. When measured by volume, such volumes will be measured at 60 F or will be corrected to the volume at 60 F using ASTM D 1250 for asphalts or ASTM D 633 for tars.

Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work.

When bituminous materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, may be used for computing quantities.

Cement will be measured by the ton or hundredweight.

Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term ``lump sum" when used as an item of payment will mean complete payment for the work described in the contract.

When a complete structure or structural unit (in effect, ``lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered by the Engineer in connection with force account work will be measured as agreed in the change order or supplemental agreement authorizing such force account work as provided in the subsection titled PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK of this section.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gage, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales.

Scales shall be accurate within one-half percent of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the inspector before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed one-tenth of 1 percent of the nominal rated capacity of the scale, but not less than 1 pound ~~(454 grams)~~. The use of spring balances will not be permitted.

Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the inspector can safely and conveniently view them.

Scale installations shall have available ten standard 50-pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment.

Scales must be tested for accuracy and serviced before use at a new site. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.

Scales ``overweighing" (indicating more than correct weight) will not be permitted to operate, and all materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of one-half of 1 percent.

In the event inspection reveals the scales have been ``underweighing" (indicating less than correct weight), they shall be adjusted, and no additional payment to the Contractor will be allowed for materials previously weighed and recorded.

All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.

When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the Engineer. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

90-02 SCOPE OF PAYMENT. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the prosecution thereof, subject to the provisions of the subsection titled NO WAIVER OF LEGAL RIGHTS of Section 70.

When the ``basis of payment'' subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 COMPENSATION FOR ALTERED QUANTITIES. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in the subsection titled ALTERATION OF WORK AND QUANTITIES of Section 40 will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from his/her unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 PAYMENT FOR OMITTED ITEMS. As specified in the subsection titled OMITTED ITEMS of Section 40, the Engineer shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the Engineer omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the Engineer's order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the Engineer's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the Engineer's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK. Extra work, performed in accordance with the subsection titled EXTRA WORK of Section 40, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work. When the change order or supplemental agreement authorizing the extra work requires that it be done by force account, such force account shall be measured and paid for based on expended labor, equipment, and materials plus a negotiated and agreed upon allowance for overhead and profit.

a. Miscellaneous. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.

b. Comparison of Record. The Contractor and the Engineer shall compare records of the cost of force account work at the end of each day. Agreement shall be indicated by signature of the Contractor and the Engineer or their duly authorized representatives.

c. Statement. No payment will be made for work performed on a force account basis until the Contractor has furnished the Engineer with duplicate itemized statements of the cost of such force account work detailed as follows:

(1) Name, classification, date, daily hours, total hours, rate and extension for each laborer and foreman.

(2) Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.

(3) Quantities of materials, prices, and extensions.

(4) Transportation of materials.

(5) Cost of property damage, liability and workman's compensation insurance premiums, unemployment insurance contributions, and social security tax.

Statements shall be accompanied and supported by a receipted invoice for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices the Contractor shall furnish an affidavit certifying that such materials were taken from his/her stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor.

90-06 PARTIAL PAYMENTS. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the Engineer, of the value of the work performed and materials complete and in place in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with the subsection titled PAYMENT FOR MATERIALS ON HAND of this section. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. The Owner must ensure prompt and full payment of retainage from the prime contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

From the total of the amount determined to be payable on a partial payment, {insert amount of retainage, not to exceed 10 percent} percent of such total amount will be deducted and retained by the Owner until the final payment is made, except as may be provided (at the Contractor's option) in the subsection titled PAYMENT OF WITHHELD FUNDS of this section. The balance {(insert balance)} of the amount payable, less all previous payments, shall be certified for payment. Should the Contractor exercise his/her option, as provided in the subsection titled PAYMENT OF WITHHELD FUNDS of this section, no such percent retainage shall be deducted.

When at least 95 percent of the work has been completed, the Engineer shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done.

The Owner may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the Engineer to be a part of the final quantity for the item of work in question.

No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in the subsection titled ACCEPTANCE AND FINAL PAYMENT of this section.

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 PAYMENT FOR MATERIALS ON HAND. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract,

plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

a. The material has been stored or stockpiled in a manner acceptable to the Engineer at or on an approved site.

b. The Contractor has furnished the Engineer with acceptable evidence of the quantity and quality of such stored or stockpiled materials.

c. The Contractor has furnished the Engineer with satisfactory evidence that the material and transportation costs have been paid.

d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material so stored or stockpiled.

e. The Contractor has furnished the Owner evidence that the material so stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of his/her responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this subsection.

90-08 PAYMENT OF WITHHELD FUNDS. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in subsection 90-06 PARTIAL PAYMENTS, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.

b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.

c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.

d. The Contractor shall obtain the written consent of the surety to such agreement.

90-09 ACCEPTANCE AND FINAL PAYMENT. When the contract work has been accepted in accordance with the requirements of the subsection titled FINAL ACCEPTANCE of Section 50, the Engineer will prepare the final estimate of the items of work actually performed. The Contractor shall approve the Engineer's final estimate or advise the Engineer of his/her objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the Engineer shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the Engineer's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the Engineer's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with the subsection titled CLAIMS FOR ADJUSTMENT AND DISPUTES of Section 50.

After the Contractor has approved, or approved under protest, the Engineer's final estimate, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of the subsection titled CLAIMS FOR ADJUSTMENTS AND DISPUTES of Section 50 or under the provisions of this subsection, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

90-10 CONSTRUCTION WARRANTY.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of:

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within 14 days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

90-11 PROJECT CLOSEOUT. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the Engineer approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.

c. Complete final cleanup in accordance with subsection 40-08, FINAL CLEANUP.

d. Complete all punch list items identified during the Final Inspection.

e. Provide complete release of all claims for labor and material arising out of the Contract.

f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.

g. When applicable per state requirements, return copies of sales tax completion forms.

h. Manufacturer's certifications for all items incorporated in the work.

i. All required record drawings, as-built drawings or as-constructed drawings.

j. Project Operation and Maintenance (O&M) Manual.

k. Security for Construction Warranty.

l. Equipment commissioning documentation submitted, if required.

END OF SECTION 90

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SECTION 100
CONTRACTOR QUALITY CONTROL PROGRAM

100-01 GENERAL. The Contractor shall establish, provide, and maintain an effective Quality Control Program that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The intent of this section is to enable the Contractor to establish a necessary level of control that will:

a. Adequately provide for the production of acceptable quality materials.

b. Provide sufficient information to assure both the Contractor and the Engineer that the specification requirements can be met.

c. Allow the Contractor as much latitude as possible to develop his or her own standard of control.

The Contractor shall be prepared to discuss and present, at the preconstruction conference, his/her understanding of the quality control requirements. The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the Quality Control Program has been reviewed by the Engineer. No partial payment will be made for materials subject to specific quality control requirements until the Quality Control Program has been reviewed.

The quality control requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the acceptance testing requirements. Acceptance testing requirements are the responsibility of the Engineer.

Paving projects over $250,000 shall have a Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, Contractor, subcontractors, testing laboratories, and Owner's representative and the FAA prior to or at start of construction. The workshop shall address QC and QA requirements of the project specifications. The Contractor shall coordinate with the Airport and the Engineer on time and location of the QC/QA workshop.

100-02 DESCRIPTION OF PROGRAM.

a. General Description. The Contractor shall establish a Quality Control Program to perform inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. This Quality Control Program shall ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of quality control.

b. Quality Control Program. The Contractor shall describe the Quality Control Program in a written document that shall be reviewed by the Engineer prior to the start of any production, construction, or off-site fabrication. The written Quality Control Program shall be submitted to the Engineer for review at least 14 calendar days before the Preconstruction Conference.

The Quality Control Program shall be organized to address, as a minimum, the following items:

a. Quality control organization;

b. Project progress schedule;

c. Submittals schedule;

d. Inspection requirements;

e. Quality control testing plan;

f. Documentation of quality control activities; and

g. Requirements for corrective action when quality control and/or acceptance criteria are not met.

The Contractor is encouraged to add any additional elements to the Quality Control Program that he/she deems necessary to adequately control all production and/or construction processes required by this contract.

100-03 QUALITY CONTROL ORGANIZATION. The Contractor Quality Control Program shall be implemented by the establishment of a separate quality control organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all quality control staff by name and function, and shall indicate the total staff required to implement all elements of the Quality Control Program, including inspection and testing for each item of work. If necessary, different technicians can be utilized for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the Quality Control Program, the personnel assigned shall be subject to the qualification requirements of paragraph 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The quality control organization shall consist of the following minimum personnel:

a. **Program Administrator.** The Program Administrator shall be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The Program Administrator shall have a minimum of 5 years of experience in airport and/or highway construction and shall have had prior quality control experience on a project of comparable size and scope as the contract.

Additional qualifications for the Program Administrator shall include at least 1 of the following requirements:

(1) Professional engineer with 1 year of airport paving experience acceptable to the Engineer.

(2) Engineer-in-training with 2 years of airport paving experience acceptable to the Engineer.

(3) An individual with 3 years of highway and/or airport paving experience acceptable to the Engineer, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

(4) Construction materials technician certified at Level III by the National Institute for Certification in Engineering Technologies (NICET).

(5) Highway materials technician certified at Level III by NICET.

(6) Highway construction technician certified at Level III by NICET.

(7) A NICET certified engineering technician in Civil Engineering Technology with 5 years of highway and/or airport paving experience acceptable to the Engineer.

The Program Administrator shall have full authority to institute any and all actions necessary for the successful implementation of the Quality Control Program to ensure compliance with the contract plans and technical specifications. The Program Administrator shall report directly to a responsible officer of the construction firm. The Program Administrator may supervise the Quality Control Program on more than one project provided that person can be at the job site within 2 hours after being notified of a problem.

b. Quality Control Technicians. A sufficient number of quality control technicians necessary to adequately implement the Quality Control Program shall be provided. These personnel shall be either engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II or higher construction materials technician or highway construction technician and shall have a minimum of 2 years of experience in their area of expertise.

The quality control technicians shall report directly to the Program Administrator and shall perform the following functions:

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by Section 100-06.

(2) Performance of all quality control tests as required by the technical specifications and Section 100-07.

(3) Performance of density tests for the Engineer when required by the technical specifications.

Certification at an equivalent level, by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing Levels. The Contractor shall provide sufficient qualified quality control personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The Quality Control Program shall state where different technicians will be required for different work elements.

100-04 PROJECT PROGRESS SCHEDULE. The Contractor shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified in the contract. As a minimum, it shall provide information on the sequence of work activities, milestone dates, and activity duration.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

100-05 SUBMITTALS SCHEDULE. The Contractor shall submit a detailed listing of all submittals (e.g., mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:

a. Specification item number;

b. Item description;

c. Description of submittal;

d. Specification paragraph requiring submittal; and

e. Scheduled date of submittal.

100-06 INSPECTION REQUIREMENTS. Quality control inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by Section 100-07.

Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the particular feature of work. These shall include the following minimum requirements:

a. During plant operation for material production, quality control test results and periodic inspections shall be utilized to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment utilized in proportioning and mixing shall be inspected to ensure its proper operating condition. The Quality Control Program shall detail how these and other quality control functions will be accomplished and utilized.

b. During field operations, quality control test results and periodic inspections shall be utilized to ensure the quality of all materials and workmanship. All equipment utilized in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The Program shall document how these and other quality control functions will be accomplished and utilized.

100-07 QUALITY CONTROL TESTING PLAN. As a part of the overall Quality Control Program, the Contractor shall implement a quality control testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes.

The testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

a. Specification item number (e.g., P-401);

b. Item description (e.g., Plant Mix Bituminous Pavements);

c. Test type (e.g., gradation, grade, asphalt content);

d. Test standard (e.g., ASTM or AASHTO test number, as applicable);

e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated);

f. Responsibility (e.g., plant technician); and

g. Control requirements (e.g., target, permissible deviations).

The testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D 3665. The Engineer shall be provided the opportunity to witness quality control sampling and testing.

All quality control test results shall be documented by the Contractor as required by Section 100-08.

100-08 DOCUMENTATION. The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the Engineer daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the Contractor's Program Administrator.

Specific Contractor quality control records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily Inspection Reports. Each Contractor quality control technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations on a form acceptable to the Engineer. These technician's daily reports shall provide factual evidence that continuous quality control inspections have been performed and shall, as a minimum, include the following:

(1) Technical specification item number and description;

(2) Compliance with approved submittals;

(3) Proper storage of materials and equipment;

(4) Proper operation of all equipment;

(5) Adherence to plans and technical specifications;

(6) Review of quality control tests; and

(7) Safety inspection.

The daily inspection reports shall identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible quality control technician and the Program Administrator. The Engineer shall be provided at least one copy of each daily inspection report on the work day following the day of record.

b. Daily Test Reports. The Contractor shall be responsible for establishing a system that will record all quality control test results. Daily test reports shall document the following information:

(1) Technical specification item number and description;

(2) Test designation;

(3) Location;

(4) Date of test;

(5) Control requirements;

(6) Test results;

(7) Causes for rejection;

(8) Recommended remedial actions; and

(9) Retests.

Test results from each day's work period shall be submitted to the Engineer prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical quality control charts. The daily test reports shall be signed by the responsible quality control technician and the Program Administrator.

100-09 CORRECTIVE ACTION REQUIREMENTS. The Quality Control Program shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the Quality Control Program as a whole, and for individual items of work contained in the technical specifications.

The Quality Control Program shall detail how the results of quality control inspections and tests will be used for determining the need for corrective action and shall contain clear sets of rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and utilize statistical quality control charts for individual quality control tests. The requirements for corrective action shall be linked to the control charts.

100-10 SURVEILLANCE BY THE ENGINEER. All items of material and equipment shall be subject to surveillance by the Engineer at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate quality control system in conformance with the requirements detailed herein and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to surveillance by the Engineer at the site for the same purpose.

Surveillance by the Engineer does not relieve the Contractor of performing quality control inspections of either on-site or off-site Contractor's or subcontractor's work.

100-11 NONCOMPLIANCE.

a. The Engineer will notify the Contractor of any noncompliance with any of the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Engineer or his/her authorized representative to the Contractor or his/her authorized representative at the site of the work, shall be considered sufficient notice.

b. In cases where quality control activities do not comply with either the Contractor Quality Control Program or the contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, as determined by the Engineer, the Engineer may:

(1) Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors.

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

END OF SECTION 100

SECTION 105
MOBILIZATION

105-1 DESCRIPTION. Refer to Technical Specifications Section P-100 for additional Mobilization Requirements, descriptions and pay information. This item shall consist of work and operations, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

105-1.1 POSTED NOTICES. Prior to commencement of construction activities the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

105-2 BASIS OF MEASUREMENT AND PAYMENT. Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

a. With first pay request, 25%.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 40%.

d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by 90-11, the final 10%.

END OF SECTION 105

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SECTION 110
METHOD OF ESTIMATING PERCENTAGE OF MATERIAL WITHIN SPECIFICATION LIMITS (PWL)

110-01 GENERAL. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index(s), Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

IT IS THE INTENT OF THIS SECTION TO INFORM THE CONTRACTOR THAT, IN ORDER TO CONSISTENTLY OFFSET THE CONTRACTOR'S RISK FOR MATERIAL EVALUATED, PRODUCTION QUALITY (USING POPULATION AVERAGE AND POPULATION STANDARD DEVIATION) MUST BE MAINTAINED AT THE ACCEPTABLE QUALITY SPECIFIED OR HIGHER. IN ALL CASES, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PRODUCE AT QUALITY LEVELS THAT WILL MEET THE SPECIFIED ACCEPTANCE CRITERIA WHEN SAMPLED AND TESTED AT THE FREQUENCIES SPECIFIED.

110-02 METHOD FOR COMPUTING PWL. The computational sequence for computing PWL is as follows:

a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

b. Locate the random sampling position within the sublot in accordance with the requirements of the specification.

c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

d. Find the sample average (X) for all sublot values within the lot by using the following formula:

$$X = (x_1 + x_2 + x_3 + \ldots x_n) / n$$

Where: X = Sample average of all sublot values within a lot
x_1, x_2 = Individual sublot values
n = Number of sublots

e. Find the sample standard deviation (Sn) by use of the following formula:

$$S_n = (d_1^2 + d_2^2 + d_3^2 + \ldots d_n^2)/(n-1)^{1/2}$$

Where: S_n = Sample standard deviation of the number of sublot values in the set
$d_1, d_2,$ = Deviations of the individual sublot values $x_1, x_2, \ldots$ from the average value X
that is: $d_1 = (x_1 - X)$, $d_2 = (x_2 - X)$ … $d_n = (x_n - X)$
n = Number of sublots

f. For single sided specification limits (i.e., L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L, using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (i.e. L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$Q_L = (X - L) / Sn$ and $Q_U = (U - X) / Sn$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U, using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U. Determine the PWL by use of the following formula:

$PWL = (P_U + P_L) - 100$

Where: P_L = percent within lower specification limit
P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project
Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1 96.60
A-2 97.55
A-3 99.30
A-4 98.35
n = 4

2. Calculate average density for the lot.

$X = (x_1 + x_2 + x_3 + . . . x_n) / n$
$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$
X = 97.95 percent density

3. Calculate the standard deviation for the lot.

$Sn = ((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)^{1/2}$
$Sn = (1.82 + 0.16 + 1.82 + 0.16) / 3^{1/2}$
Sn = 1.15

4. Calculate the Lower Quality Index Q_L for the lot. (L=96.3)

$Q_L = (X - L) / S_n$
$Q_L = (97.95 - 96.30) / 1.15$

Q_L = 1.4348

5. Determine PWL by entering Table 1 with Q_L= 1.44 and n= 4.

PWL = 98

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

A-1 5.00
A-2 3.74
A-3 2.30
A-4 3.25

2. Calculate the average air voids for the lot.

$X = (x_1 + x_2 + x_3 \ldots n) / n$

$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$

X = 3.57 percent

3. Calculate the standard deviation Sn for the lot.

$Sn = ((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)^{1/2}$

$Sn = (2.04 + 0.03 + 1.62 + 0.10) / 3^{1/2}$

Sn = 1.12

4. Calculate the Lower Quality Index Q_L for the lot. (L= 2.0)

$Q_L = (X - L) / S_n$

$Q_L = (3.57 - 2.00) / 1.12$

Q_L = 1.3992

5. Determine P_L by entering Table 1 with Q_L = 1.41 and n = 4.

PL = 97

6. Calculate the Upper Quality Index Q_U for the lot. (U= 5.0)

$Q_U = (U - X) / S_n$

$Q_U = (5.00 - 3.57) / 1.12$

Q_U = 1.2702

7. Determine P_U by entering Table 1 with Q_U = 1.29 and n = 4.

P_U = 93

8. Calculate Air Voids PWL

$PWL = (P_L + P_U) - 100$

$PWL = (97 + 93) - 100 = 90$

EXAMPLE OF OUTLIER CALCULATION (Reference ASTM E 178)

Project: Example Project
Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A. arranged in descending order.

A-3 99.30
A-4 98.35
A-2 97.55
A-1 96.60

2. Use n=4 and upper 5 percent significance level of to find the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

a. For measurements greater than the average:
If: (measurement - average)/(standard deviation) is less than test criterion,
Then: the measurement is not considered an outlier

For A-, check if (99.30 - 97.95) / 1.15 greater than 1.463
Since 1.174 is less than 1.463, the value is not an outlier

b. For measurements less than the average:
If (average - measurement)/(standard deviation) is less than test criterion,
the measurement is not considered an outlier

For A-, check if (97.95 - 96.60) / 1.15 greater than 1.463
Since 1.435 is less than 1.463, the value is not an outlier

NOTE: In this example, a measurement would be considered an outlier if the density was:
greater than (97.95+1.463x1.15) = 99.63 percent, or
less than (97.95-1.463x1.15) = 96.27 percent

TABLE 1. TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)

Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE 1. TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)

Percent Within Limits (P_L and P_U)	Negative Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

END OF SECTION 110

GENERAL REQUIREMENTS

City of Venice

Venice Municipal Airport

Airfield Access Policy

The City of Venice is responsible for safe and secure operation of the Venice Municipal Airport. Access to the airfield is authorized on the basis of both safety and security.

The staff of Venice Municipal Airport strives to provide the most user-friendly environment possible and is solely responsible for the issuance of Airport proximity access badges.

This policy provides the guidelines for Airport staff to use in determining who is eligible for access to the airfield and establishes the procedures and documentation requirements that must be met before a badge will be issued. Any deviation from this policy must be consistent with the approved Airport Security Plan and have the advance, written authorization of the Airport Director.

In addition, this policy serves as notification to the badge-holder of the responsibilities that are imparted on that individual when a badge is issued. A copy of this policy must be signed in acknowledgement and acceptance before a badge will be issued. Any person providing false or fraudulent information in order to receive a badge, or as a sponsor for another individual, will have their access permanently terminated.

DEFINITIONS

The terms in this document are determined to have the following definitions for the purposes of this policy:

Account in good standing – Accounts with the City that are paid and current with no amounts owed in arrears. If no account currently exists with the City, then the situation shall be treated as though there is an account in good standing.

Aircraft owner – A person who is the owner or co-owner of an aircraft as indicated in the FAA registration database. In the case of a corporate registration, a person who can prove, to the satisfaction of the Airport Director or designee, that they are the principal or president of the organization.

Applicant – Any person requesting a badge.

Badge – Airport-produced identification card, which distinguishes an individual as having authorization to access the airfield. Badges may be permanent or temporary and may be programmed to grant access to the airfield through gates located in the Airport perimeter fencing.

City – City of Venice, Florida.

Deposit – A refundable monetary amount payable to the City of Venice. Venice City Council will determine the badge deposit amounts associated with this policy, which may change from time to time. The Deposit and Fee Schedule in effect at the time of deposit collection shall apply. If a badge is not returned to the Airport Administration office upon the badge-holder becoming ineligible, the badge deposit will be forfeited.

Initials

Escort – To accompany a guest or service provider, who does not possess a badge, while they are on the airfield.

Fee – A non-refundable monetary amount payable to the City of Venice to cover administrative costs. Venice City Council will determine the fees associated with this policy, which may change from time to time. The Deposit and Fee Schedule in effect at the time of fee collection shall apply.

Pilot – A person holding a valid pilot's license.

Pilot/owner – A pilot who is the owner or co-owner of an aircraft as indicated in the FAA registration database. In the case of a corporate registration, a pilot who can prove, to the satisfaction of the Airport Director or designee, that they are the principal or president of the organization.

Pilot's license – An FAA-issued pilot certificate or current student medical certificate.

Sponsor – Person requesting a badge for another individual who certifies that the applicant has an operational need to have unescorted access to the airfield, and who accepts responsibility for the applicant, by completing an Airfield Access Request Form.

Spouse – Legally recognized husband or wife.

Qualifying aircraft – A fixed- or rotor-wing vehicle based at Venice Municipal Airport.

Qualifying family member – A person possessing a valid pilot's license who is related to a qualifying aircraft-owner in one of the following ways: legal spouse, child, stepchild, parent, grandparent, grandchild, brother, sister, father-in-law, mother-in-law, son-in-law, daughter-in-law, or as determined by the Airport Director.

ELIGIBILITY

1. All Applicants must possess a valid driver's license, be associated with a qualifying aircraft or business, and have an account in good standing. Any sponsor must also have an account in good standing.

2. If a sponsor becomes ineligible, then any persons sponsored by that individual or organization are also immediately deemed ineligible.

3. In order to be eligible for a permanent badge, the qualifying aircraft must be based at Venice Municipal Airport for a minimum of 120 consecutive days with payment made for any applicable parking or hangar fees. If an aircraft becomes ineligible due to removal from the airfield, non-payment of fees, or other reasonable cause as determined by the Airport Director, then the badge-holders associated with that aircraft will also be deemed ineligible.

4. Pilot/owners of based aircraft may be issued a badge, if requested. Payment of a badge deposit is required.

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Initials

5. Non-pilots may be sponsored by their owner/pilot-spouse in order to receive a badge. Advance payment of a training fee, the satisfactory completion of an airfield driver training course, and payment of a badge deposit is required.

6. Non-pilot aircraft owners may request a badge. The satisfactory completion of an airfield driver training course and payment of a badge deposit is required.

7. Pilots who are qualifying family members of the owners of qualifying aircraft may be sponsored in their application for a badge. Payment of a badge deposit is required.

8. Employees of authorized commercial Airport tenants may be sponsored by their organization and issued badges at the discretion of the Airport Director or designee. The owner, registered agent, or other person authorized to enter into contracts on behalf of the organization must complete an Airfield Access Request form and supply any other supporting documentation that may be requested in order to verify the applicant's operational need to have unescorted access to the airfield when conducting legitimate, authorized business. Failure to return a badge upon loss of eligibility (i.e. termination of employment) will result in a commercial operator fee charged to the organization.

9. Pilots, who do not own an aircraft, but have a formal lease or cost-sharing agreement with an owner of a qualifying aircraft, may request a badge. Proof of the legal relationship between the parties with respect to the aircraft will be required and a badge deposit must be paid. (This provision is not intended to provide for commercial aircraft rental situations.)

10. If an aircraft is owned by a flying club or other group, then the legal registered agent for that group must sponsor each of the other members of the group in order for them to receive a badge. A badge deposit must be paid for each badge issued.

11. Persons who are not owners, but who have entered into a long-term lease agreement for a qualifying aircraft, may be issued a badge based on the same criteria as aircraft owners. Proof of the long-term lease must be provided and a badge deposit must be paid.

12. Professional pilots who are employed by non-pilot aircraft owners may apply for a badge. The aircraft owner must sponsor the pilot and provide satisfactory proof of the pilot's employment. Payment of a badge deposit is required.

13. Select Federal and State aviation officials may be issued Airfield access badges at the discretion of the Airport Director.

14. Temporary access badges may be authorized by the Airport Director for special circumstances to include, but not be limited to, airfield construction or maintenance, special aviation events, or in cases where an aircraft is Venice-based for fewer than 120 consecutive days. Such authorization may require a security check and the successful completion of airfield driver safety training. A badge deposit is required for each badge issued.

15. Authorized Fixed Base Operators may permit transient customer service operations consistent with the approved Airport Security Plan.

16. Venice Airport Staff, select City Manager's staff, Police Officers, Firefighters and Emergency Responders may request and be granted airfield access at the discretion of the Airport Director.

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Initials

17. Other City Staff may be granted Airfield access at the request of their department head and at the discretion of the Airport Director or designee. City staff accessing the Airfield must notify the Airport Director or designee in advance of their intention and reason for doing so, except in the event of an emergency response. (The provision for notification does not apply in the case of Police Officers who access the Airfield during the course of their normal patrol duties.) In addition, the successful completion of an airfield driver safety class may be required before access is granted.

PROCEDURES

1. The Airport administrative staff shall verify the ownership of a qualifying aircraft using the FAA registration database. If a temporary registration certificate is used to prove ownership and receive a badge, a 90-day grace period will be granted to allow time for the permanent registration to get into the FAA database system. If, after 90 days, a permanent registration cannot be produced or accessed in the database, any associated badge-holders will be deemed in ineligible and any deposits will be forfeited.

   If an aircraft is registered in a corporate name, satisfactory proof of ownership of the organization will be required and copies of the supporting documentation shall be kept on file.

2. All badge-holders must possess a valid driver's license, a copy of which shall be kept on file.

3. A sponsor may request that airfield access be terminated for any badge-holder for whom they (or their organization) has responsibility.

RULES AND GUIDELINES

1. A badge is non-transferable and shall be used only by the person to whom it was issued.

2. A lost or stolen badge shall be reported to the Airport Administration Office immediately upon discovery so that it may be deactivated. If eligible, a replacement badge will be issued upon payment of a badge replacement fee.

3. Badge-holders must keep badges on their person at all times. Airport Staff, FBO staff, City Police or any other authorized badge-holder may request to see the badge at any time. Failure to produce a valid badge upon request may result in the permanent loss of access privileges.

4. Badges and access privileges may be revoked or suspended by the Airport Director or designee for non-payment of rent or aircraft parking fees or for any infraction of the provisions of the Airfield Access Policy, Airport Security Plan, Airport Rules and Regulations or Airport Minimum Standards, as may be amended from time to time.

5. No vehicle shall be parked on any runway or taxiway at any time. A vehicle may be parked in a tie-down area for the limited, temporary purpose of loading or unloading passengers or cargo only. Parking in these areas for extended periods, or for other purposes, is prohibited.

6. Operators of vehicles shall observe all traffic and directional signs on the airfield and yield the right-of-way to pedestrians and aircraft.

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Initials

7. After passing through a gate in the Airport security perimeter, vehicles must stop clear of the gate at a distance which will prevent another vehicle from utilizing that gate without the use of an access badge. Before proceeding, the gate must be permitted to close completely.

8. If badge-holder is authorized to operate a motor vehicle in specified areas only, then a map is attached which depicts those areas permitted. Access to businesses located on Airport Avenue shall be made landside only. Airside driving and parking for Airport Avenue businesses is prohibited.

9. Badge-holders are responsible for anyone to whom they are providing escort and must remain with them at all times.

10. Once a badge-holder becomes ineligible for airfield access, the badge must be immediately surrendered to the Airport Administration Office.

ACKNOWLEDGEMENT AND ACCEPTANCE

_____ _____

Printed Name Signature Date

FOR OFFICE USE ONLY

____ *Owner/Pilot* *Deposit $*_____

____ *Spouse* *Deposit $*_____ *Fee $*_____ *Training Date* _____

____ *Family/Pilot* *Deposit $*_____ *Aircraft Owner* _____

____ *Owner/Non-pilot* *Deposit $*_____

____ *Employee* *Organization* _____

____ *Federal/State* *Organization* _____

____ *Other* *Deposit $*_____ *Explanation* _____

_____

_____

_____
Initials

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AIRPORT DRIVER TRAINING
(Refer to flyvnc.com)

Suggestion Box | FAQs

Search Site

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Airport Driver Training

Before beginning this training course, please review the Airfield Access Policy (Click Here) and obtain a training guide from the Airport Administration Office, 150 Airport Ave. If applicable, a non-refundable training fee of $35 (Fee Schedule) will be collected when your guide is issued. Payment may be made with a check or money order payable to the City of Venice. If you have any questions about whether the training fee applies to you, please contact us at (941) 486-2711 and we will be happy to assist you.

Airfield access badges are issued at the Airport Administration Office during regular business hours:

Monday – Friday (except holidays)
8 a.m. – 4 p.m.

To make an appointment, please call (941) 486-2711 or e-mail Airport@flyvnc.com with the desired date and time. Your message should include your name and phone number so that we can call to confirm your appointment. Walk-ins and unconfirmed appointments will be assisted whenever possible, but cannot be guaranteed.

DRIVER TRAINING COURSE

Venice Municipal Airport
Driver Training Course

A Message to Vehicle Operators

This online training course was prepared to teach you about the unique problems and safety requirements of working and driving a vehicle on an airport. It is meant to be a companion to the FAA guide titled *Airport Ground Vehicle Operations*. Please study the guide and keep it for reference and future review as a refresher. If you have not yet obtained your training guide from the Airport Administration Office, please contact (941) 486-2711 or Airport@flyvnc.com.

If you have never driven on an airport before, the first few times can be confusing. This course explains some of the things you will see, how things work and some of the rules that you will have to follow when driving on the airfield. If you have previous experience with airfield driving, this training program may teach you some things that you didn't know or remind you of some things that you may have forgotten.

Some of the topics that will be covered are:

- *Airport Familiarization*
- *Airport Rules and Regulations*
- *Movement Area Familiarization*

Compliance

All persons operating vehicles on the airfield must comply at all times with the Airfield Access Policy for Venice Municipal Airport. In accordance with this policy, those individuals requiring driver training must successfully complete this course before an airfield access badge will be issued.

Additionally, please remember:

- No person shall operate a ground vehicle which is so constructed, equipped or loaded, or is in physical or mechanical condition as to endanger persons or property.
- Vehicles operating in the Airport Operations Area (AOA) shall be expressly authorized to do so by airport management.
- All vehicles shall yield the right-of-way to aircraft, pedestrians, emergency vehicles and aircraft in tow.
- No vehicle may be parked as to block:
  - *Fence openings or emergency entrances to the AOA*
  - *Emergency vehicles or equipment*
  - *Fire hydrants or lanes*

- *Fire hydrants or lanes*
- *Any paved access way, roadway or vehicular traffic lane*

- Vehicles operating on the Airport shall be equipped with two (2) headlights and two (2) or more red taillights, which shall be lighted during operations between sunset and sunrise.

Failure to comply with the Airfield Access Policy for Venice Municipal Airport may result in the permanent revocation of access privileges.

Airport management will make available to the FAA for inspection, upon request, any records of accidents or incidents in the movement area involving any aircraft and/or ground vehicles.

Definitions

Airport	An area of land or water that is used, or intended to be used for the landing and taking off of aircraft and, if applicable, includes its buildings and facilities.
Airport Operations Area (AOA)	The portion of an airport used for the landing, takeoff, ground-maneuvering and parking of an aircraft.
Apron or Ramp	The area of an airport designated for aircraft parking for the purpose of deplaning and enplaning passengers or cargo.
Ground Vehicle	Vehicles and equipment having access to the AOA, including: airport service equipment, ground equipment vehicles, aircraft fire and rescue vehicles and all other emergency and City of Venice vehicles necessary for the safe and secure operation of the airport.
Movement Area	Runways, taxiways and associated safety areas of an airport which are used for taxiing, hover taxiing, air taxiing and takeoff and landing of aircraft, exclusive of loading ramps and aircraft parking.
Non-Movement Area	The portion of the AOA where both aircraft and vehicle traffic is allowed.
Runway	A defined, rectangular area (on a land airport), which has been prepared for the landing and takeoff of aircraft along its length. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 0.10 degree. The runways and Venice Municipal Airport (VNC) are 4/22 and 13/31.
Runway Safety Area	An area 400 feet in width, the center portion of which is the usable runway and which extends 1,000 feet beyond the end of the runway pavement.
Hold Lines	This is the airport version of a stop sign. They are depicted by two continuous and two dashed yellow lines, which are spaced 12 inches apart and which are perpendicular to the taxiway centerline. They may also consist of one or more signs at the edge of the taxiway.
Taxiway	The portion of the movement area used for surface-maneuvering of aircraft to transition between aircraft

	parking areas and the runways on the AOA.
Taxiway Safety Area	An area 150 feet wide, the center of which is the usable taxiway.
Runway/Taxiway Incursion	The unauthorized entry onto a runway or taxiway by an aircraft, vehicle or person. Airport management controls runway and taxiway vehicle access.

Ground Vehicles

Access

Access to the movement areas and safety areas shall be limited to those ground vehicles necessary for airport operations. No ground vehicle may operate in movement areas without express authorization from airport management. In the event that a vehicle is granted authorization, it must meet the following standards before it may operate:

- Be equipped with a flashing/rotating amber beacon which is clearly visible and functional on the top of the vehicle
- Have two-way radio communication with UNICOM

If a vehicle does not meet the standards listed above, then the vehicle must have an authorized escort that does meet the standards.

It is important to note that the presence of two-way radios and flashing beacons does not give a vehicle license to operate in any movement area unless express authorization is granted.

Vehicle Operations

Airport tenant vehicles may not enter any runway, taxiway or safety area at any time, nor operate in any areas not expressly authorized in accordance with the Airfield Access Policy. In addition, when it is permitted, driving on ramps and aprons must be kept to an absolute minimum.

All authorized vehicles operating on the runways, excluding aircraft rescue and firefighting equipment and airport operations, shall, when possible, do so in a direction opposite to aircraft traffic flow. When crossing a runway, vehicle operators should do so at an end whenever possible.

Please be aware that persons operating vehicles on movement areas without authorization shall be subject to prosecution of public trespass and may have their airfield access privileges revoked.

In addition, please remember that driving on the airfield is a privilege that may be revoked for failure to comply with the Airfield Access Policy or Airport Rules and Regulations.

Safety is the First Priority!

Operating a vehicle on an airfield is different from any other place that you have ever driven. But, just like when operating on a standard roadway, each driver must make safety the first priority. One careless mistake could result in the injury or death of yourself or others. Therefore, it is up to every one of us to make sure that we do everything we can to make the airport as safe as possible.

One way to do that is to know how the airport operates and the types of problems and safety hazards that may exist. As you continue with this course, you will learn about these things and your responsibilities as a vehicle operator.

Airport Familiarization

Venice Municipal Airport is located on approximately 834 acres three miles south of downtown Venice. The facility is owned and operated by the City of Venice and has the three-letter airport designation code of "VNC."

VNC has two runways. The primary runway, 13/31, is 4,999 feet long. The secondary runway, 4/22, is 5,000 feet long. In addition, there are six main taxiways: A, B, C, D, E and F.

Taxiways A and B parallel the ramp on the north side of the airport. The east end of Taxiway A gives access to Runway 22.

Taxiway C runs north and south from the ramp along the east side of the t-hangar area

and terminates at the midfield wind tee.

From the wind tee, Taxiway D crosses Runway 4/22 and runs parallel to Runway 31, to which it gives access.

Taxiway E begins at the wind tee, crosses Runway 13/31 and runs parallel to Runway 4, to which it gives access.

Taxiway F runs from the west end of Taxiway B to give access to Runway 13.

Non-Towered Airport

Venice Municipal Airport is non-towered and, therefore, considered "pilot-controlled." Consequently, if a vehicle must enter a runway or taxiway, permission must be granted in advance by airport management. If permission is obtained to enter these areas, a radio tuned to the airport's common traffic advisory frequency (CTAF), usually called UNICOM, must be on to monitor the air traffic while in the vicinity.

When approaching runways or taxiways, SLOW DOWN, look both ways and look UP for aircraft that are landing, taking off or are in the traffic pattern. Vehicles must always yield the right-of-way to taxiing aircraft and give them plenty of room. If an aircraft is on the same taxiway as you and headed in your direction, move your vehicle out of the way, being careful not to hit any taxiway edge lights.

If an aircraft is about to land on a runway that you have permission to cross, stop and yield to the aircraft until it has landed and taxied clear of the runway before proceeding.

Aircraft at non-towered airports frequently make "touch-and-go" landings. This means that immediately after landing, full power is applied and the aircraft takes off again. It is, therefore, very important to make sure, before crossing a runway, that any aircraft have exited the runway or have gone past you.

Extra vigilance is key at non-towered airports since aircraft so not have to communicate or announce their position in the pattern or on the surface. In fact, some aircraft do not have radios. So, be very careful not to be lulled into complacency due to the fact that the airport sometimes does not seem very busy – this may not always be the case!

Movement Areas

The movement areas are the portions of the Airport Operations Area (AOA) for which express authorization is required from airport management for ground vehicle operations. Movement areas include:

- Runways
- Taxiways
- Safety areas associated with runways and taxiways

Safety Area Operations

Ground vehicles having the need to operate within the safety areas shall obtain proper authorization in accordance with the City of Venice's Airfield Access Policy.

Operators of ground vehicles within a safety area shall, at all times, operate the vehicle's rotating beacon and monitor the UNICOM frequency for air traffic.

What is a Runway Incursion?

A runway incursion is any occurrence at an airport that involves an aircraft, vehicle, person or object on the ground that creates a collision hazard or results in interference with an aircraft taking off, landing or intending to land or takeoff.

Safeguard Against Incursions

- Be aware of problem locations for aircraft, vehicles and pedestrians. This includes familiarizing yourself with runway/taxiway geometry and complex intersections.
- Use standard radio verbiage and airport operating procedures to help ensure effective airfield communications.

A Vehicle/Pedestrian Deviation (VPD) is a type of runway incursion that occurs when a vehicle operator or pedestrian enters the movement area without approval.

Another type or runway incursion, an Operational Deviation (OD,) can occur when an aircraft, vehicle, equipment or person enters the active landing area without coordination.

Other Important Information

Foreign Object Debris (FOD)

Trash or rocks sucked into a jet engine can shred parts of it in seconds. A rock caught by a propeller can damage the propeller, as well as become a deadly projectile. In order to help avoid these types of incidents, it is imperative that we all work to make the airport a safer place by putting all trash in a covered container that will not be blown over and by

- Always dim or lower the beams of vehicle headlights when approaching oncoming aircraft or motor vehicles.
- Taxiing aircraft or aircraft in tow have the right of way.
- Smoking is prohibited on the apron, including smoking inside of vehicles.
- Immediately report all fuel spills to the Airport Administration Office at (941) 486-2711 during office hours, or at any other time, to the Venice Police Department at (941) 486-2444.
- Speed Limit: 10 MHP on the roadway from Gate 6 to the t-hangar area.
- Speed Limit: 5 MHP on all aprons.
- Speed Limit: 5 MHP in the vicinity of any aircraft.
- Never, without notification to and authorization from airport management, enter an aircraft movement area.

Jet Blast and Prop Wash

An operating rotating beacon on an aircraft indicates that the engines are running or are about to be started. When positioned behind an aircraft, even if it is not running, you should always be aware that the current situation may change and that there is the potential for jet blast or prop wash if the engines start.

In addition, an aircraft just starting to move will generate considerably more jet blast or prop wash than one that is idling. Consequently, an object that may be in a safe position for idle thrust may be subject to a mishap when breakaway thrust is applied.

Finally, be aware of any aircraft that may turn or use reverse thrust to back up.

CAUTION: When an engine is running, a propeller may be invisible to the naked eye.

Reference Material

- Federal Aviation Administration Advisory Circular 150/5210-20, Ground Vehicle Operations on Airports
- Federal Aviation Administration Advisory Circular 150/5210-5B, Painting, Marking, and Lighting of Vehicles Used on an Airport

Before You Begin

In order to successfully complete this training program, at least seven questions must be answered correctly. If you do not pass the test, you may take it again in two weeks at no additional charge. If more than two attempts are necessary to pass the test, an additional $35 training fee must be paid in advance for subsequent attempts. Any tests that are submitted outside of the permitted timeframes and without the appropriate training fee being paid will not be scored and will not be taken into consideration for airfield access eligibility. If you have any questions about the training program or taking the test, please contact the Airport Administration Office at (941) 486-2711.

TAKE THE TEST

TECHNICAL SPECIFICATIONS

CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY

AT

VENICE MUNICIPAL AIRPORT
VENICE, FLORIDA

Prepared By:

American Infrastructure Development, Inc.

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Item P-100 Mobilization and General Conditions

DESCRIPTION

100-1.1 This item shall consist of the preparatory work and operations in mobilizing for beginning work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site. For the establishment by the Contractor of staging areas, temporary offices, building facilities, all utilities, safety equipment and first aid supplies, sanitary and other facilities, as required by these Specifications, and State and local laws and regulations including the submittal of a NPDES Notice of Intent and Storm Water Pollution Prevention Plan, if required. The preparation, submittal and approval of all shop drawings, the ordering of required material and the cost to establish, maintain and restore to the existing condition, of the Contractor staging area and seeding of disturbed grass areas outside of the limits of construction shall also be included in this item.

100-1.2 The costs of bonds and any required insurance and other preconstruction expense necessary for the start of the work, excluding the cost of construction materials, shall be included in this Item.

100-1.3 This item of work will also include any other item or items of work shown, implied or required for the completion of the project that are not directly paid for under other pay items.

100-1.4 All costs associated with the required meetings and coordination with the Construction Manager, Authority, and Engineer. In addition, all costs associated with the Contractor badging and the quality control and safety plan requirements, as well as preparation and maintenance of the project schedule, shall be included in this item.

100-1.5 DEMOBILIZATION. The Contractor shall completely demobilize and remove from the project site all equipment, vehicles, materials, offices and waste within 10 days of final acceptance. Retainage will not be released for the project until the Contactor has completely demobilized from the project site.

METHOD OF MEASUREMENT

100-2.1 Measurement of the item, mobilization, as specified herein will be on the lump sum basis.

BASIS OF PAYMENT

100-3.1 The work and incidental costs covered under this item will be paid for at the Contract lump sum price for the item of mobilization and general conditions. No additional payment will be made for demobilization and/or remobilization due to project shutdowns or suspensions of the work identified in the project documents. No payment for any percentage of construction mobilization shall be made until the Contractor's initial project schedule; safety plan compliance document (SPCD) and quality control plan are approved by the Engineer and Construction Manager.

Payment shall be made under:

Item P-100-1	Mobilization - per lump sum

Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as specified in the General Provisions Section GP-105.

The Percent of Contract Amount Earned shall equal the work completed to date, including the total of all previous mobilization plus or minus work completed associated with any executed Change Orders, if any, divided by the Total Original Contract Amount plus or minus the Total Executed Change Order Amounts, if any.

In the event that the lump sum bid amount for mobilization exceeds ten percent (10%) of the original Contract amount for that project, the difference (remainder) will not be paid until the project is complete and the Engineer and Owner have issued a statement of substantial completion. This date shall be set in accordance with the project documents.

The standard retainage, as herein specified will be applied to these allowances. Partial payments made on this item shall in no way act to preclude or limit any of the provisions for partial payments otherwise provided for by the Contract.

In the event the contract completion date is extended or additional work is added to the project, no additional payment will be made for the mobilization or maintenance of traffic unless otherwise addressed by change order.

END OF ITEM P-100

ITEM P-102 SAFETY, SECURITY AND MAINTENANCE OF AIRFIELD OPERATIONS

GENERAL

102-1.1 The provisions of this safety and security plan and associated procedures are applicable within the boundaries of the Venice Municipal Airport. A complete understanding of all procedures and requirements contained herein is required to ensure safety during construction. *The contractor shall be required to submit for approval a Safety Plan Compliance Document (SPCD).* This safety plan is a part of this Contract and deviations from the requirements established herein will be sufficient cause for Contract termination.

Required reference material associated with this safety plan includes:

FAA AC 150/5200-18C, Airport Safety Self-Inspection
FAA AC 150/5210-5D, Painting, Marking and Lighting of Vehicles Used on an Airport
FAA AC 150/5370-2G, Operational Safety on Airports During Construction

These documents are available online at http://www.faa.gov/airports/resources/advisory_circulars or can be provided upon request.

CONTRACTOR SAFETY AND SECURITY OFFICER

102-2.1 CONTRACTOR SAFETY AND SECURITY OFFICER (CSSO). The Contractor shall appoint its on-site Construction Superintendent or other qualified individual(s) as its duly authorized representative to serve as Contractor Safety and Security Officer (CSSO) for the duration of the Contract. The CSSO shall thoroughly understand the safety and security requirements of the Contract, the necessity for them and shall have sufficient authority to implement its provisions without significant deviation. The Contractor shall notify the Construction Manager in writing of the name of the individual(s) selected for the assignment.

The CSSO shall represent the Contractor on safety and security requirements compliance. The CSSO shall be especially knowledgeable regarding the requirements of FAA AC's 150/5200-18, Airport Self Inspection Guide and 150/5370-2 Operational Safety on Airports During Construction, latest edition.

102-2.2 RESPONSIBILITIES OF THE CONTRACTOR SAFETY AND SECURITY OFFICER. Prior to the desired date for commencement of any work on the project, the CSSO shall accomplish the following:

a. Develop and submit in writing a detailed work sequence schedule with dates and times specified for all milestone events. This sequence schedule shall be subject to the approval of the Construction Manager. To assure adequate time for coordination, this document shall be submitted at least one week prior to the date of the Pre-construction Conference.

b. Develop and submit in writing a detailed outline of the procedures to be followed to maintain safety and security of both Contractor operations and the integrity of airport landside and airside operations during the prosecution of contract work. This plan shall detail, in addition, the procedures to be followed in the event of an accident or fire involving Contractor personnel and the Contractor's efforts to maintain fire protection and security. These procedures shall be subject to the approval of the Construction Manager and reflect any change as may be deemed necessary.

c. Conduct at least one meeting of all Contractor supervisory personnel prior to the start of contract work. The purpose of this meeting is to review the approved Work sequence schedule and safety and security procedures. Attendance at this meeting by the CSSO, all Contractor supervisory personnel and the Construction Manager is mandatory. This meeting shall also be open to other employees of the Contractor and others as the Construction Manager may deem appropriate. Minutes of this meeting shall be taken by the CSSO, copies provided to each supervisor and kept on file in the Contractor's construction office for periodic review and updating.

d. Develop a safety and security orientation program and provide a briefing for all employees of the

Contractor and subcontractors that will be used on the project. A similar briefing will be given to new employees prior to their use on contract work. In addition, the CSSO shall be responsible for briefing, from time to time, all Contractor personnel on any changes to safety and security measures deemed necessary.

e. Submit a Safety Plan Compliance Document (SPCD) to the airport operator and supplying any details that could not be determined before contract award. The SPCD must include a certification statement by the contractor that indicates it understands the operational safety requirements and it asserts it will not deviate from the approved SPCD unless written approvals granted by the airport operator. Any construction practice proposed by the contractor that does not conform to the SPCD may impact the airport's operational safety and will require a revision to the SPCD and re-coordination with the airport operator and the FAA in advance.

1) The SPCD must include all supplemental information that could not be included prior to the contract award. The contractor statement should include the name of the contractor, the title of the project, and a reference to any supplemental information (that is, "I, Name of Contractor, approved on Date, and will abide by it as written and with the following additions as noted:"). If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title.

   i. **Coordination**. Discuss details of proposed safety meetings with the airport operator and with contractor employees and subcontractors.

   ii. **Phasing**. Discuss proposed construction schedule elements, including:
      1. Duration of each phase.
      2. Daily start and finish of construction, including "night only" construction.
      3. Duration of construction activities during:
      4. Normal runway operations.
      5. Closed runway operations.
      6. Modified runway "Aircraft Reference Code" usage.

   iii. **Areas and operations affected by the construction activity**. Discuss any areas or operations affected by the construction activity.

   iv. **Protection of NAVAIDs**. Discuss specific methods proposed to protect operating NAVAIDs.

   v. **Contractor access**. Provide the following:
      1. Details on how the contractor will maintain the integrity of the airport security fence (gate guards, daily log of construction personnel, and other).
      2. Listing of individuals requiring driver training (for certificated airports and as requested).
      3. Radio communications.
      4. Types of radios and backup capabilities.
      5. Who will be monitoring radios.
      6. Whom to contact if the ATCT cannot reach the contractor's designated person by radio.
      7. Details on how the contractor will escort material delivery vehicles.

   vi. **Wildlife management**. Discuss the following:
      1. Methods and procedures to prevent wildlife attraction.
      2. Wildlife reporting procedures.

   vii. **Foreign Object Debris (FOD) management**. Discuss equipment and methods for control of FOD, including construction debris and dust.

   viii. **Hazardous material (HAZMAT) management**. Discuss equipment and methods for responding to hazardous spills.

   ix. **Notification of construction activities**. Provide the following:
      1. Contractor points of contact.

2. Contractor emergency contact.
3. Listing of tall or other requested equipment proposed for use on the airport and the timeframe for submitting 7460-1 forms not previously submitted by the airport operator.

x. **Inspection requirements**. Discuss daily (or more frequent) inspections and special inspection procedures.

xi. **Underground utilities**. Discuss proposed methods of identifying and protecting underground utilities.

xiii. **Special conditions**. Discuss proposed actions for each special condition.

xiv. **Runway and taxiway visual aids**. Including marking, lighting, signs, and visual NAVAIDs. Discuss proposed visual aids including the following:
1. Equipment and methods for covering signage and airfield lights.

xv. **Marking and signs for access routes**. Discuss proposed methods of demarcating access routes for vehicle drivers.

xvi. **Hazard marking and lighting**. Discuss proposed equipment and methods for identifying excavation areas.

xvii. **Protection of runway and taxiway safety areas**, including object free areas, obstacle free zones, and approach/departure surfaces. Discuss proposed methods of identifying, demarcating, and protecting airport surfaces including:
1. Equipment and methods for maintaining Taxiway Safety Area standards.
2. Equipment and methods for separation of construction operations from aircraft operations, including details of barricades.

xviii. **Other limitations on construction**. Discuss any other limitation for the proposed construction.

2) Have available at all times copies of the SPCD for reference by the airport operator and its representatives, and by subcontractors and contractor employees.

3) Ensure that construction personnel are familiar with safety procedures and regulations on the airport. Provide a point of contact who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport. Contractor shall provide 24-hour coverage.

4) Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the SPCD during construction. At least one of these employees must be on-site whenever active construction is taking place.

5) Conduct inspections sufficiently frequently to ensure construction personnel comply with the SPCD and that there are no altered construction activities that could create potential safety hazards.

6) Restrict movement of construction vehicles and personnel to permitted construction areas by flagging, barricading, erecting temporary fencing, or providing escorts, as appropriate and as specified in the SPCD.

7) Ensure that no contractor employees, employees of subcontractors or suppliers, or other persons enter any part of the air operations area (AOA) from the construction site unless authorized.

8) The Contractor shall submit and receive approval of SPCD prior to issuance of Notice to Proceed.

CONSTRUCTION SEQUENCING

102-3.1 CONSTRUCTION SEQUENCE. The Contractor shall prepare a construction schedule and submit to the Construction Manager at least one week prior to the pre-construction conference.

102-3.2 CLOSING RUNWAYS. The Contractor shall acquaint his supervisors and employees with the sequence of construction and its relationship to airport activity and aircraft operations that are inherent to this airport. No runway, taxiway, apron or airport roadway shall be closed without the written approval of the Owner, to enable necessary NOTAMS and/or advisories to airport fixed based operators (FBOs), tenants and users.

The Contractor shall contact the Construction Manager a minimum of 72 Hours prior to any requested closing.

Any construction activity within 250 feet of the centerline of an active runway (runway safety area) or within 160 feet of the centerline of an active taxiway or apron (taxilane object free area) requires the closure of the affected area. These safety areas are shown on the phasing plan

The Construction Manager will arrange for an inspection prior to return to service of any facility, that has been closed for work, on or adjacent thereto, or that has been used for a crossing point or haul route by the Contractor.

MARKING AND LIGHTING

102-4.1 Proper marking and lighting of areas on the airfield associated with the construction shall be the responsibility of the Contractor and shall be described by the SPCD. This will include properly marking and lighting closed runways, taxiways, taxilanes, and aprons, the limits of construction, material storage areas, equipment storage areas, haul routes, parking areas and other areas defined as required for the Contractor's exclusive use. The Contractor shall erect and maintain around the perimeter of these areas suitable marking and warning devices visible for day and night use. Temporary barricades, flagging, and flashing warning lights shall be required at critical access points. The type and location of marking and warning devices will be approved by the Construction Manager.

Special emphasis shall be given to open trenches, excavations, heavy equipment marshalling areas, and stockpiled material located in the airport operations area, which shall be predominantly marked by the Contractor with flags and lighted by approved light units during hours of restricted visibility and darkness. All marking shall be in accordance with FAA Advisory Circular (AC) 150/5340-1H or latest edition.

TRAFFIC CONTROL

102-5.1 VEHICLE IDENTIFICATION. The Contractor shall establish and maintain a list of Contractor and subcontractor vehicles authorized to operate on the site. Personal vehicles are not allowed in the Airport Operations Area (AOA) at any time. To be authorized to operate on the airport, each Contractor or subcontractor's vehicle shall:

a. be marked/flagged for high daytime visibility and lighted for nighttime operations. Vehicles that are not marked and/or lighted shall be escorted by a vehicle appropriately marked and/or lighted. Vehicles requiring escort shall be identified on the list.

b. be identified with the name and/or logo of the Contractor and be of sufficient size to be identified at a distance. Vehicles needing intermittent identification could be marked with tape or with commercially available magnetically attached markers. Vehicles that are not appropriately identified shall be escorted by a vehicle that conforms to this requirement. Vehicles requiring escort shall be identified on the list.

c. be operated in a manner that does not compromise the safety of either landside or airside airport operations. If, in the opinion of the Construction Manager, any vehicle is operated in a manner not fully consistent with this requirement, the Construction Manager has the right to restrict operation of the vehicle or prohibit its use on the airport.

102-5.2 ACCESS TO THE SITE OF CONSTRUCTION. The Contractor's access to the site shall be as shown on

the Contract Layout Plan. No other access points shall be allowed unless approved by the Construction Manager. All Contractor traffic authorized to enter the site shall be experienced in the route or guided by Contractor personnel. The Contractor shall be responsible for traffic control to and from the various construction areas on the site, and for the operation and security of the access gate to the site. A Contractor's flagman or traffic control person shall monitor and coordinate all Contractor traffic at the access gate with Airport Security. The Contractor shall not permit any unauthorized construction personnel or traffic on the site. Access gates to the site shall be locked and secured at all times when not attended by the Contractor. If the Contractor chooses to leave any access gate open, it shall be attended by Contractor personnel who are familiar with the requirements of the Airport Security Program. The Contractor is responsible for the immediate cleanup of any debris deposited along the access route as a result of his construction traffic. Directional signing from the access gate along the delivery route to the storage area, plant site or work site shall be as directed by the Construction Manager. In addition, the following requirements are applicable:

a. All Contractor traffic authorized to travel on the airport shall have been briefed as part of the Contractor's construction safety and security orientation program, be thoroughly familiar with the access procedures and route for travel or be escorted by personnel authorized by the Contractor Safety and Security Officer (CSSO).

b. The Contractor shall install work site identification signs at the authorized access point(s). If, in the opinion of the Construction Manager, directional signs are needed for clarity, they shall be installed along the route authorized for access to each construction site.

c. Under no circumstance will Contractor personnel be permitted to drive their individually owned vehicles to any construction site on the airport. All vehicles must be parked in the area designated for employee parking and out of secured airport property.

d. In addition to the inspection and cleanup required at the end of each shift, the Contractor is responsible for the immediate cleanup of any debris generated along the construction site access route(s) as a result of construction related traffic or operations whether or not created by Contractor personnel.

102-5.3 MATERIAL SUPPLIERS. All material suppliers, subcontractors and visitors to the work site are obligated to follow the same safety and security operating procedures as the Contractor. All material suppliers shall make their deliveries using the same access points and routes as the Contractor and shall be advised of the appropriate delivery procedures at the time the materials order is placed. The Contractor shall not use the Airport address for any delivery but shall use the street address appropriate to the location of the entrance of the work site. If it is not practical to conform to the vehicle identification requirements of Section 102-5.1 and the safety and security operations program requirements of Section 102-2.2, the Contractor shall be prepared to escort all suppliers, subcontractors and visitors while they are on the airport.

102-5.4 PERSONNEL IDENTIFICATION. All employees, agents, vendors, invitees, etc. of the Contractor or subcontractors requiring access to the construction site shall, conform to the Security Program.

102-5.5 TRAFFIC CONTROL DEVICES, WARNING DEVICES AND BARRIERS.

a. Installation. The responsibility for installation and maintenance of adequate traffic control devices, warning devices and barriers, for the protection of the traveling public and workers, as well as to safeguard the work area in general shall rest with the Contractor. The required traffic control devices, warning devices and barriers shall be erected by the Contractor prior to creation of any hazardous condition and in conjunction with any necessary rerouting of traffic. The Contractor shall immediately remove, turn or cover any devices or barriers that do not apply to existing conditions.

The Contractor shall make the Engineer aware of any scheduled operation which will affect traffic patterns or safety sufficiently in advance of commencing such operation to permit their review of the plan for installation of traffic control devices, warning devices, or barriers proposed by the Contractor.

The Contractor shall assign one of their employees the responsibility of maintaining the position and condition of all traffic control devices, warning devices and barriers throughout the duration of the contract. The Project Engineer shall be kept advised at all times as to the identification and means of contacting this employee on a 24-hour basis.

b. Furnishing of Devices and Barriers. All traffic control devices (including signs), warning devices and barriers shall be furnished by the Contractor.

c. Maintenance of Devices and Barriers. Traffic control devices, warning devices, and barriers shall be kept in the correct position, properly directed, clearly visible and clean at all times. Damaged, defaced or dirty Devices or barriers shall be immediately repaired, replaced or cleaned as directed.

d. Guard/Flagmen. The Contractor shall provide competent flagmen to direct traffic where one-way operation in a single lane is in effect and in other situations as may be required by the standards established. Contractor shall provide competent gate guard(s) during construction hours and in accordance with the general notes as specified in the plans.

e. Existing Pavement Markings. Where a detour changes the lane use or where normal vehicle paths are altered during construction, all existing pavement markings that will be in conflict with the adjusted vehicle paths shall be removed. Over-painting will not be allowed. The removal may be accomplished by any method that will not materially damage the surface texture of the pavement and which will eliminate the previous marking pattern regardless of weather and light conditions.

The Engineer may waive these requirements for detours that will be in use less than 12 hours.

All pavement markings that will be in conflict with "next phase of operation" vehicle paths shall be removed as described above, prior to opening to traffic, when possible. Markings that cannot be removed prior to changing traffic patterns will be removed as soon as practicable. The term "practicable" shall be interpreted as meaning or implying:

1. Marking removal equipment will be scheduled for use immediately following any change in lanes.

2. If darkness or inclement weather interferes with removal operations, such operations will be accomplished during the next daylight period or as soon thereafter as weather conditions permit.

3. If equipment failures occur such equipment will be repaired, replaced, or leased so that the removal can be accomplished by the following day.

102-5.6 CROSSING GUARDS/FLAGGERS. The Contractor shall provide at that there expense crossing guards to monitor and control traffic when construction vehicles are crossing pavement areas that are available to aircraft operations. The crossing guards must obtain badges from the Airport Operations department. Crossing guards must monitor the ATCT ground frequency at all times and be able to communicate with the ATCT as necessary. The crossing guard must be approved by Airport Operations and may be required to be replaced if Airport Operations determines that the crossing guard cannot safely meet the requirements of the position. There shall be no separate measurement or payment for crossing guards and they shall be considered incidental to the Safety and Security pay item.

GENERAL SAFETY REQUIREMENTS

102-6.1 All Contractor vehicles that are authorized to operate on the airport outside of the designated construction area limits or haul routes as defined herein shall display in full view above the vehicle a flashing amber (yellow) dome-type light or a three-foot by three-foot, or larger, orange and white checkerboard flag, each checkerboard color being one-foot square. Vehicles must be under control of a Contractor mobile (two-way) radio operator (flagmen) monitoring the Airport frequency. Vehicle operators must be vigilant for conflict with any aircraft and give way to any operating aircraft.

All Contractor vehicles that are required to operate outside of the construction area limits as defined herein and cross active runways, taxiways, aprons, or runway approach clear zones shall do so under the direct control of a flagman

who is monitoring the Airport frequency. Flagmen and two-way radios shall be furnished by the Contractor. Flagmen shall be instructed in the use of two-way radios prior to use. All aircraft traffic on runways, taxiways and aprons shall have priority over Contractor's traffic.

Construction vehicles not in use for extended periods during the work day, or during nights and weekends (nonwork periods) shall be parked away from active runways, taxiways, and aprons in designated vehicle marshalling areas.

102-6.2 In order to protect all aircraft traffic, aviation related businesses, terminal apron areas, etc. from potential damage caused by foreign object debris (FOD) generated by construction activities, the Contractor shall provide a vacuum truck as required at the startup of construction to daily vacuum all pavements affected by construction. The vacuum truck shall remain on-site for the duration of the project and shall be available at the discretion of the Owner to vacuum pavement areas adjacent to the construction areas to ensure no FOD is present on pavements within 500 feet of any construction area. Protecting the aircraft, airport tenants, users, public, etc. against FOD is a critical safety issue therefore the cost of the vacuum truck will be included in the cost established for this specification item.

CONSTRUCTION CONTROL

102-7.1 A primary and alternate responsible Contractor's representative shall be designated by the Contractor. The Contractor's representatives shall be available locally on a 24-hour basis. Names of the primary and alternate, including phone number, shall be made available to the Construction Manager by the Contractor. The Contractor shall insure that the names and phone numbers are kept current and made available to the Construction Manager.

CONSTRUCTION TECHNIQUES

102-8.1 Construction shall be planned and conducted throughout this project in such a manner as to allow the maintenance of completely safe airport operations. Every effort shall be made to reduce the impact of construction activity on overall airport operations. To this end the Contractor's activities shall be conducted in such a manner so as to preclude, except where absolutely required, open excavations, trenches, ditches and above ground obstacles such as booms on cranes or obstacle markers such as wooden saw horses. The primary responsibility for assuring that the safest possible construction techniques are followed rests with the Contractor Safety and Security Officer (CSSO).

METHOD OF MEASUREMENT

102-9.1 The item of Safety and Security shall be measured as a lump sum item when required and furnished for the life of the Contract.

BASIS OF PAYMENT

102-10. Payment shall be made for airport safety and security measures for personnel or materials related to this specification item and incidentally required to satisfy the specified objective(s) under item P-102-1, Safety and Security. This compensation shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

PARTIAL PAYMENTS. Partial payments will be made in accordance with the following:

Percentage of Original Contract Earned	Allowable Percent of the Lump Sum Price for the Item
5	15
15	20
25	25
50	50
75	75
100 (or Contract Completion)	100

Payment shall be made under:

Item P-102-1	Safety, Security and Maintenance of Airfield Operations- per lump sum

END OF ITEM P-102

Item P-151 Clearing and Grubbing

DESCRIPTION

151-1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Engineer.

a. Clearing shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

b. Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing.

c. Toposil stripping shall consist of the clearing of the surface of the ground of all vegetation, grass weeds and organic topsoils that are unsuitable for the construction of pavements or embankments within safety areas.

CONSTRUCTION METHODS

151-2.1 General. The areas denoted on the plans to be cleared or cleared and grubbed or removal or trimming of isolated trees shall be staked on the ground by the Engineer. The clearing and grubbing shall be done at a satisfactory distance in advance of the grading operations.

All spoil materials removed by clearing or by clearing and grubbing shall be disposed of outside the Airport's limits at the Contractor's responsibility, except when otherwise directed by the Engineer. As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry that cannot be used in construction and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the Engineer and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the Engineer permission in writing from the property owner for the use of private property for this purpose.

Blasting shall not be allowed. The removal of existing structure and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone or telegraph pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated, the Contractor shall advise the Engineer who will notify the proper local authority or owner to secure prompt action.

151-2.2 Clearing. The Contractor shall clear the staked or indicated area of all objectionable materials. Trees unavoidably falling outside the specified clearing limits must be cut up, removed, and disposed of

in a satisfactory manner. To minimize damage to trees that are to be left standing, trees shall be felled toward the center of the area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.

Fences shall be removed and disposed of as directed by the Engineer. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a location designated by the Engineer if the fence is to remain the property of a local owner or authority.

151-2.3 Clearing and grubbing. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed, except where embankments exceeding 3-1/2 feet in depth will be constructed outside of paved areas. For embankments constructed outside of paved areas, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain. Tap roots and other projections over 1-1/2 inches in diameter shall be grubbed out to a depth of at least 18 inches below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the plans to be removed shall be demolished or removed, and all materials shall be disposed of by removal from the site. The cost of removal is incidental to this item. The remaining or existing foundations, wells, cesspools, and like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material that cannot be used in backfill shall be removed and disposed of at the Contractor's expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes under embankment areas remaining after the grubbing operation shall have the sides of the holes flattened to facilitate filling with acceptable material and compacting as required in Item P-152. The same procedure shall be applied to all holes remaining after grubbing in areas where the depth of holes exceeds the depth of the proposed excavation.

151-2.4 Topsoil Stripping. In areas designated to be stripped of topsoil and all areas that are to receive embankment which are located within runway or taxiway safety areas, all vegetation, grasses, weeds and organic topsoils shall be removed to a depth of 4 inches except where embankments exceeding 3-1/2 feet in depth will be constructed outside of paved areas.

METHOD OF MEASUREMENT

151-3.1 There shall be no measurement for payment for topsoil stripping. Payment for all topsoil stripping shall be included incidental to unclassified excavation.

BASIS OF PAYMENT

151-4.1 For topsoil stripping, payment shall be made **incidental to "unclassified excavation" operations**. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

END OF ITEM P-151

Item P-152 Excavation, Subgrade, and Embankment

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152-1.2 Classification. All material excavated shall be classified as defined below:

a. **Unclassified excavation.** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature.

152-1.3 Unsuitable excavation. Any material containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material, suitable for topsoil may be used on the embankment slope when approved by the Engineer.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be completely cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the Engineer. All unsuitable material shall be disposed of in waste areas shown on the plans. All waste areas shall be graded to allow positive drainage of the area and of adjacent areas. The surface elevation of waste areas shall not extend above the surface elevation of adjacent usable areas of the airport, unless specified on the plans or approved by the Engineer.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the Engineer notified per subsection 70-20. At the direction of the Engineer, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Those areas outside of the limits of the pavement areas where the top layer of soil material has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches, to loosen and pulverize the soil.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the Engineer, who shall arrange for their removal if necessary. The Contractor, at his or her expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

152-2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the Engineer has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the Engineer. All suitable excavated

material shall be used in the formation of embankment, subgrade, or other purposes shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

When the volume of the excavation exceeds that required to construct the embankments to the grades indicated, the excess shall be used to grade the areas of ultimate development or disposed as directed by the Engineer. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the work.

a. Selective grading. Not used.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches below the subgrade or to the depth specified by the Engineer. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed off the airport. The cost is incidental to this item. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for **unclassified excavation**. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans.

c. Overbreak. Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Engineer. All overbreak shall be graded or removed by the Contractor and disposed of as directed by the Engineer. The Engineer shall determine if the displacement of such material was unavoidable and his or her decision shall be final. Payment will not be made for the removal and disposal of overbreak that the Engineer determines as avoidable. Unavoidable overbreak will be classified as "Unclassified Excavation."

d. Removal of utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by someone other than the Contractor; for example, the utility unless otherwise shown on the plans. All existing foundations shall be excavated at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the Engineer. All foundations thus excavated shall be backfilled with suitable material and compacted as specified.

e. Compaction requirements. The subgrade under areas to be paved shall be compacted to a depth of **12 inches** and to a density of not less than **100** percent of the maximum density as determined by ASTM **D1557.** The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils).

The in-place field density shall be determined in accordance with ASTM D1556 **or** ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. Stones or rock fragments larger than 4 inches in their greatest dimension will not be permitted in the top 6 inches of the subgrade. The finished grading operations, conforming to the typical cross-section, shall be completed and maintained at least 1,000 feet ahead of the paving operations or as directed by the Engineer.

All loose or protruding rocks on the back slopes of cuts shall be pried loose or otherwise removed to the slope finished grade line. All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the Engineer.

Blasting shall not be allowed.

f. Proof rolling. After compaction is completed, the subgrade area shall be proof rolled with a heavy pneumatic-tired roller having four or more tires abreast, each tire loaded to a minimum of 30,000 pounds and inflated to a minimum of 125 psi in the presence of the Engineer. Apply a minimum of **four passes of** coverage, or as specified by the Engineer, to all paved areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch or show permanent deformation greater than 1 inch shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications.

152-2.3 Borrow excavation. Not Used.

152-2.4 Drainage excavation. Drainage excavation shall consist of excavating for drainage ditches such as intercepting; inlet or outlet ditches; for temporary levee construction; or for any other type as designed or as shown on the plans. The work shall be performed in sequence with the other construction. Intercepting ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the Engineer. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

152-2.5 Preparation of embankment area. Where an embankment is to be constructed to a height of 4 feet or less, all sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches and shall then be compacted as indicated in paragraph 152-2.6. When the height of fill is greater than 4 feet, sod not required to be removed shall be thoroughly disked and recompacted to the density of the surrounding ground before construction of embankment.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.6 Formation of embankments. Embankments shall be formed in successive horizontal layers of not more than 8 inches in loose depth for the full width of the cross-section, unless otherwise approved by the Engineer.

The layers shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the Engineer. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each layer shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. To achieve a uniform moisture content throughout the layer, the material shall be moistened or aerated as necessary. Samples of all embankment materials for testing, both before and after

placement and compaction, will be taken for each **1,000 cubic yards**. Based on these tests, the Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

Rolling operations shall be continued until the embankment is compacted to not less than 95% of maximum density for noncohesive soils, and 90% of maximum density for cohesive soils as determined by ASTM **D 1557** Under all areas to be paved, the embankments shall be compacted to a depth of **12 inches** and to a density of not less than **100** percent of the maximum density as determined by ASTM **1557**.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches.

The in-place field density shall be determined in accordance with ASTM **1556 or** ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The Contractor's laboratory shall perform all density tests in the Engineer's presence and provide the test results upon completion to the Engineer for acceptance.

Compaction areas shall be kept separate, and no layer shall be covered by another layer until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each layer is placed. Layer placement shall begin in the deepest portion of the embankment fill. As placement progresses, the layers shall be constructed approximately parallel to the finished pavement grade line.

When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated under the future paved areas. Stones or fragmentary rock larger than 4 inches in their greatest dimensions will not be allowed in the top 6 inches of the subgrade. Rockfill shall be brought up in layers as specified or as directed by the Engineer and the finer material shall be used to fill the voids with forming a dense, compact mass. Rock or boulders shall not be disposed of outside the excavation or embankment areas, except at places and in the manner designated on the plans or by the Engineer.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in layers of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in layers not exceeding 2 feet in thickness. Each layer shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The layer shall not be constructed above an elevation 4 feet below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in layers, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation or other items.

152-2.7 Finishing and protection of subgrade. After the subgrade is substantially complete, the Contractor shall remove any soft or other unstable material over the full width of the subgrade that will not compact properly. All low areas, holes or depressions in the subgrade shall be brought to grade with suitable select material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans.

Grading of the subgrade shall be performed so that it will drain readily. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes. All ruts or rough places that develop in the completed subgrade shall be graded and recompacted.

No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer.

152-2.8 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

152-2.9 Tolerances. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a 12-foot straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of 1/2 inch, or shall not be more than 0.05 feet from true grade as established by grade hubs. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting.

On safety areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10 feet from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.10 Topsoil. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall not be placed within **250** feet of runway pavement or **70** feet of taxiway pavement and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the Engineer, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further rehandling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as directed, or as required in Item T-905.

No direct payment will be made for topsoil under Item P-152. The quantity removed and placed directly or stockpiled shall be paid for at the contract unit price per cubic yard (cubic meter) for "Unclassified Excavation."

When stockpiling of topsoil and later rehandling of such material is directed by the Engineer, the material so rehandled shall be paid for at the contract unit price per cubic yard (cubic meter) for "topsoiling," as provided in Item T-905.

METHOD OF MEASUREMENT

152-3.1 The quantity of excavation to be paid for shall be the number of cubic yards (cubic meters) measured from its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

152-3.2 There shall be no measurement for payment for Embankment in Place or Borrow Material in Place. Payment for all embankment in place or borrow material shall be included incidental to unclassified excavation.

BASIS OF PAYMENT

152-4.1 "Unclassified excavation" payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.2 For embankment in place or borrow material, payment shall be made **incidental to "unclassified excavation" operations**. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-152-1	**Unclassified Excavation** - per cubic yard

TESTING REQUIREMENTS

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

END OF ITEM P-152

Item P-156 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control

DESCRIPTION

156-1.1 This item shall consist of temporary control measures as shown on the plans or as ordered by the Engineer during the life of a contract to control water pollution, soil erosion, and siltation through the use of silt fences, berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Temporary control measures shall be design, installed and maintained to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near public-use airports.

MATERIALS

156-2.1 Grass. Grass that will not compete with the grasses sown later for permanent cover per Item T-901 shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

156-2.2 Mulches. Mulches may be hay, straw, fiber mats, netting, bark, wood chips, or other suitable material reasonably clean and free of noxious weeds and deleterious materials per Item T-908. Mulches shall not create a wildlife attractant.

156-2.3 Fertilizer. Fertilizer shall be a standard commercial grade and shall conform to all Federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

156-2.4 Slope drains. Slope drains may be constructed of pipe, fiber mats, rubble, Portland cement concrete, bituminous concrete, or other materials that will adequately control erosion.

156-2.5 Silt fence. The silt fence shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life. Silt fence shall meet the requirements of ASTM D6461.

156-2.6 Other. All other materials shall meet commercial grade standards and shall be approved by the Engineer before being incorporated into the project.

CONSTRUCTION REQUIREMENTS

156-3.1 General. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The Engineer shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

156-3.2 Schedule. Prior to the start of construction, the Contractor shall submit schedules for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the Engineer.

156-3.3 Construction details. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the accepted schedule. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion may be a problem, clearing and grubbing operations should be scheduled and performed so that grading operations and permanent erosion control features can follow immediately if project conditions permit; otherwise, temporary erosion control measures may be required.

The Engineer shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current with the accepted schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the Engineer.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the Engineer. If temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or directed by the Engineer, the work shall be performed by the Contractor and the cost shall be incidental to this item.

The Engineer may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.

The erosion control features installed by the Contractor shall be acceptably maintained by the Contractor during the construction period.

Whenever construction equipment must cross watercourses at frequent intervals, temporary structures should be provided.

Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.

156-3.4 Installation, maintenance and removal of silt fences. Silt fences shall extend a minimum of 16 inches and a maximum of 34 inches above the ground surface. Posts shall be set no more than 10 feet on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post with a minimum 12-inch overlap and securely sealed. A trench shall be excavated approximately 4 inches deep by 4 inches wide on the upslope side of the silt fence. The trench shall be backfilled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the Engineer.

METHOD OF MEASUREMENT

156-4.1 Installation and removal of silt fence will be measured by the linear foot.

156-4.2 Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor.

BASIS OF PAYMENT

156-5.1 Accepted quantities of temporary water pollution, soil erosion, and siltation control work ordered by the Engineer and measured as provided in paragraph 156-4.1 will be paid for under:

Item P-156-1 Silt Fence (linear feet)

Where other directed work falls within the specifications for a work item that has a contract price, the units of work shall be measured and paid for at the contract unit price bid for the various items.

Temporary control features not covered by contract items that are ordered by the Engineer will be paid for in accordance with Section 90-05 Payment for Extra work.

MATERIAL REQUIREMENTS

ASTM D6461	Standard Specification for Silt Fence Materials
AC 150/5200-33	Hazardous Wildlife Attractants

END OF ITEM P-156

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Item P-219 Recycled Concrete Aggregate Base Course

DESCRIPTION

219-1.1 This item consists of a base course composed of recycled concrete aggregate, crushed to meet a particular gradation, constructed on a prepared course per these specifications and in conformity to the dimensions and typical cross-sections shown on the plans.

MATERIALS

219-2.1 Aggregate. Recycled concrete aggregate shall consist of portland cement concrete (PCC) or other concrete containing pozzolanic binder material. The recycled concrete material shall be free of reinforcing steel and expansion material. Asphalt concrete overlays shall be removed from the PCC surface prior to pavement removal and crushing. Any full-slab asphalt concrete panels (used as a replacement for a removed PCC slab) shall also be removed. An incidental amount of recycled asphalt concrete pavement and other foreign material may be present in the recycled concrete aggregate.

Recycled concrete aggregate base course shall consist of at least 90%, by weight, Portland cement concrete, with the remaining 10% consisting of the following materials:

Wood	0.1% maximum
Brick, mica, schist, or other friable materials	4% maximum
Asphalt concrete	10% maximum

Virgin aggregates may be added to meet the 90% minimum PCC requirement.

The percentage of wood, brick, mica, schist, other friable materials, and asphalt concrete shall be determined by weighing that material retained on the No. 4 sieve, and dividing by the total weight of recycled concrete aggregate material retained on the No. 4 sieve.

The fine aggregate shall be produced by crushing stone, gravel, slag, or recycled concrete that meet the requirements for wear and soundness specified for coarse aggregate. Fine aggregate may be added to produce the correct gradation.

The amount of flat and elongated particles in recycled concrete aggregate shall not exceed 20% for the fraction retained on the 1/2 inch sieve nor 20% for the fraction passing the 1/2 inch sieve when tested per ASTM D4791. A flat particle is one having a f width to thickness ratio greater than 3; an elongated particle is one having a length to width ratio greater than 3.

The percentage of wear shall not be greater than 45% when tested per ASTM C131. The sodium sulfate soundness test (ASTM C88) requirement is waived for recycled concrete aggregate.

The fraction passing the No. 40 sieve shall have a liquid limit no greater than 25 and a plasticity index of not more than four (4) when tested per ASTM D4318. The fine aggregate shall have a minimum sand equivalent value of 35 when tested per ASTM D2419.

a. Sampling and testing. Recycled concrete aggregate samples for preliminary testing shall be furnished by the Contractor prior to the start of base construction. All tests for initial aggregate submittals necessary to determine compliance with the specification requirements will be made by the Engineer at no expense to the Contractor.

Samples of recycled concrete aggregate shall be furnished by the Contractor at the start of production and at intervals during production. The sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval of specific lots of recycled concrete aggregate for the quality requirements.

Samples of recycled concrete aggregate to check gradation shall be taken at least once daily. Sampling shall be per ASTM D75, and testing shall be per ASTM C136 and ASTM C117.

b. Gradation requirements. The gradation (job mix) of the final mixture shall fall within the design range indicated in the following table, when tested per ASTM C117 and ASTM C136. The final gradation shall be continuously graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

Requirements for Gradation Of Recycled Concrete Aggregate Base

Sieve Size	Percentage by Weight Passing Sieves	Job Mix Tolerances Percent
2 inch	100	--
1-1/2 inch	95 - 100	±5
1 inch	70 - 95	±8
3/4 inch	55 - 85	±8
No. 4	30 - 60	±8
No. 30	12 - 30	±5
No. 200	0 - 5	±3

The job mix tolerances in the table shall be applied to the job mix gradation to establish a job control gradation band. The full tolerance still will apply if application of the tolerances results in a job control gradation band outside the design range.

EQUIPMENT

219-3.1 General. All equipment necessary to mix, transport, place, compact, and finish the recycled concrete aggregate base course shall be furnished by the Contractor. The Contractor shall provide written certification to the Engineer that all equipment meets the requirements for this section. The equipment shall be inspected by the Engineer at the job site prior to the start of construction operations.

219-3.2 Mixing equipment. Base course shall be thoroughly mixed in a plant suitable for recycled concrete aggregate. The mixer shall be a batch or continuous-flow type equipped with a calibrated metering and feeding device that introduce the aggregate and water into the mixer in specified quantities. If necessary, a screening device shall be installed to remove oversized material greater than 2 inches from the recycled concrete aggregate feed.

The Engineer shall have access to the plant at all times for inspection of the plant’s equipment and operation and for sampling the mixed recycled concrete aggregate materials.

219-3.3 Hauling equipment. The mixed recycled concrete aggregate base course shall be transported from the plant to the job site in hauling equipment having beds that are smooth, clean, and tight. Truck bed covers shall be provided and used to protect the mixed recycled concrete aggregate base course from rain during transport.

219-3.4 Placing equipment. Recycled concrete aggregate shall be placed using a mechanical spreader or machine capable of receiving, spreading, and shaping the material into a uniform layer or lift without segregation. The placing equipment shall be equipped with a strike off plate that can be adjusted to the layer thickness.

219-3.5 Compaction equipment. Recycled concrete aggregate base course shall be compacted using one or a combination of the following pieces of equipment: steel-wheeled roller; vibratory roller; pneumatic-tire roller; and/or hand-operated power tampers (for areas inaccessible to rollers).

219-3.6 Finishing equipment. Trimming of the compacted recycled concrete aggregate to meet surface requirements shall be accomplished using a self-propelled grader or trimming machine, with a mold board cutting edge of 12 feet minimum width automatically controlled by sensors in conjunction with an independent grade control from a taut stringline. Stringline will be required on both sides of the sensor controls for all lanes.

CONSTRUCTION METHODS

219-4.1 Weather limitations. Construction is allowed only when the atmospheric temperature is at or above 35°F. When the temperature falls below 35°F, the Contractor shall protect all completed areas against detrimental effects of freezing. The Contractor shall repair any areas damaged by freezing, rainfall, or other weather conditions.

219-4.2 Preparing underlying course. The underlying course shall be checked by the Engineer before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed there. Material shall not be placed on frozen material.

To protect the existing layers and to ensure proper drainage, the spreading of the recycled concrete aggregate base course shall begin along the centerline of the pavement on a crowned section or on the greatest contour elevation of a pavement with a variable uniform cross slope.

219-4.3 Grade control. Grade control between the edges of the recycled concrete aggregate base course lanes shall be accomplished by grade stakes, steel pins, or forms placed in lanes parallel to the centerline and at intervals of 50 feet or less on the longitudinal grade and 25 feet or less on the transverse grade.

219-4.4 Mixing. The recycled concrete shall be uniformly blended during crushing operations and mixed with water in a mixing plant suitable for recycled concrete aggregate. The plant shall blend and mix the materials to meet the specifications and to secure the proper moisture content for compaction.

219-4.5 Placing. The recycled concrete aggregate base material shall be placed on the moistened subgrade or base in layers of uniform thickness with an approved mechanical spreader.

The maximum depth of a compacted layer shall be 6 inches. If the total depth of the compacted material is more than 6 inches, it shall be constructed in two or more layers. In multi-layer construction, the material shall be placed in approximately equal-depth layers.

The previously constructed layer shall be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

Adjustments in placing procedures or equipment shall be made to obtain grades, to minimize segregation grading, to adjust the water content, and to ensure an acceptable recycled concrete aggregate base course.

219-4.6 Compaction. Immediately after completion of the spreading operations, the recycled concrete aggregate shall be compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density.

Each layer of the recycled concrete aggregate base course shall be compacted to the required density using the compaction equipment. The moisture content of the material during placing operations shall be within ±1-1/2 percentage points of the optimum moisture content as determined by ASTM **D1557**.

The compaction shall continue until each layer has reached compaction that is at least 100% of the laboratory maximum density through the full depth of the layer. The Contractor shall make adjustments in compacting or finishing techniques to obtain true grades, to minimize segregation and degradation, to reduce or increase water content and to ensure a satisfactory base course. Any unsatisfactory materials shall be removed and replaced with satisfactory material or reworked, to meet the requirements of this specification.

219-4.7 Acceptance sampling and testing for density. The Contractor's laboratory shall perform all density tests in the Engineer's presence and provide the test results upon completion daily to the Engineer for acceptance. Recycled concrete aggregate shall be accepted for density on a lot basis. A lot will consist of one day's production where it does not exceed 2,400 square yards per lift. A lot will consist of one-half day's production, where a day's production is between 2,400 and 4,800 square yards per lift.

Each lot shall be divided into two equal sublots. One density test shall be made for each sublot and shall consist of the average of two random locations for density determination. Sampling locations will be determined by the Engineer on a random basis per ASTM D3665.

Each lot will be accepted for gradation when it falls within the limits and tolerances shown in the table above when tested per ASTM C117 and ASTM C131. If the proper gradation is not attained the gradation test will be repeated. If the re-test does not indicate gradations within the limits of the table above, the entire lot shall be rejected and replaced by the Contractor at the Contractor's expense.

Each lot will be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens prepared from samples of the base course material. The specimens shall be compacted and tested per ASTM **D1557**. The in-place field density shall be determined per ASTM D6938. The field density shall be determined in accordance with ASTM D6938 using Procedure A, the direct transmission method and the machines shall be calibrated in accordance with per ASTM D6938. When using the nuclear method, ASTM D4643 shall be used to determine the moisture content of the material. If the specified density is not attained, the entire lot shall be reworked and two additional random tests made. This procedure shall be followed until the specified density is reached.

219-4.8 Finishing. The surface of the recycled concrete aggregate base course shall be finished by equipment designed for this purpose.

Adding a thin layer of material to the top of the base course to meet grade shall not be allowed. If the elevation of the layer is 1/2 inch or more below grade, the layer shall be scarified to a depth of at least 3

inches, new material added, and the layer shall be recompacted. If the finished surface is above plan grade, it shall be cut back to grade and rerolled. The grade shall be measured on a maximum 25-foot grid (longitudinal and transverse). Thickness results shall be furnished to the Engineer daily for acceptance determination.

Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, and recompacted or replaced at the Contractor's expense.

219-4.9 Surface tolerances. The finished surface shall not vary more than 3/8 inch when tested with a 12-foot straightedge applied parallel with or at right angles to the centerline. The Contractor shall correct any deviation in excess of this amount, at the Contractor's expense.

219-4.10 Thickness control. The completed thickness of the base course shall be within 1/2 inch of the design thickness. Four thickness determinations shall be made for each lot of material placed. Each lot shall be divided into four equal sublots and one test shall be made for each sublot. Sampling locations will be determined per ASTM D3665. Where the thickness is not more than 1/2 inch deficient, the Contractor, at his or her expense, shall correct the areas by excavating to the required depth and replacing with new material. Additional test holes may be required to identify the limits of deficient areas.

219-4.11 Traffic. Equipment used in construction may be routed over completed portions of the base course, provided there is no damage to the base course. The equipment shall be routed evenly over the full width of the base course to avoid rutting or uneven compaction.

219-4.12 Maintenance. The base course shall be maintained until the base course is completed and accepted. Maintenance will include immediate repairs to any defects and shall be repeated as often as necessary to keep the completed work intact. The Contractor, at his or her expense, will rework any area of the recycled concrete aggregate base course that is damaged.

METHOD OF MEASUREMENT

219-5.1 The quantity of **4 inch or 6 inch** recycled concrete aggregate base course will be determined by measurement of the number of square yards of material actually constructed and accepted as complying with the plans and specifications.

BASIS OF PAYMENT

219-6.1 Payment shall be made at the contract unit price per square yard for **4 inch or 6 inch** recycled concrete aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-219-1	**4 inch** Recycled Concrete Aggregate Base Course per square yard
Item P-219-2	**6 inch** Recycled Concrete Aggregate Base Course per square yard

TESTING REQUIREMENTS

ASTM C29	Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D75	Standard Practice for Sampling Aggregates
ASTM C117	Standard Test Method for Materials Finer than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber-Balloon Method
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4643	Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating
ASTM D4718	Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

END OF ITEM P-219

Item P-403 Hot Mix Asphalt (HMA) Pavements (Base, Leveling or Surface Course)

DESCRIPTION

403-1.1 This item shall consist of a **surface** course composed of mineral aggregate and asphalt cement binder (asphalt binder) mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

403-2.1 Aggregate. Aggregates shall consist of crushed stone, crushed gravel, screenings, natural sand and mineral filler, as required. The aggregates should be free of ferrous sulfides, such as pyrite, that would cause "rust" staining that can bleed through pavement markings. The portion retained on the No. 4 sieve is coarse aggregate. The portion passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate, and the portion passing the No. 200 sieve is mineral filler.

a. Coarse aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the bituminous material and free from organic matter and other deleterious substances. The percentage of wear shall not be greater than **40** percent when tested in accordance with ASTM C131. The sodium sulfate soundness loss shall not exceed 12%, or the magnesium sulfate soundness loss shall not exceed 18%, after five cycles, when tested in accordance with ASTM C88. Clay Lumps and friable particles shall not exceed 1.0% when tested in accordance with ASTM C142.

Aggregate shall contain at least **50** percent by weight of individual pieces having two or more fractured faces and **65** percent by weight having at least one fractured face. The area of each face shall be equal to at least 75% of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces. Fractured faces shall be achieved by crushing.

The aggregate shall not contain more than a total of 8%, by weight, of flat particles, elongated particles, and flat and elongated particles, when tested in accordance with ASTM D4791 with a value of 5:1.

Slag shall not be used.

b. Fine aggregate. Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter.

The fine aggregate, including any blended material for the fine aggregate, shall have a plasticity index of not more than six (6) and a liquid limit of not more than 25 when tested in accordance with ASTM D4318.

The soundness loss shall not exceed 10% when sodium sulfate is used or 15% when magnesium sulfate is used, after five cycles, when tested per ASTM C88.

Clay lumps and friable particles shall not exceed 1.0 percent, by weight, when tested in accordance with ASTM C142.

Natural (non-manufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. The amount of sand to be added will be adjusted to produce mixtures conforming to requirements of this specification. The fine aggregate shall not contain more than 15% natural sand by weight of total aggregates. If used, the natural sand shall meet the requirements of ASTM D1073 and shall have a plasticity index of not more than six (6) and a liquid limit of not more than 25 when tested in accordance with ASTM D4318.

The aggregate shall have sand equivalent values of **45** or greater when tested in accordance with ASTM D2419.

c. Sampling. ASTM D75 shall be used in sampling coarse and fine aggregate, and ASTM C183 shall be used in sampling mineral filler.

403-2.2 Mineral filler. If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D242.

403-2.3 Asphalt cement binder. Asphalt cement binder shall conform to ASTM D6373 Performance Grade (PG) **76-22**. A certificate of compliance from the manufacturer shall be included with the mix design submittal.

The supplier's certified test report with test data indicating grade certification for the asphalt binder shall be provided to the Engineer for each load at the time of delivery to the mix plant. A certified test report with test data indicating grade certification for the asphalt binder shall also be provided to the Engineer for any modification of the asphalt binder after delivery to the mix plant and before use in the HMA.

403-2.4 Preliminary material acceptance. Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:

a. Coarse aggregate:

(1) Percent of wear

(2) Soundness

(3) Clay lumps and friable particles

(4) Percent fractured faces

(5) Flat and elongated particles

b. Fine aggregate:

(1) Liquid limit and Plasticity index

(2) Soundness

(3) Clay lumps and friable particles

(4) Percent natural sand

(5) Sand equivalent

c. Mineral filler.

d. Asphalt binder. Test results for **asphalt binder** shall include temperature/viscosity charts for mixing and compaction temperatures.

The certifications shall show the appropriate ASTM tests for each material, the test results, and a statement that the material meets the specification requirement.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

403-2.5 Anti-stripping agent. Any anti-stripping agent or additive if required shall be heat stable, shall not change the asphalt cement viscosity beyond specifications, shall contain no harmful ingredients, shall be added in recommended proportion by approved method, and shall be a material approved by the Department of Transportation of the State in which the project is located.

COMPOSITION

403-3.1 Composition of mixture. The HMA plant mix shall be composed of a mixture of well-graded aggregate, filler and anti-strip agent if required, and asphalt binder. The several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

403-3.2 Job mix formula. No hot-mixed asphalt (HMA) for payment shall be produced until a JMF has been approved in writing by the Engineer. The asphalt mix design and JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 403-3.4. The HMA shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition. Samples shall be prepared at various asphalt contents and compacted using the gyratory compactor in accordance with ASTM D6925**.**

Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D4867, shall not be less than 75 when tested at a saturation of 70-80% or an anti-stripping agent shall be added to the HMA, as necessary, to produce a TSR of not less than 75 when tested at a saturation of 70-80%. If an anti-strip agent is required, it shall be provided by the Contractor at no additional cost to the Owner.

The JMF shall be submitted in writing by the Contractor at least 30 days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates currently being produced.

The submitted JMF shall be stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

a. Percent passing each sieve size for total combined gradation, individual gradation of all aggregate stockpiles and percent by weight of each stockpile used in the JMF.

b. Percent of asphalt cement.

c. Asphalt performance, grade, and type of modifier if used.

d. Number of gyrations.

e. Laboratory mixing temperature.

f. Laboratory compaction temperature.

g. Temperature-viscosity relationship of the PG asphalt cement binder showing acceptable range of mixing and compaction temperatures and for modified binders include supplier recommended mixing and compaction temperatures.

h. Plot of the combined gradation on the 0.45 power gradation curve.

i. Graphical plots of air voids, voids in the mineral aggregate, and unit weight versus asphalt content.

j. Specific gravity and absorption of each aggregate.

k. Percent natural sand.

l. Percent fractured faces.

m. Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).

n. Tensile Strength Ratio (TSR).

o. Anti-strip agent (if required).

p. Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted.

The Contractor shall submit to the Engineer the results of verification testing of three (3) asphalt samples prepared at the optimum asphalt content. The average of the results of this testing shall indicate conformance with the JMF requirements specified in Tables 1 and 3.

When the project requires asphalt mixtures of differing aggregate gradations, a separate JMF and the results of JMF verification testing shall be submitted for each mix.

The JMF for each mixture shall be in effect until a modification is approved in writing by the Engineer. Should a change in sources of materials be made, a new JMF must be submitted within 15 days and approved by the Engineer in writing before the new material is used. After the initial production JMF has been approved by the Engineer and a new or modified JMF is required for whatever reason, the subsequent cost of the Engineer's approval of the new or modified JMF will be borne by the Contractor. There will be no time extension given or considerations for extra costs associated with the stoppage of production paving or restart of production paving due to the time needed for the Engineer to approve the initial, new or modified JMF.

Table 1. Gyratory Compaction Criteria

Test Property	**Pavements designed for aircraft gross weights less than 60,000 lbs (27216 kg) or tire pressures less than 100 psi**
Number of compactor gyrations	**50**
Air voids (%)	**3.5**
Percent voids in mineral aggregate, minimum	**See Table 2**

Table 2. Minimum Percent Voids In Mineral Aggregate (VMA)

Aggregate (See Table 3)	Minimum VMA
Gradation 2	15

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 3 when tested in accordance with ASTM C136 and ASTM C117.

The gradations in Table 3 represent the limits that shall determine the suitability of aggregate for use from the sources of supply, be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa.

Table 3. Aggregate - HMA Pavements

Sieve Size	Percentage by Weight Passing Sieve
	Gradation 2
1 inch (25 mm)	--
3/4 inch (19 mm)	100
1/2 inch (12 mm)	79-99
3/8 inch (9 mm)	68-88
No. 4 (4.75 mm)	48-68
No. 8 (2.36 mm)	33-53
No. 16 (1.18 mm)	20-40
No. 30 (0.60 mm)	14-30
No. 50 (0.30 mm)	9-21
No. 100 (0.15 mm)	6-16
No. 200 (0.075 mm)	3-6
Asphalt Percent:	
Stone or gravel	5.0-7.5

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition.

403-3.3 Reclaimed asphalt concrete (RAP). Rap shall not be used.

403-3.4 Job mix formula (JMF) laboratory. The Contractor's laboratory used to develop the JMF shall be accredited in accordance with ASTM D3666. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for developing the JMF must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

403-3.5 Test section. Prior to full production, the Contractor shall prepare and place a quantity of HMA according to the JMF. The amount of HMA shall be sufficient to construct a test section 200 feet long and 20 feet wide, placed in two lanes, with a longitudinal cold joint, and shall be of the same depth specified for the construction of the course which it represents. A cold joint for this test section is an exposed construction joint at least four (4) hours old or whose mat has cooled to less than 160°F. The cold joint must be cut back using the same procedure that will be used during production in accordance with 403-4.12. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.

The test section shall be evaluated for acceptance as a single lot in accordance with the acceptance criteria in paragraph 403-5.1 and 403-5.2. The test section shall be divided into equal sublots. As a minimum the test section shall consist of three (3) sublots.

The test section shall be considered acceptable if the average mat density of the test section cores is greater than or equal to 96% and the average joint density of the test section cores is greater than or equal to 94%.

If the initial test section should prove to be unacceptable, the necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that are not acceptable shall be removed at the Contractor's expense. Full production shall not begin until an acceptable test section has been constructed and accepted in writing by the Engineer. Once an acceptable test section has been placed, payment for the initial test section and the section that meets specification requirements shall be made in accordance with paragraph 403-8.1.

Job mix control testing shall be performed by the Contractor at the start of plant production and in conjunction with the calibration of the plant for the JMF. If the aggregates produced by the plant do not satisfy the gradation requirements or produce a mix that meets the JMF, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens shall be prepared and the optimum asphalt content determined in the same manner as for the original JMF tests.

Contractor will not be allowed to place the test section until the Contractor Quality Control Program, showing conformance with the requirements of paragraph 403-6.1, has been approved, in writing, by the Engineer.

CONSTRUCTION METHODS

403-4.1 Weather limitations. The HMA shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the Engineer, if requested; however, all other requirements including compaction shall be met.

Table 4. Surface Temperature Limitations of Underlying Course

Mat Thickness	Base Temperature (Minimum)	
	Degrees F	Degrees C
3 inches or greater	40	4
Greater than 2 inches but less than 3 inches	45	7

403-4.2 HMA plant. Plants used for the preparation of HMA shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 with the following changes:

a. Requirements for all plants include:

(1) Truck scales. The HMA shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor's expense. Scales shall be inspected and sealed as often as the

Engineer deems necessary to assure their accuracy. Scales shall conform to the requirements of the General Provisions, subsection 90-01.

In lieu of scales, and as approved by the Engineer, HMA weights may be determined by the use of an electronic weighing system equipped with an automatic printer that weighs the total HMA production and as often thereafter as requested by the Engineer.

(2) Testing facilities. The Contractor shall ensure laboratory facilities are provided at the plant for the use of the Engineer. The lab shall have sufficient space and equipment so that both testing representatives (Engineer's and Contractor's) can operate efficiently. The lab shall meet the requirements of ASTM D3666 including all necessary equipment, materials, and current reference standards to comply with the specifications and masonry saw with diamond blade for trimming pavement cores and samples. The plant testing laboratory shall have a floor space area of not less than 200 square feet, with a ceiling height of not less than 7-1/2 feet. The laboratory shall be weather tight, sufficiently heated in cold weather, air-conditioned in hot weather to maintain temperatures for testing purposes of 70°F ±5°F. The plant testing laboratory shall be located on the plant site to provide an unobstructed view, from one of its windows, of the trucks being loaded with the plant mix materials. In addition, the facility shall include the minimum:

(a) Adequate artificial lighting.

(b) Electrical outlets sufficient in number and capacity for operating the required testing equipment and drying samples.

(c) A minimum of two (2) Underwriter's Laboratories approved fire extinguishers of the appropriate types and class.

(d) Work benches for testing.

(e) Desk with chairs and file cabinet.

(f) Sanitary facilities convenient to testing laboratory.

(g) Exhaust fan to outside air.

(h) Sink with running water.

Failure to provide the specified facilities shall be sufficient cause for disapproving HMA plant operations.

Laboratory facilities shall be kept clean, and all equipment shall be maintained in proper working condition. The Engineer shall be permitted unrestricted access to inspect the Contractor's laboratory facility and 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 the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

(3) Inspection of plant. The Engineer, or Engineer's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

(4) Storage bins and surge bins. The HMA stored in storage and surge bins shall meet the same requirements as HMA loaded directly into trucks and may be permitted under the following conditions:

(a) Stored in non-insulated bins for a period of time not to exceed three (3) hours.

(b) Stored in insulated storage bins for a period of time not to exceed eight (8) hours.

If the Engineer determines that there is an excessive amount of heat loss, segregation or oxidation of the HMA due to temporary storage, no temporary storage will be allowed.

403-4.3 Hauling equipment. Trucks used for hauling HMA shall have tight, clean, and smooth metal beds. To prevent the HMA from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the Engineer. Petroleum products shall not be used for coating truck beds. 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.

403-4.3.1 Material transfer vehicle (MTV). A material transfer vehicle is not required.

403-4.4 HMA pavers. HMA pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of HMA that 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 HMA uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

If, during construction, it is found that the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued and satisfactory equipment shall be provided by the Contractor.

403-4.4.1 Automatic grade control. The HMA paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices that will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within ±0.1%.

The controls shall be capable of working in conjunction with any of the following attachments:

a. Ski-type device of not less than 30 feet in length

b. Taut stringline (wire) set to grade

c. Short ski or shoe

d. Laser control

403-4.5 Rollers. Vibratory rollers shall NOT be allowed to be used. Only static rollers will be allowed to be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the HMA. The number and weight of rollers shall be sufficient to compact the HMA to the required density while it is still in a workable condition.

All rollers shall be specifically designed and suitable for compacting hot mix bituminous concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used. Depressions in pavement surfaces caused by rollers shall be repaired by the Contractor at their own expense.

The use of equipment that causes crushing of the aggregate will not be permitted.

403-4.5.1 Density device. The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall also supply a qualified technician during all paving operations to calibrate the density gauge and obtain accurate density readings for all new HMA. These densities shall be supplied to the Engineer upon

request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

403-4.6 Preparation of asphalt binder. The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the bituminous material to the mixer at a uniform temperature. The temperature of the unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F when added to the aggregate.

403-4.7 Preparation of mineral aggregate. The aggregate for the HMA shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

403-4.8 Preparation of HMA. The aggregates and the asphalt binder shall be weighed or metered and introduced into the mixer in the amount specified by the JMF.

The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all HMA upon discharge shall not exceed 0.5%.

403-4.9 Preparation of the underlying surface. Immediately before placing the HMA, the underlying course shall be cleaned of all dust and debris. A prime coat or tack shall be applied in accordance with Item P-602 and P-603, if shown on the plans.

403-4.10 Laydown plan, transporting, placing, and finishing. Prior to the placement of the HMA, the Contractor shall prepare a laydown plan for approval by the Engineer. This is to minimize the number of cold joints in the pavement. The laydown plan shall include the sequence of paving laydown by stations, width of lanes, temporary ramp locations, and laydown temperature. The laydown plan shall also include estimated time of completion for each portion of the work (that is, milling, paving, rolling, cooling, etc.). Modifications to the laydown plan shall be approved by the Engineer.

The HMA shall be transported from the mixing plant to the site in vehicles conforming to the requirements of paragraph 403-4.3. Deliveries shall be scheduled so that placing and compacting of HMA is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

The alignment and elevation of the paver shall be regulated from outside reference lines established for this purpose for the first lift of all runway and taxiway pavements. Successive lifts of HMA surface course may be placed using a ski, or laser control per paragraph 403-4.4.1, provided grades of the first lift of bituminous surface course meet the tolerances of paragraphs 403-5.2b(5) as verified by a survey. Contractor shall survey each lift of HMA surface course and certify to Engineer that every lot of each lift meets the grade tolerances of paragraph 403-5.2b(5) before the next lift can be placed.

The initial placement and compaction of the HMA shall occur at a temperature suitable for obtaining density, surface smoothness, and other specified requirements but not less than 250°F.

Edges of existing HMA pavement abutting the new work shall be saw cut and carefully removed as shown on the drawings and coated with asphalt tack coat before new material is placed against it.

Upon arrival, the mixture shall be placed to the full width by a bituminous paver. It shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the HMA mat. Unless otherwise permitted, placement of the HMA shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The HMA shall be placed in consecutive adjacent strips having a minimum width of **10** feet on tawiway pavment except where edge lanes require less width to complete the area. Additional screed sections shall not be attached to widen paver to meet the minimum lane width requirements specified above unless additional auger sections are added to match. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least one foot; however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course.

Transverse joints in adjacent lanes shall be offset a minimum of 10 feet.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the HMA may be spread and luted by hand tools.

Areas of segregation in the course, as determined by the Engineer, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of 2 inches deep. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet long.

403-4.11 Compaction of HMA. After placing, the HMA shall be thoroughly and uniformly compacted by power rollers. The surface shall be compacted as soon as possible when the mixture has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations shall be at the discretion of the Contractor. 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 corrected at once.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross-section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, the wheels shall be equipped with a scraper and kept properly moistened using a water soluble asphalt release agent approved by the Engineer.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power driven tampers. Tampers shall weigh not less than 275 pounds, have a tamping plate width not less than 15 inches, be rated at not less than 4,200 vibrations per minute, and be suitably equipped with a standard tamping plate wetting device.

Any HMA that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed full depth and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

403-4.12 Joints. The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade. The roller shall not pass over

the unprotected end of the freshly laid HMA except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be coated with an asphalt tack coat before placing any fresh HMA against the joint.

Longitudinal joints which are have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F; or are irregular, damaged, uncompacted or otherwise defective shall be cut back 3 inches to 6 inches to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material shall be removed from the project. A asphalt tack coat or other product approved by the Engineer shall be applied to the clean, dry joint prior to placing any additional fresh HMA against the joint. Any laitance produced from cutting joints shall be removed by vacuuming and washing. The cost of this work shall be considered incidental to the cost of the HMA.

403-4.13 Diamond grinding. When required, diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive. The saw blades shall be assembled in a cutting head mounted on a machine designed specifically for diamond grinding that will produce the required texture and smoothness level without damage to the pavement. The saw blades shall be 1/8-inch wide and there shall be a minimum of 55 to 60 blades per 12 inches of cutting head width; the actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Each machine shall be capable of cutting a path at least 3 feet wide. Equipment that causes ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted. The depth of grinding shall not exceed 1/2 inch and all areas in which diamond grinding has been performed will be subject to the final pavement thickness tolerances specified. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. Areas that have been ground will be sealed with a P-608 surface treatment as directed by the Engineer. It may be necessary to seal a larger area to avoid surface treatment creating any conflict with runway or taxiway markings.

403-4.14 Nighttime Paving Requirements. Paving during nighttime construction shall require the following:

a. All paving machines, rollers, distribution trucks and other vehicles required by the Contractor for his operations shall be equipped with artificial illumination sufficient to safely complete the work.

b. Minimum illumination level shall be 20 horizontal foot-candles and maintained in the following areas:

(1) An area of 30 feet wide by 30 feet long immediately behind the paving machines during the operations of the machines.

(2) An area 15 feet wide by 30 feet long immediately in front and back of all rolling equipment, during operation of the equipment.

(3) An area 15 feet wide by 15 feet long at any point where an area is being tack coated prior to the placement of pavement.

c. As partial fulfillment of the above requirements, the Contractor shall furnish and use, complete artificial lighting units with a minimum capacity of 3,000 watt electric beam lights, affixed to all equipment in such a way to direct illumination on the area under construction.

d. A lighting plan must be submitted by the Contractor and approved by the Engineer prior to the start of any nighttime work.

"If the Contractor places any out of specification mix in the project work area, the Contractor is required to remove it at its own expense, to the satisfaction of the Engineer. If the Contractor has to continue placing non-payment HMA, as directed by the Engineer, to make the surfaces safe for

aircraft operations, the Contractor shall do so to the satisfaction of the Engineer. It is the Contractor's responsibility to leave the facilities to be paved in a safe condition ready for aircraft operations. No consideration for extended closure time of the area being paved will be given. As a first order of work for the next paving shift, the Contractor shall remove all out of specification material and replace with approved material to the satisfaction of the Engineer. When the above situations occur, there will be no consideration given for additional construction time or payment for extra costs."

MATERIAL ACCEPTANCE

403-5.1 Acceptance sampling and testing. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the Engineer at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

Testing organizations performing these tests shall be accredited in accordance with ASTM D3666. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction. All equipment in Contractor furnished laboratories shall be calibrated by an independent testing organization prior to the start of operations.

a. Hot mixed asphalt. Plant-produced HMA shall be tested for air voids on a lot basis. Sampling shall be from material deposited into trucks at the plant or from trucks at the job site. Samples shall be taken in accordance with ASTM D979.

A standard lot shall be equal to one day's production or 2000 tons whichever is smaller. If the day's production is expected to exceed 2000 tons but less than 4000 tons, the lot size shall be 1/2 day's production. If the day's production exceeds 4000 tons, the lot size shall be an equal sized fraction of the day's production, but shall not exceed 2000 tons.

Where more than one plant is simultaneously producing HMA for the job, the lot sizes shall apply separately for each plant.

(1) Sampling. Each lot will consist of four equal sublots. Sufficient HMA for preparation of test specimens for all testing will be sampled by the Engineer on a random basis, in accordance with the procedures contained in ASTM D3665. Samples will be taken in accordance with ASTM D979.

The sample of HMA may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to stabilize to compaction temperature. The compaction temperature of the specimens shall be as specified in the JMF.

(2) Testing. **Air voids will be determined by the Engineer in accordance with ASTM D3203. One set of laboratory compacted specimens will be prepared for each sublot in accordance with ASTM D6925 at the number of gyrations required by paragraph 403-3.2, Table 1. Each set of laboratory compacted specimens will consist of three test specimens prepared from the same sample.** Prior to testing, the bulk specific gravity of each test specimen shall be measured by the Engineer in accordance with **ASTM D2726** using the procedure for laboratory-prepared thoroughly dry specimens for use in computing air voids and pavement density.

For air voids determination, the theoretical maximum specific gravity of the mixture shall be measured one time for each sublot in accordance with ASTM D2041. The value used in the air voids computation for each sublot shall be based on theoretical maximum specific gravity measurement for the sublot.

(3) Acceptance. **Acceptance of plant produced HMA for air voids shall be determined by the Engineer in accordance with the requirements of paragraph 403-5.1.**

b. In-place HMA. HMA placed in the field shall be tested for mat and joint density on a lot basis. A standard lot shall be equal to one day's production or 2000 tons whichever is smaller. If the day's production is expected to exceed 2000 tons, but less than 4000 tons, the lot size shall be 1/2 day's production. If the day's production exceeds 4000 tons, the lot size shall be an equal sized fraction of the day's production, but shall not exceed 2000 tons.

(1) Mat density. The lot size shall be the same as that indicated in paragraph 403-5.1a The lot shall be divided into four equal sublots. One core of finished, compacted HMA shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D3665. Cores for mat density shall not be taken closer than one foot from a transverse or longitudinal joint.

(2) Joint density. The lot size shall be the total length of longitudinal joints constructed by a lot of HMA as defined in paragraph 403-5.1a. The lot shall be divided into four equal sublots. One core of finished, compacted HMA shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D3665. All cores for joint density shall be taken centered on the joint. The minimum core diameter for joint density determination shall be 5 inches.

(3) Sampling. Samples shall be neatly cut with a diamond core drill bit. Samples will be taken in accordance with ASTM D979. The minimum diameter of the sample shall be 5 inches. Samples that are defective, as a result of sampling, shall be discarded and another sample taken. The Contractor shall furnish all tools, labor, and materials for cutting samples, cleaning, and filling the cored pavement. Cored pavement shall be cleaned and core holes shall be filled in a manner acceptable to the Engineer and within one day after sampling. Laitance produced by the coring operation shall be removed immediately. The top most lift of bituminous material shall be completely bonded to the underlying layers of bituminous material. If any of the cores reveal that the surface is not bonded to the bituminous layer immediately below the surface then additional cores shall be taken as directed by the Engineer in accordance with paragraph 403-5.1b to determine the extent of any delamination. All delaminated areas shall be completely removed by milling to the limits and depth and replaced as directed by the Engineer at no additional cost.

(4) Testing. The bulk specific gravity of each cored sample will be measured by the Engineer in accordance with **ASTM D2726**. Samples will be taken in accordance with ASTM D979. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the average bulk specific gravity of all laboratory prepared specimens for the lot, as determined in paragraph 403-5.1a(2). The bulk specific gravity used to determine the joint density at joints formed between different lots shall be the lowest of the bulk specific gravity values from the two different lots.

(5) Acceptance. Acceptance of field placed HMA for mat density will be determined by the Engineer in accordance with the requirements of paragraph 403-5.2b(1). Acceptance for joint density will be determined by the Engineer in accordance with the requirements of paragraph 403-5.2b(2).

c. Partial lots HMA. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or other minor tonnage placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

The last batch produced where production is halted will be sampled, and its properties shall be considered as representative of the particular sublot from which it was taken. In addition, an agreed to minor placement will be sampled, and its properties shall be considered as representative of the particular

sublot from which it was taken. Where three sublots are produced, they shall constitute a lot. Where one or two sublots are produced, they shall be incorporated into the next lot, and the total number of sublots shall be used in the acceptance plan calculation, that is, n = 5 or n = 6, for example. Partial lots at the end of asphalt production on the project shall be included with the previous lot. The lot size for field placed material shall correspond to that of the plant material, except that, in no cases, shall less than three (3) cored samples be obtained, that is, n = 3.

403-5.2 Acceptance criteria.

a. General. Acceptance will be based on the following characteristics of the HMA and completed pavement and test results:

(1) Air Voids

(2) Mat density

(3) Joint density

(4) Thickness

(5) Smoothness

(6) Grade

Mat density will be evaluated for acceptance in accordance with paragraph 403-5.2b(1). Joint density will be evaluated for acceptance in accordance with paragraph 403-5.2b(2).

Thickness will be evaluated by the Engineer for compliance in accordance with paragraph 403-5.2b(3). Acceptance for smoothness will be based on the criteria contained in paragraph 403-5.2b(4). Acceptance for grade will be based on the criteria contained in paragraph 403-5.2b(5).

The Engineer may at any time reject and require the Contractor to dispose of any batch of HMA which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or improper mix temperature. Such rejection may be based on only visual inspection or temperature measurements. 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 it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

b. Acceptance criteria.

(1) Mat density. Acceptance of each lot of plant produced material for mat density shall be based on the average of all of the densities taken from the sublots. If the average mat density of the lot so established equals or exceeds 96%, the lot shall be acceptable. If the average mat density of the lot is below 96%, the lot shall be removed and replaced at the Contractor's expense.

(2) Joint density. Acceptance of each lot of plant produced HMA for joint density shall be based on the average of all of the joint densities taken from the sublots. If the average joint density of the lot so established equals or exceeds 94%, the lot shall be acceptable. If the average joint density of the lot is less than 94%, the Contractor shall stop production and evaluate the method of compacting joints. Production may resume once the reason for poor compaction has been determined and appropriate measures have been taken to ensure proper compaction.

(3) Thickness. Thickness of each course shall be evaluated by the Engineer for compliance to the requirements shown on the plans. Measurements of thickness shall be made by the Engineer using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point shall not be more than 1/4 inch less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, shall not be less than the indicated thickness. Where thickness deficiency exceeds the specified tolerances, the lot or sublot shall be corrected by the Contractor at his expense by removing the

deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the Engineer to circumscribe the deficient area.

(4) **Smoothness**. The final surface shall be free from roller marks. After final rolling, but not later than 24 hours after placement, the surface of each lot shall be tested in both longitudinal and transverse directions for smoothness to reveal all surface irregularities exceeding the tolerances specified. The Contractor shall furnish paving equipment and employ methods that produce a surface for each pavement lot such that the finished surface course of the pavement shall not vary more than 1/4 inch when evaluated with a 12-foot straightedge. When the surface course smoothness exceeds specification tolerances which cannot be corrected by diamond grinding of the surface course, full depth removal and replacement of surface course corrections shall be to the limit of the longitudinal placement. Corrections involving diamond grinding will be subject to the final pavement thickness tolerances specified. The Contractor shall apply a surface treatment per Item P-608 to all areas that have been subject to grinding as directed by the Engineer.

a. Transverse measurements. Transverse measurements will be taken for each lot placed. Transverse measurements will be taken perpendicular to the pavement centerline each 50 feet or more often as determined by the Engineer.

1) Testing shall be continuous across all joints, starting with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Smoothness readings will not be made across grade changes or cross slope transitions; at these transition areas, the straightedge position shall be adjusted to measure surface smoothness and not design grade or cross slope transitions. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points. Deviations on final surface course > 1/4 inch in transverse direction shall be corrected with diamond grinding per paragraph 403-4.13 or by removing and replacing full depth of surface course. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The area corrected by grinding should not exceed 10% of the total area and these areas shall be retested after grinding.

2) The joint between lots shall be tested separately to facilitate smoothness between lots. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface, with half the straightedge on one side of the joint and the other half of the straightedge on the other side of the joint. Measure the maximum gap between the straightedge and the pavement surface in the area between these two high points. One measurement shall be taken at the joint every 50 feet or more often if directed by the Engineer. Deviations on final surface course > 1/4 inch in transverse direction shall be corrected with diamond grinding per paragraph 403-4.13 or by removing and replacing full depth of surface course. Each measurement shall be recorded and a copy of the data shall be furnished to the Engineer at the end of each days testing.

3) Longitudinal measurements. Longitudinal measurements will be taken for each lot placed. Longitudinal tests will be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet; and the third points of paving lanes when widths of paving lanes are 20 ft or greater. The finished surface shall not vary more than 1/4 inch when evaluated with a 12-foot straightedge. Smoothness readings will not be made across grade changes or cross

slope transitions; at these transition areas, the straightedge position shall be adjusted to measure surface smoothness and not design grade or cross slope transitions. Testing shall be continuous across all joints, starting with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points. Deviations on final surface course > 1/4 inch in longitudinal direction will be corrected with diamond grinding per paragraph 403-4.13 or by removing and replacing full depth of surface course. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The area corrected by grinding should not exceed 10% of the total area and these areas shall be retested after grinding. The primary purpose of smoothness testing is to identify areas that may be prone to ponding of water which could lead to hydroplaning of aircraft. If the contractor's machines and/or methods are producing significant areas that need corrective actions then production should be stopped until corrective measures can be implemented. If corrective measures are not implemented and when directed by the Engineer, production shall be stopped until corrective measures can be implemented.

(5) Grade. Grade shall be evaluated on the first day of placement and then every **day** to allow adjustments to paving operations if measurements do not meet specification requirements. The Contractor must submit the survey data to the Engineer by the following day after measurements have been taken. The finished surface of the pavement shall not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch. The finished grade of each lot will be determined by running levels at intervals of 50 feet or less longitudinally and all breaks in grade transversely (not to exceed 50 feet) to determine the elevation of the completed pavement. The Contractor shall pay the cost of surveying of the level runs that shall be performed by a licensed surveyor. The documentation, stamped and signed by a licensed surveyor, shall be provided by the Contractor to the Engineer. The lot size shall be **2,000** square yards. When more than 15% of all the measurements within a lot are outside the specified tolerance, or if any one shot within the lot deviates 3/4 inch or more from planned grade, the Contractor shall remove the deficient area to the depth of the final course of pavement and replace with new material. Skin patching shall not be permitted. Isolated high points may be ground off providing the course thickness complies with the thickness specified on the plans. High point grinding will be limited to 15 square yard. The surface of the ground pavement shall have a texture consisting of grooves between 0.090 and 0.130 inches wide. The peaks and ridges shall be approximately 1/32 inch higher than the bottom of the grooves. The pavement shall be left in a clean condition. The removal of all of the slurry resulting from the grinding operation shall be continuous. The grinding operation should be controlled so the residue from the operation does not flow across other lanes of pavement. Areas in excess of 15 square yard will require removal and replacement of the pavement in accordance with the limitations noted above. Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

c. Density outliers. If the tests within a lot include a very large or a very small value that appears to be outside the normal limits of variation, check for an outlier in accordance with ASTM E178, at a significance level of 5%, to determine if this value should be discarded.

403-5.3 Resampling Pavement for Mat Density.

a. General. Resampling of a lot of pavement will only be allowed for mat density and then, only if the Contractor requests same in writing, within 48 hours after receiving the written test results from the

Engineer. A retest will consist of all the sampling and testing procedures contained in paragraphs 403-5.1. Only one resampling per lot will be permitted.

(1) A redefined mat density shall be calculated for the resampled lot. The number of tests used to calculate the redefined mat density shall include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

b. Payment for resampled lots. The redefined mat density for a resampled lot shall be used to evaluate the acceptance of that lot in accordance with paragraph 403-5.2.

c. Outliers. Check for outliers in accordance with ASTM E178, at a significance level of 5%.

403-5.4 Leveling course. Not used.

CONTRACTOR QUALITY CONTROL

403-6.1 General. The Contractor shall perform quality control sampling, testing, and inspection during all phases of the work and shall perform them at a rate sufficient to ensure that the work conforms to the contract requirements, and at minimum test frequencies required by paragraph 403-6.3, including but not limited to:

a. Mix Design

b. Aggregate Grading

c. Quality of Materials

d. Stockpile Management

e. Proportioning

f. Mixing and Transportation

g. Placing and Finishing

h. Joints

i. Compaction

j. Surface smoothness

k. Personnel

l. Laydown plan

The Contractor shall perform quality control sampling, testing, and inspection during all phases of the work and shall perform them at a rate sufficient to ensure that the work conforms to the contract requirements, and at minimum test frequencies required by paragraph 403-6.3 and Section 100 of the General Provisions. As a part of the process for approving the Contractor's plan, the Engineer may require the Contractor's technician to perform testing of samples to demonstrate an acceptable level of performance.

No partial payment will be made for materials that are subject to specific quality control requirements without an approved plan.

403-6.2 Contractor testing laboratory. The lab shall meet the requirements of ASTM D3666 including all necessary equipment, materials, and current reference standards to comply with the specifications.

403-6.3 Quality control testing. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to these specifications and as set forth in the

approved Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

a. Asphalt content. A minimum of two asphalt content tests shall be performed per lot in accordance with ASTM D6307 or ASTM D2172 if the correction factor in ASTM D6307 is greater than 1.0. The asphalt content for the lot will be determined by averaging the test results.

b. Gradation. Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D5444 and ASTM C136, and ASTM C117.

c. Moisture content of aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C566.

d. Moisture content of HMA. The moisture content of the HMA shall be determined once per lot in accordance with ASTM D1461

e. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the HMA at the plant, and the HMA at the job site.

f. In-place density monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D2950.

g. Additional testing. Any additional testing that the Contractor deems necessary to control the process may be performed at the Contractor's option.

h. Monitoring. The Engineer reserves the right to monitor any or all of the above testing.

403-6.4 Sampling. When directed by the Engineer, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

403-6.5 Control charts. The Contractor shall maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each sublot will be calculated and monitored by the Quality Control laboratory.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept 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. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If 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. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation, asphalt content, and VMA. The control charts shall use the JMF 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**
3/4 inch	±6%	±9%
1/2 inch	±6%	±9%
3/8 inch	±6%	±9%
No. 4	±6%	±9%
No. 16	±5%	±7.5%
No. 50	±3%	±4.5%
No. 200	±2%	±3%
Asphalt Content	±0.45%	±0.70%
VMA	-1.00%	-1.5%

b. Range. Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed 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**
1/2 inch	11%
3/8 inch	11%
No. 4	11%
No. 16	9%
No. 50	6%
No. 200	3.5%
Asphalt Content	0.8%

c. Corrective action. The Contractor Quality Control Program shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, 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 points in a row fall outside the Action Limit line for individual measurements.

403-6.6 Quality control reports. The Contractor shall maintain records and shall submit reports of quality control activities daily, in accordance with the Contractor Quality Control Program described in General Provisions, Section 100.

METHOD OF MEASUREMENT

403-7.1 Measurement. Plant mix bituminous concrete pavement shall be measured by the number of tons of HMA used in the accepted work. Recorded batch weights or truck scale weights will be used to determine the basis for the tonnage.

BASIS OF PAYMENT

403-8.1 Payment. Payment for a lot of HMA meeting all acceptance criteria as specified in paragraph 403-5.2 shall be made at the contract unit price per ton for HMA. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-403-1	3 Inch Bituminous Pavement - per Ton

TESTING REQUIREMENTS

AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C183	Standard Practice for Sampling and the Amount of Testing of Hydraulic Cement
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D979	Standard Practice for Sampling Bituminous Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
ASTM D1074	Standard Test Method for Compressive Strength of Bituminous Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4125	Standard Test Methods for Asphalt Content of Bituminous mixtures by the Nuclear Method
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D4867	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
ASTM D5581	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6 inch-Diameter Specimen)
ASTM D6307	Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method
ASTM D6926	Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
ASTM D6925	**Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor**
ASTM D6752	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
ASTM E178	Standard Practice for Dealing with Outlying Observations
AASHTO T030	Standard Method of Test for Mechanical Analysis of Extracted Aggregate
AASHTO T110	Standard Method of Test for Moisture or Volatile Distillates in Hot Mix Asphalt (HMA)

AASHTO T275 Standard Method of Test for Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Using Paraffin-Coated Specimens).

Asphalt Institute Handbook MS-26
Asphalt Binder

Asphalt Institute MS-2 Mix Design Manual, 7th Edition

MATERIAL REQUIREMENTS

ASTM D242 Standard Specification for Mineral Filler for Bituminous Paving Mixtures

ASTM D946 Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction

ASTM D3381 Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction

ASTM D4552 Standard Practice for Classifying Hot-Mix Recycling Agents

ASTM D6373 Standard Specification for Performance Graded Asphalt Binder

END OF ITEM P-403

ITEM P-501 PORTLAND CEMENT CONCRETE (PCC) PAVEMENT

DESCRIPTION

501-1.1 This work shall consist of pavement composed of portland cement concrete (PCC), with reinforcement **or** without reinforcement constructed on a prepared underlying surface in accordance with these specifications and shall conform to the lines, grades, thickness, and typical cross-sections shown on the plans.

MATERIALS

501-2.1 Aggregates.

a. Reactivity. Fine and Coarse aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity in accordance with both ASTM C1260 and ASTM C1567. Aggregate and mix proportion reactivity tests shall be performed for each project.

(1) Coarse and fine aggregate shall be tested separately in accordance with ASTM C1260. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.10% at 28 days (30 days from casting).

(2) Combined coarse and fine aggregate shall be tested in accordance with ASTM C1567, modified for combined aggregates, using the proposed mixture design proportions of aggregates, cementitious materials, and/or specific reactivity reducing chemicals. If lithium nitrate is proposed for use with or without supplementary cementitious materials, the aggregates shall be tested in accordance with Corps of Engineers (COE) Concrete Research Division (CRD) C662. If lithium nitrate admixture is used, it shall be nominal 30% ±0.5% weight lithium nitrate in water.

(3) If the expansion of the proposed combined materials test specimens, tested in accordance with ASTM C1567, modified for combined aggregates, or COE CRD C662, does not exceed 0.10% at 28 days, the proposed combined materials will be accepted. If the expansion of the proposed combined materials test specimens is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10% at 28 days, or new aggregates shall be evaluated and tested.

b. Fine aggregate. Fine aggregate shall conform to the requirements of ASTM C33. Grading of the fine aggregate, as delivered to the mixer, shall conform to the requirements of ASTM C33 and shall have a fineness modulus of not less than 2.50 nor more than 3.40. The soundness loss shall not exceed 10% when sodium sulfate is used or 15% when magnesium sulfate is used, after five cycles, when tested per ASTM C88.

The amount of deleterious material in the fine aggregate shall not exceed the following limits:

Limits for Deleterious Substances in Fine Aggregate for Concrete

Deleterious material	ASTM	Percentage by Mass
Clay Lumps and friable particles	ASTM C142	1.0
Material finer than 0.075mm (No. 200 sieve)	ASTM C117	3.0
Lightweight particles	ASTM C123 using a medium with a density of Sp. Gr. of 2.0	0.5
Total of all deleterious Material		3.0

c. Coarse aggregate. Gradation, within the separated size groups, shall meet the coarse aggregate grading requirements of ASTM C33 when tested in accordance with ASTM C136. When the nominal maximum size of the aggregate is greater than one inch (25 mm), the aggregates shall be furnished in two size groups.

Aggregates delivered to the mixer shall consist of crushed stone, crushed or uncrushed gravel, air-cooled iron blast furnace slag, crushed recycled concrete pavement, or a combination. The aggregates should be free of ferrous sulfides, such as pyrite, that would cause "rust" staining that can bleed through pavement markings. Steel blast furnace slag shall not be permitted. The aggregate shall be composed of clean, hard, uncoated particles. Dust and other coating shall be removed from the aggregates by washing.

The percentage of wear shall be no more than **40%** when tested in accordance with ASTM C131.

The quantity of flat, elongated, and flat and elongated particles in any size group coarser than 3/8 sieve (9 mm) shall not exceed 8% by weight when tested in accordance with ASTM D4791. A flat particle is defined as one having a ratio of width to thickness greater than 5. An elongated particle is one having a ratio of length to width greater than 5.

The soundness loss shall not exceed 12% when sodium sulfate is used or 18% when magnesium sulfate is used, after five cycles, when tested per ASTM C88.

The amount of deleterious material in the coarse aggregate shall not exceed the following limits:

Limits for Deleterious Substances in Coarse Aggregate for Concrete

Deleterious material	ASTM	Percentage by Mass
Clay Lumps and friable particles	ASTM C142	1.0
Material finer than No. 200 sieve (0.075mm)	ASTM C117	1.0
Lightweight particles	ASTM C123 using a medium with a density of Sp. Gr. of 2.0	0.5
Chert (less than 2.40 Sp Gr.)	ASTM C123 using a medium with a density of Sp. Gr. of 2.0)	1.0
Total of all deleterious Material		3.0

Table 1. Gradation For Coarse Aggregate

(ASTM C33)

Percentage by Weight Passing Sieves	
inch	
2-1/2	---
2	---
1-1/2	100
1	95-100
3/4	---
1/2	25-60
3/8	---
No. 4	0-10
No. 8	0-5

(1) Aggregate susceptibility to durability (D) cracking. Aggregates that have a history of D-cracking shall not be used.

(2) Combined aggregate gradation. If substituted for the grading requirements specified for coarse aggregate and for fine aggregate and when approved by the Engineer, the combined aggregate grading shall meet the following requirements:

(a) The materials selected and the proportions used shall be such that when the Coarseness Factor (CF) and the Workability Factor (WF) are plotted on a diagram as described in d. below, the point thus determined shall fall within the parallelogram described therein.

(b) The CF shall be determined from the following equation:

CF = (cumulative percent retained on the 3/8 in. sieve)(100) / (cumulative percent retained on the No. 8 sieve)

(c) The Workability Factor WF is defined as the percent passing the No. 8 sieve based on the combined gradation. However, WF shall be adjusted, upwards only, by 2.5 percentage points for each 94 pounds of cementitious material per cubic meter yard greater than 564 pounds per cubic yard.

(d) A diagram shall be plotted using a rectangular scale with WF on the Y-axis with units from 20 (bottom) to 45 (top), and with CF on the X-axis with units from 80 (left side) to 30 (right side). On this diagram a parallelogram shall be plotted with corners at the following coordinates (CF-75, WF-28), (CF-75, WF-40), (CF-45, WF-32.5), and (CF-45, WF-44.5). If the point determined by the intersection of the computed CF and WF does not fall within the above parallelogram, the grading of each size of aggregate used and the proportions selected shall be changed as necessary.

501-2.2 Cement. Cement shall conform to the requirements of ASTM **C150** Type **II**

If aggregates are deemed innocuous when tested in accordance with paragraph 501-2.1.a.1 and accepted in accordance with paragraph 501-2.1.a.2, higher equivalent alkali content in the cement may be allowed if approved by the Engineer and FAA. If cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

501-2.3 Cementitious materials.

a. Fly ash. Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash for use in mitigating alkali-silica reactivity shall have a Calcium Oxide (CaO) content of less than 13% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the mix design, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the Engineer.

b. Slag cement (ground granulated blast furnace(GGBF)). Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

c. Raw or calcined natural pozzolan. Natural pozzolan shall be raw or calcined and conform to ASTM C618, Class N, including the optional requirements for uniformity and effectiveness in controlling Alkali-Silica reaction and shall have a loss on ignition not exceeding 6%. Class N pozzolan for use in mitigating Alkali-Silica Reactivity shall have a total available alkali content less than 3%.

501-2.4 Joint seal. The joint seal for the joints in the concrete pavement shall meet the requirements of Item P-605 and shall be of the type specified in the plans.

501-2.5 Isolation joint filler. Premolded joint filler for isolation joints shall conform to the requirements of ASTM D1751 and shall be where shown on the plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint, unless otherwise specified by the Engineer. When the use of more than one piece is required for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means satisfactory to the Engineer.

501-2.6 Steel reinforcement. Reinforcing shall consist of **Reinforcing Steel and bar mats** conforming to the requirements of **ASTM A 615 and ASTM A 184, respectively.**

501-2.7 Dowel and tie bars. Dowel bars shall be plain steel bars conforming to ASTM A615 and shall be free from burring or other deformation restricting slippage in the concrete. Before delivery to the construction site each dowel bar shall be epoxy coated per ASTM A1078. The dowels shall be coated with a bond-breaker recommended by the manufacturer. Dowel sleeves or inserts are not permitted. Grout retention rings shall be fully circular metal or plastic devices capable of supporting the dowel until the grout hardens.

Tie bars shall be deformed steel bars and conform to the requirements of ASTM A615. Tie bars designated as Grade 60 in ASTM A615 or ASTM A706 shall be used for construction requiring bent bars.

501-2.8 Water. Water used in mixing or curing shall be potable, clean, free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product, except that non-potable water, or water from concrete production operations, may be used if it meets the requirements of ASTM C1602.

501-2.9 Material for curing concrete. Curing materials shall conform to one of the following specifications:

a. Liquid membrane-forming compounds for curing concrete shall conform to the requirements of ASTM C309, Type 2, Class B, or Class A if wax base only.

b. White polyethylene film for curing concrete shall conform to the requirements of ASTM C171.

c. White burlap-polyethylene sheeting for curing concrete shall conform to the requirements of ASTM C171.

d. Waterproof paper for curing concrete shall conform to the requirements of ASTM C171.

501-2.10 Admixtures. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Engineer may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

c. Other admixtures. The use of set retarding, and set-accelerating admixtures shall be approved by the Engineer. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

d. Lithium Nitrate. The lithium admixture shall be a nominal 30% aqueous solution of Lithium Nitrate, with a density of 10 pounds/gallon, and shall have the approximate chemical form as shown below:

Constituent	Limit (Percent by Mass)
LiNO3 (Lithium Nitrate)	30 ±0.5
SO4 (Sulfate Ion)	0.1 (max)
Cl (Chloride Ion)	0.2 (max)

Na (Sodium Ion)	0.1 (max)
K (Potassium Ion)	0.1 (max)

Provide a trained manufacturer's representative to supervise the lithium nitrate admixture dispensing and mixing operations.

501-2.11 Epoxy-resin. All epoxy-resin materials shall be two-component materials conforming to the requirements of ASTM C881, Class as appropriate for each application temperature to be encountered, except that in addition, the materials shall meet the following requirements:

a. Material for use for embedding dowels and anchor bolts shall be Type IV, Grade 3.

b. Material for use as patching materials for complete filling of spalls and other voids and for use in preparing epoxy resin mortar shall be Type III, Grade as approved.

c. Material for use for injecting cracks shall be Type IV, Grade 1.

d. Material for bonding freshly mixed Portland cement concrete or mortar or freshly mixed epoxy resin concrete or mortar to hardened concrete shall be Type V, Grade as approved.

501-2.12 Material acceptance. Prior to use of materials, the Contractor shall submit certified test reports to the Engineer for those materials proposed for use during construction. The certification shall show the appropriate ASTM test for each material, the test results, and a statement that the material passed or failed.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

MIX DESIGN

501-3.1. General. No concrete shall be placed until the mix design has been submitted to the Engineer for review and the Engineer has taken appropriate action. The Engineer's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

501-3.2 Proportions. The laboratory preparing the mix design shall be accredited in accordance with ASTM C1077. The mix design for all Portland cement concrete placed under P-501 shall be stamped or sealed by the responsible professional Engineer of the laboratory. Concrete shall be proportioned to achieve a 28-day flexural strength that meets or exceeds the acceptance criteria contained in paragraph 501-5.2 for a flexural strength of **600** psi per ASTM C78. The mix shall be developed using the procedures contained in the Portland Cement Association's (PCA) publication, "Design and Control of Concrete Mixtures".

The minimum cementitious material shall be adequate to ensure a workable, durable mix. The minimum cementitious material (cement plus fly ash, or slag cement) shall be **470** pounds per cubic yard. The ratio of water to cementitious material, including free surface moisture on the aggregates but not including moisture absorbed by the aggregates shall not be more than **0.45** by weight.

Flexural strength test specimens shall be prepared in accordance with ASTM C192 and tested in accordance with ASTM C78. The mix determined shall be workable concrete having a maximum allowable slump between one and two inches as determined by ASTM C143. For slip-form concrete, the slump shall be between 1/2 inch and 1-1/2 inch. At the start of the project, the Contractor shall determine a maximum allowable slump for slip-form pavement which will produce in-place pavement to control the edge slump. The selected slump shall be applicable to both pilot and fill-in lanes.

Before the start of paving operations and after approval of all material to be used in the concrete, the Contractor shall submit a mix design showing the proportions and flexural strength obtained from the concrete at seven (7) and 28 days. The mix design shall include copies of test reports, including test dates, and a complete list of materials including type, brand, source, and amount of cement, fly ash, ground slag, coarse aggregate, fine aggregate, water, and admixtures. The mix design shall be submitted to the Engineer at least 30 days prior to the start of operations. The submitted mix design shall not be more than 90 days old. Production shall not begin until the mix design is approved in writing by the Engineer.

If a change in sources is made, or admixtures added or deleted from the mix, a new mix design must be submitted to the Engineer for approval.

The results of the mix design shall include a statement giving the maximum nominal coarse aggregate size and the weights and volumes of each ingredient proportioned on a one cubic yard basis. Aggregate quantities shall be based on the mass in a saturated surface dry condition. The recommended mixture proportions shall be accompanied by test results demonstrating that the proportions selected will produce concrete of the qualities indicated. Trial mixtures having proportions, slumps, and air content suitable for the work shall be based on methodology described in PCA's publication, Design and Control of Concrete Mixtures, modified as necessary to accommodate flexural strength.

The submitted mix design shall be stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

a. Coarse, fine, and combined aggregate gradations and plots including fineness modulus of the fine aggregate.

b. Reactivity Test Results.

c. Coarse aggregate quality test results, including deleterious materials.

d. Fine aggregate quality test results, including deleterious materials.

e. Mill certificates for cement and supplemental cementitious materials.

f. Certified test results for all admixtures, including Lithium Nitrate if applicable.

g. Specified flexural strength, slump, and air content.

h. Recommended proportions/volumes for proposed mixture and trial water-cementitious materials ratio, including actual slump and air content.

i. Flexural and compressive strength summaries and plots, including all individual beam and cylinder breaks.

j. Correlation ratios for acceptance testing and Contractor Quality Control testing, when applicable.

k. Historical record of test results documenting production standard deviation, when applicable.

501-3.3 Cementitious materials.

a. Fly ash. When fly ash is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 20 and 30% by weight of the total cementitious material. If fly ash is used in conjunction with slag cement the maximum replacement rate shall not exceed 10% by weight of total cementitious material.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement may be used. The slag cement, or slag cement plus fly ash if both are used, may constitute between 25 to 55% of the total

cementitious material by weight. If the concrete is to be used for slipforming operations and the air temperature is expected to be lower than 55°F the percent slag cement shall not exceed 30% by weight.

c. Raw or calcined natural pozzolan. Natural pozzolan may be used in the mix design. When pozzolan is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 20 and 30% by weight of the total cementitious material. If pozzolan is used in conjunction with slag cement the maximum replacement rate shall not exceed 10% by weight of total cementitious material.

501-3.4 Admixtures.

a. Air-entraining admixtures. Air-entraining admixture are to be added in such a manner that will ensure uniform distribution of the agent throughout the batch. The air content of freshly mixed air-entrained concrete shall be based upon trial mixes with the materials to be used in the work adjusted to produce concrete of the required plasticity and workability. The percentage of air in the mix shall be **3.0%**. Air content shall be determined by testing in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag and other highly porous coarse aggregate.

b. Water-reducing admixtures. Water-reducing admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted on trial mixes, with the materials to be used in the work, in accordance with ASTM C494.

c. Other admixtures. Set controlling, and other approved admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted on trial mixes, with the materials to be used in the work, in accordance with ASTM C 494.

d. Lithium nitrate. Lithium nitrate shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements in accordance with paragraph 501-2.10d.

501-3.5 Concrete mix design laboratory. The Contractor's laboratory used to develop the concrete mix design shall be accredited in accordance with ASTM C1077. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for developing the concrete mix design must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

CONSTRUCTION METHODS

501-4.1 Equipment. Equipment necessary for handling materials and performing all parts of the work shall be approved by the Engineer, but does not relieve the Contractor of the responsibility for the proper operation of equipment and maintaining the equipment in good working condition. The equipment shall be at the jobsite sufficiently ahead of the start of paving operations to be examined thoroughly and approved.

a. Batch plant and equipment. The batch plant and equipment shall conform to the requirements of ASTM C94.

b. Mixers and transportation equipment.

(1) General. Concrete may be mixed at a central plant, or wholly or in part in truck mixers. Each mixer shall have attached in a prominent place a manufacturer's nameplate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.

(2) Central plant mixer. Central plant mixers shall conform to the requirements of ASTM C94. The mixer shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or wear of blades. The pickup and throwover blades shall be replaced when they have worn down 3/4 inch or more. The Contractor shall have a copy of the manufacturer's design on hand showing dimensions and arrangement of blades in reference to original height and depth.

(3) Truck mixers and truck agitators. Truck mixers used for mixing and hauling concrete and truck agitators used for hauling central-mixed concrete shall conform to the requirements of ASTM C94.

(4) Nonagitator trucks. Nonagitating hauling equipment shall conform to the requirements of ASTM C94.

(5) Transfer and spreading equipment. Equipment for transferring concrete from the transporting equipment to the paving lane in front of the paver shall be specially manufactured, self-propelled transfer equipment which will accept the concrete outside the paving lane and will transfer and spread it evenly across the paving lane in front of the paver and strike off the surface evenly to a depth which permits the paver to operate efficiently.

c. Finishing equipment. The standard method of constructing concrete pavements shall be with an approved slip-form paving equipment designed and operated to spread, consolidate, screed, and float-finish the freshly placed concrete in one complete pass of the machine so that the end result is a dense and homogeneous pavement which is achieved with a minimum of hand finishing. The paver-finisher shall be a heavy duty, self-propelled machine designed specifically for paving and finishing high quality concrete pavements. It shall weigh at least 2,200 lbs per foot of paving lane width and powered by an engine having at least 6.0 horsepower per foot of lane width.

On projects requiring less than 500 square yard of cement concrete pavement or requiring individual placement areas of less than 500 square yard, or irregular areas at locations inaccessible to slip-form paving equipment, concrete pavement may be placed with approved placement and finishing equipment using stationary side forms. Hand screeding and float finishing may only be used on small irregular areas as allowed by the Engineer.

d. Vibrators. Vibrator shall be the internal type. Operating frequency for internal vibrators shall be between 8,000 and 12,000 vibrations per minute. Average amplitude for internal vibrators shall be 0.025-0.05 inch.

The number, spacing, and frequency shall be as necessary to provide a dense and homogeneous pavement and meet the recommendations of American Concrete Institute (ACI) 309, Guide for Consolidation of Concrete. Adequate power to operate all vibrators shall be available on the paver. The vibrators shall be automatically controlled so that they shall be stopped as forward motion ceases. The Contractor shall provide an electronic or mechanical means to monitor vibrator status. The checks on vibrator status shall occur a minimum of two times per day or when requested by the Engineer.

Hand held vibrators may be used in irregular areas only, but shall meet the recommendations of ACI 309R, Guide for Consolidation of Concrete.

e. Concrete saws. The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions. The Contractor shall provide at least one standby saw in good working order and a supply of saw blades at the site of the work at all times during sawing operations. Early-entry saws may be used, subject to demonstration and approval of the Engineer.

f. Side forms. Straight side forms shall be made of steel and shall be furnished in sections not less than 10 feet in length. Forms shall have a depth equal to the pavement thickness at the edge, and a base width equal to or greater than the depth. Flexible or curved forms of proper radius shall be used for curves of 100-foot radius or less. Forms shall be provided with adequate devices for secure settings so that when in place

they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up forms shall not be used, except as approved by the Engineer. The top face of the form shall not vary from a true plane more than 1/8 inch in 10 feet, and the upstanding leg shall not vary more than 1/4 inch. The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting. Wood forms may be used under special conditions, when approved by the Engineer.

g. Pavers. The paver shall be fully energized, self-propelled, and designed for the specific purpose of placing, consolidating, and finishing the concrete pavement, true to grade, tolerances, and cross-section. It shall be of sufficient weight and power to construct the maximum specified concrete paving lane width as shown in the plans, at adequate forward speed, without transverse, longitudinal or vertical instability or without displacement. The paver shall be equipped with electronic or hydraulic horizontal and vertical control devices.

501-4.2 Form setting. Forms shall be set sufficiently in advance of the concrete placement to ensure continuous paving operation. After the forms have been set to correct grade, the underlying surface shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside edges of the base of the forms. Forms shall be staked into place sufficiently to maintain the form in position for the method of placement.

Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/8 inch at any joint. Forms shall be so set that they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms shall be cleaned and oiled prior to the placing of concrete.

The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete.

501-4.3 Conditioning of underlying surface. The compacted underlying surface on which the pavement will be placed shall be widened approximately 3 feet to extend beyond the paving machine track to support the paver without any noticeable displacement. After the underlying surface has been placed and compacted to the required density, the areas that will support the paving machine and the area to be paved shall be trimmed or graded to the plan grade elevation and profile by means of a properly designed machine. The grade of the underlying surface shall be controlled by a positive grade control system using lasers, stringlines, or guide wires. If the density of the underlying surface is disturbed by the trimming operations, it shall be corrected by additional compaction and retested at the option of the Engineer before the concrete is placed except when stabilized subbases are being constructed. If damage occurs on a stabilized subbase, it shall be corrected full depth by the Contractor. If traffic is allowed to use the prepared grade, the grade shall be checked and corrected immediately before the placement of concrete. The prepared grade shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from concrete. The underlying surface shall be protected so that it will be entirely free of frost when concrete is placed.

501-4.4 Conditioning of underlying surface, side-form and fill-in lane construction. The prepared underlying surface shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from the concrete. Damage caused by hauling or usage of other equipment shall be corrected and retested at the option of the Engineers. If damage occurs to a stabilized subbase, it shall be corrected full depth by the Contractor. A template shall be provided and operated on the forms immediately in advance of the placing of all concrete. The template shall be propelled only by hand and not attached to a tractor or other power unit. Templates shall be adjustable so that they may be set and

maintained at the correct contour of the underlying surface. The adjustment and operation of the templates shall be such as will provide an accurate retest of the grade before placing the concrete thereon. All excess material shall be removed and wasted. Low areas shall be filled and compacted to a condition similar to that of the surrounding grade. The underlying surface shall be protected so that it will be entirely free from frost when the concrete is placed. The use of chemicals to eliminate frost in the underlying surface shall not be permitted.

The template shall be maintained in accurate adjustment, at all times by the Contractor, and shall be checked daily.

501-4.5 Handling, measuring, and batching material. The batch plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Stockpiles shall be constructed in such a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the concrete batch plant.

Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. Rail shipments requiring more than 12 hours will be accepted as adequate binning only if the car bodies permit free drainage.

Batching plants shall be equipped to proportion aggregates and bulk cement, by weight, automatically using interlocked proportioning devices of an approved type. When bulk cement is used, the Contractor shall use a suitable method of handling the cement from weighing hopper to transporting container or into the batch itself for transportation to the mixer, such as a chute, boot, or other approved device, to prevent loss of cement. The device shall be arranged to provide positive assurance that the cement content specified is present in each batch.

501-4.6 Mixing concrete. The concrete may be mixed at the work site, in a central mix plant or in truck mixers. The mixer shall be of an approved type and capacity. Mixing time shall be measured from the time all materials, except water, are emptied into the drum. All concrete shall be mixed and delivered to the site in accordance with the requirements of ASTM C94.

Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or non-agitating trucks. The elapsed time from the addition of cementitious material to the mix until the concrete is deposited in place at the work site shall not exceed 30 minutes when the concrete is hauled in non-agitating trucks, nor 90 minutes when the concrete is hauled in truck mixers or truck agitators. Retempering concrete by adding water or by other means will not be permitted. With transit mixers additional water may be added to the batch materials and additional mixing performed to increase the slump to meet the specified requirements provided the addition of water is performed within 45 minutes after the initial mixing operations and provided the water/cementitious ratio specified in the approved mix design is not exceeded, and approved by the Engineer.

501-4.7 Limitations on mixing and placing. No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.

a. Cold weather. Unless authorized in writing by the Engineer, mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40°F

and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35°F.

The aggregate shall be free of ice, snow, and frozen lumps before entering the mixer. The temperature of the mixed concrete shall not be less than 50°F at the time of placement. Concrete shall not be placed on frozen material nor shall frozen aggregates be used in the concrete.

When concreting is authorized during cold weather, water and/or the aggregates may be heated to not more than 150°F. The apparatus used shall heat the mass uniformly and shall be arranged to preclude the possible occurrence of overheated areas which might be detrimental to the materials.

b. Hot weather. During periods of hot weather when the maximum daily air temperature exceeds 85°F, the following precautions shall be taken.

The forms and/or the underlying surface shall be sprinkled with water immediately before placing the concrete. The concrete shall be placed at the coolest temperature practicable, and in no case shall the temperature of the concrete when placed exceed 90°F. The aggregates and/or mixing water shall be cooled as necessary to maintain the concrete temperature at or not more than the specified maximum.

The finished surfaces of the newly laid pavement shall be kept damp by applying a water-fog or mist with approved spraying equipment until the pavement is covered by the curing medium. When necessary, wind screens shall be provided to protect the concrete from an evaporation rate in excess of 0.2 psf per hour. When conditions are such that problems with plastic cracking can be expected, and particularly if any plastic cracking begins to occur, the Contractor shall immediately take such additional measures as necessary to protect the concrete surface. Such measures shall consist of wind screens, more effective fog sprays, and similar measures commencing immediately behind the paver. If these measures are not effective in preventing plastic cracking, paving operations shall be immediately stopped.

c. Temperature management program. Prior to the start of paving operation for each day of paving, the Contractor shall provide the Engineer with a Temperature Management Program for the concrete to be placed to assure that uncontrolled cracking is avoided. As a minimum the program shall address the following items:

(1) Anticipated tensile strains in the fresh concrete as related to heating and cooling of the concrete material.

(2) Anticipated weather conditions such as ambient temperatures, wind velocity, and relative humidity; and anticipated evaporation rate using Figure 11-8, PCA, Design and Control of Concrete Mixtures.

(3) Anticipated timing of initial sawing of joint.

(4) Anticipated number and type of saws to be used.

501-4.8 Placing concrete. At any point in concrete conveyance, the free vertical drop of the concrete from one point to another or to the underlying surface shall not exceed 3 feet. The finished concrete product must be dense and homogeneous, without segregation and conforming to the standards in this specification. Backhoes and grading equipment shall not be used to distribute the concrete in front of the paver. Front end loaders will not be used. All concrete shall be consolidated without voids or segregation, including under and around all load-transfer devices, joint assembly units, and other features embedded in the pavement. Hauling equipment or other mechanical equipment can be permitted on adjoining previously constructed pavement when the concrete strength reaches a **flexural strength of 550 psi**, based on the average of four field cured specimens per 2,000 cubic yards of concrete placed. Also, subgrade and subbase planers, concrete pavers, and concrete finishing equipment may be permitted to ride upon the edges of previously constructed pavement when the concrete has attained a minimum flexural strength of 400 psi.

The Contractor shall have available materials for the protection of the concrete during inclement weather. Such protective materials shall consist of rolled polyethylene sheeting at least 4 mils thick of sufficient length and width to cover the plastic concrete slab and any edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering.

a. Slip-form construction. The concrete shall be distributed uniformly into final position by a self-propelled slip-form paver without delay. The alignment and elevation of the paver shall be regulated from outside reference lines established for this purpose. The paver shall vibrate the concrete for the full width and depth of the strip of pavement being placed and the vibration shall be adequate to provide a consistency of concrete that will stand normal to the surface with sharp well defined edges. The sliding forms shall be rigidly held together laterally to prevent spreading of the forms. The plastic concrete shall be effectively consolidated by internal vibration with transverse vibrating units for the full width of the pavement and/or a series of equally placed longitudinal vibrating units. The space from the outer edge of the pavement to longitudinal unit shall not exceed 9 inches for slipform and at the end of the dowels for the fill-in lanes The spacing of internal units shall be uniform and shall not exceed 18 inches.

The term internal vibration means vibrating units located within the specified thickness of pavement section.

The rate of vibration of each vibrating unit shall be within 8000 to 12000 cycles per minute and the amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete along the entire length of the vibrating unit and for a distance of at least one foot. The frequency of vibration or amplitude shall vary proportionately with the rate of travel to result in a uniform density and air content. The paving machine shall be equipped with a tachometer or other suitable device for measuring and indicating the actual frequency of vibrations.

The concrete shall be held at a uniform consistency. The slip-form paver shall be operated with as nearly a continuous forward movement as possible and all operations of mixing, delivering, and spreading concrete shall be coordinated to provide uniform progress with stopping and starting of the paver held to a minimum. If for any reason, it is necessary to stop the forward movement of the paver, the vibratory and tamping elements shall also be stopped immediately. No tractive force shall be applied to the machine, except that which is controlled from the machine.

When concrete is being placed adjacent to an existing pavement, that part of the equipment which is supported on the existing pavement shall be equipped with protective pads on crawler tracks or rubber-tired wheels on which the bearing surface is offset to run a sufficient distance from the edge of the pavement to avoid breaking the pavement edge.

Not more than 15% of the total free edge of each 500 foot segment of pavement, or fraction thereof, shall have an edge slump exceeding 1/4 inch, and none of the free edge of the pavement shall have an edge slump exceeding 3/8 inch. (The total free edge of 500 feet of pavement will be considered the cumulative total linear measurement of pavement edge originally constructed as nonadjacent to any existing pavement; that is, 500 feet of paving lane originally constructed as a separate lane will have 1,000 feet of free edge, 500 feet of fill-in lane will have no free edge, etc.). The area affected by the downward movement of the concrete along the pavement edge shall be limited to not more than 18 inches from the edge. When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump shall be removed and replaced at the expense of the Contractor as directed by the Engineer.

b. Side-form construction. Side form sections shall be straight, free from warps, bends, indentations, or other defects. Defective forms shall be removed from the work. Metal side forms shall be used except at end closures and transverse construction joints where straight forms of other suitable material may be used.

Side forms may be built up by rigidly attaching a section to either top or bottom of forms. If such build-up is attached to the top of metal forms, the build-up shall also be metal.

Width of the base of all forms shall be equal to or greater than the specified pavement thickness.

Side forms shall be of sufficient rigidity, both in the form and in the interlocking connection with adjoining forms, that springing will not occur under the weight of subgrading and paving equipment or from the pressure of the concrete. The Contractor shall provide sufficient forms so that there will be no delay in placing concrete due to lack of forms.

Before placing side forms, the underlying material shall be at the proper grade. Side forms shall have full bearing upon the foundation throughout their length and width of base and shall be placed to the required grade and alignment of the finished pavement. They shall be firmly supported during the entire operation of placing, compacting, and finishing the pavement.

Forms shall be drilled in advance of being placed to line and grade to accommodate tie bars where these are specified.

Immediately in advance of placing concrete and after all subbase operations are completed, side forms shall be trued and maintained to the required line and grade for a distance sufficient to prevent delay in placing.

Side forms shall remain in place at least 12 hours after the concrete has been placed, and in all cases until the edge of the pavement no longer requires the protection of the forms. Curing compound shall be applied to the concrete immediately after the forms have been removed.

Side forms shall be thoroughly cleaned and oiled each time they are used and before concrete is placed against them.

Concrete shall be spread, screeded, shaped and consolidated by one or more self-propelled machines. These machines shall uniformly distribute and consolidate concrete without segregation so that the completed pavement will conform to the required cross-section with a minimum of handwork.

The number and capacity of machines furnished shall be adequate to perform the work required at a rate equal to that of concrete delivery.

Concrete for the full paving width shall be effectively consolidated by internal vibrators without causing segregation. Internal type vibrators' rate of vibration shall be not less than 7,000 cycles per minute. Amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete more than one foot (30 cm) from the vibrating element. The Contractor shall furnish a tachometer or other suitable device for measuring and indicating frequency of vibration.

Power to vibrators shall be connected so that vibration ceases when forward or backward motion of the machine is stopped.

The provisions relating to the frequency and amplitude of internal vibration shall be considered the minimum requirements and are intended to ensure adequate density in the hardened concrete.

c. Consolidation. Concrete shall be consolidated with the specified type of lane-spanning, gang-mounted, mechanical, immersion type vibrating equipment mounted in front of the paver, supplemented, in rare instances as specified, by hand-operated vibrators. The vibrators shall be inserted into the concrete to a depth that will provide the best full-depth consolidation but not closer to the underlying material than inches (50 mm). Excessive vibration shall not be permitted. If the vibrators cause visible tracking in the paving lane, the paving operation shall be stopped and equipment and operations modified to prevent it. Concrete in small, odd-shaped slabs or in isolated locations inaccessible to the gang-mounted vibration equipment shall be vibrated with an approved hand-operated immersion vibrator operated from a bridge

spanning the area. Vibrators shall not be used to transport or spread the concrete. Hand-operated vibrators shall not be operated in the concrete at one location for more than 20 seconds. Insertion locations for hand-operated vibrators shall be between 6 to 15 inches on centers. For each paving train, at least one additional vibrator spud, or sufficient parts for rapid replacement and repair of vibrators shall be maintained at the paving site at all times. Any evidence of inadequate consolidation (honeycomb along the edges, large air pockets, or any other evidence) shall require the immediate stopping of the paving operation and adjustment of the equipment or procedures as approved by the Engineer.

If a lack of consolidation of the concrete is suspected by the Engineer, referee testing may be required. Referee testing of hardened concrete will be performed by the Engineer by cutting cores from the finished pavement after a minimum of 24 hours curing. Density determinations will be made by the Engineer based on the water content of the core as taken. ASTM C642 shall be used for the determination of core density in the saturated-surface dry condition. When required, referee cores will be taken at the minimum rate of one for each 500 cubic yards of pavement, or fraction. The Contractor shall be responsible for all referee testing cost if they fail to meet the required density.

The average density of the cores shall be at least 97% of the original mix design density, with no cores having a density of less than 96% of the original mix design density. Failure to meet the referee tests will be considered evidence that the minimum requirements for vibration are inadequate for the job conditions. Additional vibrating units or other means of increasing the effect of vibration shall be employed so that the density of the hardened concrete conforms to the above requirements.

501-4.9 Strike-off of concrete and placement of reinforcement. Following the placing of the concrete, it shall be struck off to conform to the cross-section shown on the plans and to an elevation that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown on the plans. When reinforced concrete pavement is placed in two layers, the bottom layer shall be struck off to such length and depth that the sheet of reinforcing steel fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall then be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck off, and screeded. If any portion of the bottom layer of concrete has been placed more than 30 minutes without being covered with the top layer or if initial set has taken place, it shall be removed and replaced with freshly mixed concrete at the Contractor's expense. When reinforced concrete is placed in one layer, the reinforcement may be positioned in advance of concrete placement or it may be placed in plastic concrete by mechanical or vibratory means after spreading.

Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter that may adversely affect or reduce bond. Reinforcing steel with rust, mill scale or a combination of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile properties of a hand wire-brushed test specimen are not less than the applicable ASTM specification requirements.

501-4.10 Joints. Joints shall be constructed as shown on the plans and in accordance with these requirements. All joints shall be constructed with their faces perpendicular to the surface of the pavement and finished or edged as shown on the plans. Joints shall not vary more than 1/2 inch from their designated position and shall be true to line with not more than 1/4 inch variation in 10 feet. The surface across the joints shall be tested with a 12 feet straightedge as the joints are finished and any irregularities in excess of 1/4 inch shall be corrected before the concrete has hardened. All joints shall be so prepared, finished, or cut to provide a groove of uniform width and depth as shown on the plans.

a. Construction. Longitudinal construction joints shall be slip-formed or formed against side forms as shown in the plans.

Transverse construction joints shall be installed at the end of each day's placing operations and at any other points within a paving lane when concrete placement is interrupted for more than 30 minutes or it appears that the concrete will obtain its initial set before fresh concrete arrives. The installation of the joint shall be located at a planned contraction or expansion joint. If placing of the concrete is stopped, the Contractor shall remove the excess concrete back to the previous planned joint.

b. Contraction. Contraction joints shall be installed at the locations and spacing as shown on the plans. Contraction joints shall be installed to the dimensions required by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened. When the groove is formed in plastic concrete the sides of the grooves shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The groove shall be finished or cut clean so that spalling will be avoided at intersections with other joints. Grooving or sawing shall produce a slot at least 1/8 inch wide and to the depth shown on the plans.

c. Isolation (expansion). Isolation joints shall be installed as shown on the plans. The premolded filler of the thickness as shown on the plans, shall extend for the full depth and width of the slab at the joint, except for space for sealant at the top of the slab. The filler shall be securely staked or fastened into position perpendicular to the proposed finished surface. A cap shall be provided to protect the top edge of the filler and to permit the concrete to be placed and finished. After the concrete has been placed and struck off, the cap shall be carefully withdrawn leaving the space over the premolded filler. The edges of the joint shall be finished and tooled while the concrete is still plastic. Any concrete bridging the joint space shall be removed for the full width and depth of the joint.

d. Tie bars. Tie bars shall consist of deformed bars installed in joints as shown on the plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals shown on the plans. They shall be held in position parallel to the pavement surface and in the middle of the slab depth. When tie bars extend into an unpaved lane, they may be bent against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. Tie bars shall not be painted, greased, or enclosed in sleeves. When slip-form operations call for tie bars, two-piece hook bolts can be installed.

e. Dowel bars. Dowel bars or other load-transfer units of an approved type shall be placed across joints as shown on the plans. They shall be of the dimensions and spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device to be left permanently in place. The dowel or load-transfer and joint devices shall be rigid enough to permit complete assembly as a unit ready to be lifted and placed into position. The dowels shall be coated with a bond-breaker or other lubricant recommended by the manufacturer and approved by the Engineer.

f. Dowels bars at longitudinal construction joints shall be bonded in drilled holes.

g. Placing dowels and tie bars. The method used in installing and holding dowels in position shall ensure that the error in alignment of any dowel from its required horizontal and vertical alignment after the pavement has been completed will not be greater than 1/8 inch per feet. Except as otherwise specified below, horizontal spacing of dowels shall be within a tolerance of ±5/8 inch. The vertical location on the face of the slab shall be within a tolerance of ±1/2 inch. The vertical alignment of the dowels shall be measured parallel to the designated top surface of the pavement, except for those across the crown or other grade change joints. Dowels across crowns and other joints at grade changes shall be measured to a level surface. Horizontal alignment shall be checked perpendicular to the joint edge. The horizontal alignment shall be checked with a framing square. Dowels and tie bars shall not be placed closer than 0.6 times the dowel bar length to the planned joint line. If the last regularly spaced longitudinal dowel is closer than that dimension, it shall be moved away from the joint to a location 0.6 times the dowel bar length, but not closer than 6 inches (150 mm) to its nearest neighbor. The portion of each dowel intended to move within the

concrete or expansion cap shall be wiped clean and coated with a thin, even film of lubricating oil or light grease before the concrete is placed. Dowels shall be installed as specified in the following subparagraphs.

(1) Contraction joints. Dowels and tie bars in longitudinal and transverse contraction joints within the paving lane shall be held securely in place, as indicated, by means of rigid metal frames or basket assemblies of an approved type. The basket assemblies shall be held securely in the proper location by means of suitable pins or anchors. Do not cut or crimp the dowel basket tie wires. At the Contractor's option, in lieu of the above, dowels and tie bars in contraction joints shall be installed near the front of the paver by insertion into the plastic concrete using approved equipment and procedures. Approval will be based on the results of a preconstruction demonstration, showing that the dowels and tie bars are installed within specified tolerances.

(2) Construction joints. Install dowels and tie bars by the cast-in- place or the drill-and-dowel method. Installation by removing and replacing in preformed holes will not be permitted. Dowels and tie bars shall be prepared and placed across joints where indicated, correctly aligned, and securely held in the proper horizontal and vertical position during placing and finishing operations, by means of devices fastened to the forms. The spacing of dowels and tie bars in construction joints shall be as indicated.

(3) Dowels installed in isolation joints and other hardened concrete. Install dowels for isolation joints and in other hardened concrete by bonding the dowels into holes drilled into the hardened concrete. The concrete shall have cured for seven (7) days or reached a minimum **flexural strength of 450 psi** before drilling commences. Holes 1/8 inch greater in diameter than the dowels shall be drilled into the hardened concrete using rotary-core drills. Rotary-percussion drills may be used, provided that excessive spalling does not occur to the concrete joint face. Modification of the equipment and operation shall be required if, in the Engineer's opinion, the equipment and/or operation is causing excessive damage. Depth of dowel hole shall be within a tolerance of ±1/2 inch of the dimension shown on the drawings. On completion of the drilling operation, the dowel hole shall be blown out with oil-free, compressed air. Dowels shall be bonded in the drilled holes using epoxy resin. Epoxy resin shall be injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel will not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic grout retention ring fitted around the dowel. Dowels required to be installed in any joints between new and existing concrete shall be grouted in holes drilled in the existing concrete, all as specified above.

h. Sawing of joints. Joints shall be cut as shown on the plans. Equipment shall be as described in paragraph 501-4.1. The circular cutter shall be capable of cutting a groove in a straight line and shall produce a slot at least 1/8 inch wide and to the depth shown on the plans. The top of the slot shall be widened by sawing to provide adequate space for joint sealers as shown on the plans. Sawing shall commence, without regard to day or night, as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and before uncontrolled shrinkage cracking of the pavement occurs and shall continue without interruption until all joints have been sawn. The joints shall be sawn at the required spacing. All slurry and debris produced in the sawing of joints shall be removed by vacuuming and washing. Curing compound or system shall be reapplied in the initial sawcut and maintained for the remaining cure period.

501-4.11 Finishing. Finishing operations shall be a continuing part of placing operations starting immediately behind the strike-off of the paver. Initial finishing shall be provided by the transverse screed or extrusion plate. The sequence of operations shall be transverse finishing, longitudinal machine floating if used, straightedge finishing, texturing, and then edging of joints. Finishing shall be by the machine method. The hand method shall be used only on isolated areas of odd slab widths or shapes and in the event of a breakdown of the mechanical finishing equipment. Supplemental hand finishing for machine finished pavement shall be kept to an absolute minimum. Any machine finishing operation which requires

appreciable hand finishing, other than a moderate amount of straightedge finishing, shall be immediately stopped and proper adjustments made or the equipment replaced. Any operations which produce more than 1/8 inch of mortar-rich surface (defined as deficient in plus U.S. No. 4 sieve size aggregate) shall be halted immediately and the equipment, mixture, or procedures modified as necessary. Compensation shall be made for surging behind the screeds or extrusion plate and settlement during hardening and care shall be taken to ensure that paving and finishing machines are properly adjusted so that the finished surface of the concrete (not just the cutting edges of the screeds) will be at the required line and grade. Finishing equipment and tools shall be maintained clean and in an approved condition. At no time shall water be added to the surface of the slab with the finishing equipment or tools, or in any other way, except for fog (mist) sprays specified to prevent plastic shrinkage cracking.

a. Machine finishing with slipform pavers. The slipform paver shall be operated so that only a very minimum of additional finishing work is required to produce pavement surfaces and edges meeting the specified tolerances. Any equipment or procedure that fails to meet these specified requirements shall immediately be replaced or modified as necessary. A self-propelled non-rotating pipe float may be used while the concrete is still plastic, to remove minor irregularities and score marks. Only one pass of the pipe float shall be allowed. If there is concrete slurry or fluid paste on the surface that runs over the edge of the pavement, the paving operation shall be immediately stopped and the equipment, mixture, or operation modified to prevent formation of such slurry. Any slurry which does run down the vertical edges shall be immediately removed by hand, using stiff brushes or scrapers. No slurry, concrete or concrete mortar shall be used to build up along the edges of the pavement to compensate for excessive edge slump, either while the concrete is plastic or after it hardens.

b. Machine finishing with fixed forms. The machine shall be designed to straddle the forms and shall be operated to screed and consolidate the concrete. Machines that cause displacement of the forms shall be replaced. The machine shall make only one pass over each area of pavement. If the equipment and procedures do not produce a surface of uniform texture, true to grade, in one pass, the operation shall be immediately stopped and the equipment, mixture, and procedures adjusted as necessary.

c. Other types of finishing equipment. Clary screeds, other rotating tube floats, or bridge deck finishers are not allowed on mainline paving, but may be allowed on irregular or odd-shaped slabs, and near buildings or trench drains, subject to the Engineer's approval.

Bridge deck finishers shall have a minimum operating weight of 7500 pounds and shall have a transversely operating carriage containing a knock-down auger and a minimum of two immersion vibrators. Vibrating screeds or pans shall be used only for isolated slabs where hand finishing is permitted as specified, and only where specifically approved.

d. Hand finishing. 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 and (2) in areas of narrow widths or of irregular dimensions where operation of the mechanical equipment is impractical. Use hand finishing operations only as specified below.

(1) Equipment and screed. In addition to approved mechanical internal vibrators for consolidating the concrete, provide a strike-off and tamping screed and a longitudinal float for hand finishing. The screed shall be at least one foot longer than the width of pavement being finished, of an approved design, and sufficiently rigid to retain its shape, and shall be constructed of metal or other suitable material shod with metal. The longitudinal float shall be at least 10 feet long, of approved design, and rigid and substantially braced, and shall maintain a plane surface on the bottom. Grate tampers (jitterbugs) shall not be used.

(2) Finishing and floating. As soon as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross-section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. In addition to previously specified complete coverage with handheld immersion vibrators, the entire surface shall be tamped with the strike-off and tamping template, and the tamping operation continued until the required compaction and reduction of internal and surface voids are accomplished. Immediately following the final tamping of the surface, the pavement shall be floated longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, additional concrete shall be placed, consolidated and screeded, and the float operated until a satisfactory surface has been produced. The floating operation shall be advanced not more than half the length of the float and then continued over the new and previously floated surfaces.

e. Straightedge testing and surface correction. After the pavement has been struck off and while the concrete is still plastic, it shall be tested for trueness with a Contractor furnished 12-foot straightedge swung from handles 3 feet 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. Advancing shall be 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 pavement 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 assure that the surface across joints meets the smoothness requirements of paragraph 501-5.2e(3). Straightedge testing and surface corrections shall continue until the entire surface is found to be 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. This straight-edging is not a replacement for the straightedge testing of paragraph 501-5.2e(3), Smoothness.

501-4.12 Surface texture. The surface of the pavement shall be finished with either a brush or broom, burlap drag, or artificial turf finish for all newly constructed concrete pavements. It is important that the texturing equipment not tear or unduly roughen the pavement surface during the operation. Any imperfections resulting from the texturing operation shall be corrected to the satisfaction of the Engineer.

a. Brush or broom finish. If the pavement surface texture is to be a type of brush or broom finish, it shall be applied when the water sheen has practically disappeared. The equipment shall operate transversely across the pavement surface, providing corrugations that are uniform in appearance and approximately 1/16 inch in depth.

b. Burlap drag finish. If a burlap drag is used to texture the pavement surface, it shall be at least 15 ounces per square yard. To obtain a textured surface, the transverse threads of the burlap shall be removed approximately one foot from the trailing edge. A heavy buildup of grout on the burlap threads produces the desired wide sweeping longitudinal striations on the pavement surface. The corrugations shall be uniform in appearance and approximately 1/16 inch in depth.

501-4.13 Curing. Immediately after finishing operations are completed and marring of the concrete will not occur, the entire surface of the newly placed concrete shall be cured for a 7-day cure period in accordance with one of the methods below. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2 hour during the curing period.

When a two-sawcut method is used to construct the contraction joint, the curing compound shall be applied to the sawcut immediately after the initial cut has been made. The sealant reservoir shall not be sawed until

after the curing period has been completed. When the one cut method is used to construct the contraction joint, the joint shall be cured with wet rope, wet rags, or wet blankets. The rags, ropes, or blankets shall be kept moist for the duration of the curing period.

a. Impervious membrane method. The entire surface of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. The curing compound shall not be applied during rainfall. Curing compound shall be applied by mechanical sprayers under pressure at the rate of one gallon to not more than 150 sq ft. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application the compound shall be stirred continuously by mechanical means. Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. When hand spraying is approved by the Engineer, a double application rate shall be used to ensure coverage. The curing compound shall be of such character that the film will harden within 30 minutes after application. Should the film become damaged from any cause, including sawing operations, within the required curing period, the damaged portions shall be repaired immediately with additional compound or other approved means. Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface. Curing shall be applied immediately after the bleed water is gone from the surface.

b. White burlap-polyethylene sheets. The surface of the pavement shall be entirely covered with the sheeting. The sheeting used shall be such length (or width) that it will extend at least twice the thickness of the pavement beyond the edges of the slab. The sheeting shall be placed so that the entire surface and both edges of the slab are completely covered. The sheeting shall be placed and weighted to remain in contact with the surface covered, and the covering shall be maintained fully saturated and in position for seven (7) days after the concrete has been placed.

c. Water method. The entire area shall be covered with burlap or other water absorbing material. The material shall be of sufficient thickness to retain water for adequate curing without excessive runoff. The material shall be kept wet at all times and maintained for seven (7) days. When the forms are stripped, the vertical walls shall also be kept moist. It shall be the responsibility of the Contractor to prevent ponding of the curing water on the subbase.

d. Concrete protection for cold weather. The concrete shall be maintained at an ambient temperature of at least 50°F for a period of 72 hours after placing and at a temperature above freezing for the remainder of the curing time. The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather; and any concrete damaged shall be removed and replaced at the Contractor's expense.

e. Concrete protection for hot weather. Concrete should be continuous moisture cured for the entire curing period and shall commence as soon as the surfaces are finished and continue for at least 24 hours. However, if moisture curing is not practical beyond 24 hours, the concrete surface shall be protected from drying with application of a liquid membrane-forming curing compound while the surfaces are still damp. Other curing methods may be approved by the Engineer.

501-4.14 Removing forms. Unless otherwise specified, forms shall not be removed from freshly placed concrete until it has hardened sufficiently to permit removal without chipping, spalling, or tearing. After the forms have been removed, the sides of the slab shall be cured as per the methods indicated in paragraph 501-4.13. Major honeycombed areas shall be considered as defective work and shall be removed and replaced in accordance with paragraph 501-5.2(f).

501-4.15 Saw-cut grooving. Not used.

501-4.16 Sealing joints. The joints in the pavement shall be sealed in accordance with Item P-605.

501-4.17 Protection of pavement. The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by the Contractor's employees and agents until accepted by the Engineer. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, crossovers, and protection of unsealed joints from intrusion of foreign material, etc. Any damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense.
Aggregates, rubble, or other similar construction materials shall not be placed on airfield pavements. Traffic shall be excluded from the new pavement by erecting and maintaining barricades and signs until the concrete is at least seven (7) days old, or for a longer period if directed by the Engineer.

In paving intermediate lanes between newly paved pilot lanes, operation of the hauling and paving equipment will be permitted on the new pavement after the pavement has been cured for seven (7) days and the joints have been sealed or otherwise protected, and the concrete has attained a minimum field cured flexural strength of 550 psi and approved means are furnished to prevent damage to the slab edge.

All new and existing pavement carrying construction traffic or equipment shall be continuously kept completely clean, and spillage of concrete or other materials shall be cleaned up immediately upon occurrence.

Damaged pavements shall be removed and replaced at the Contractor's expense. Slabs shall be removed to the full depth, width, and length of the slab.

501-4.18 Opening to construction traffic. The pavement shall not be opened to traffic until test specimens molded and cured in accordance with ASTM C31 have attained a flexural strength of 550 lb / square inch when tested in accordance with ASTM C78. If such tests are not conducted, the pavement shall not be opened to traffic until 14 days after the concrete was placed. Prior to opening the pavement to construction traffic, all joints shall either be sealed or protected from damage to the joint edge and intrusion of foreign materials into the joint. As a minimum, backer rod or tape may be used to protect the joints from foreign matter intrusion.

501-4.19 Repair, removal, or replacement of slabs.

a. General. New pavement slabs that are broken or contain cracks or are otherwise defective or unacceptable shall be removed and replaced or repaired, as directed by the Engineer and as specified hereinafter at no cost to the Owner. Spalls along joints shall be repaired as specified. Removal of partial slabs is not permitted. Removal and replacement shall be full depth, shall be full width of the slab, and the limit of removal shall be normal to the paving lane and to each original transverse joint. The Engineer will determine whether cracks extend full depth of the pavement and may require cores to be drilled on the crack to determine depth of cracking. Such cores shall be 4 inch diameter, shall be drilled by the Contractor and shall be filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with epoxy resin, using approved procedures. Drilling of cores and refilling holes shall be at no expense to the Owner. All epoxy resin used in this work shall conform to ASTM C881, Type V. Repair of cracks as described in this section shall not be allowed if in the opinion of the Engineer the overall condition of the pavement indicates that such repair is unlikely to achieve an acceptable and durable finished pavement. No repair of cracks shall be allowed in any panel that demonstrates segregated aggregate with an absence of coarse aggregate in the upper 1/8 inch of the pavement surface.

b. Shrinkage cracks. Shrinkage cracks, which do not exceed 4 inches in depth, shall be cleaned and then pressure injected with epoxy resin, Type IV, Grade 1, using procedures as approved by the Engineer. Care shall be taken to assure that the crack is not widened during epoxy resin injection. All epoxy resin

injection shall take place in the presence of the Engineer. Shrinkage cracks, which exceed 4 inches in depth, shall be treated as full depth cracks in accordance with paragraphs 4.19b and 4.19c.

c. Slabs with cracks through interior areas. Interior area is defined as that area more than 6 inches from either adjacent original transverse joint. The full slab shall be removed and replaced at no cost to the Owner, when there are any full depth cracks, or cracks greater than 4 inches in depth, that extend into the interior area.

d. Cracks close to and parallel to joints. All cracks essentially parallel to original joints, extending full depth of the slab, and lying wholly within 6 inches either side of the joint shall be treated as specified here. Any crack extending more than 6 inches from the joint shall be treated as specified above in subparagraph c.

(1) Full depth cracks present, original joint not opened. When the original un-cracked joint has not opened, the crack shall be sawed and sealed, and the original joint filled with epoxy resin as specified below. The crack shall be sawed with equipment specially designed to follow random cracks. The reservoir for joint sealant in the crack shall be formed by sawing to a depth of 3/4 inches, ±1/16 inch, and to a width of 5/8 inch, ±1/8 inch. Any equipment or procedure which causes raveling or spalling along the crack shall be modified or replaced to prevent such raveling or spalling. The joint sealant shall be a liquid sealant as specified. Installation of joint seal shall be as specified for sealing joints or as directed. If the joint sealant reservoir has been sawed out, the reservoir and as much of the lower saw cut as possible shall be filled with epoxy resin, Type IV, Grade 2, thoroughly tooled into the void using approved procedures.

If only the original narrow saw cut has been made, it shall be cleaned and pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures. If filler type material has been used to form a weakened plane in the transverse joint, it shall be completely sawed out and the saw cut pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures. Where a parallel crack goes part way across paving lane and then intersects and follows the original joint which is cracked only for the remained of the width, it shall be treated as specified above for a parallel crack, and the cracked original joint shall be prepared and sealed as originally designed.

(2) Full depth cracks present, original joint also cracked. At a joint, if there is any place in the lane width where a parallel crack and a cracked portion of the original joint overlap, the entire slab containing the crack shall be removed and replaced for the full lane width and length.

e. Removal and replacement of full slabs. Where it is necessary to remove full slabs, unless there are dowels present, all edges of the slab shall be cut full depth with a concrete saw. All saw cuts shall be perpendicular to the slab surface. If dowels, or tie bars are present along any edges, these edges shall be sawed full depth just beyond the end of the dowels or tie bars. These joints shall then be carefully sawed on the joint line to within one inch of the depth of the dowel or tie bar.

The main slab shall be further divided by sawing full depth, at appropriate locations, and each piece lifted out and removed. Suitable equipment shall be used to provide a truly vertical lift, and approved safe lifting devices used for attachment to the slabs. The narrow strips along doweled edges shall be carefully broken up and removed using light, hand-held jackhammers, 30 lb or less, or other approved similar equipment.

Care shall be taken to prevent damage to the dowels, tie bars, or to concrete to remain in place. The joint face below dowels shall be suitably trimmed so that there is not abrupt offset in any direction greater than 1/2 inch and no gradual offset greater than one inch when tested in a horizontal direction with a 12-foot straightedge.

No mechanical impact breakers, other than the above hand-held equipment shall be used for any removal of slabs. If underbreak between 1-1/2 and 4 inches deep occurs at any point along any edge, the

area shall be repaired as directed before replacing the removed slab. Procedures directed will be similar to those specified for surface spalls, modified as necessary.

If underbreak over 4 inches deep occurs, the entire slab containing the underbreak shall be removed and replaced. Where there are no dowels or tie bars, or where they have been damaged, dowels or tie bars of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete using procedures as specified. Original damaged dowels or tie bars shall be cut off flush with the joint face. Protruding portions of dowels shall be painted and lightly oiled. All four (4) edges of the new slab shall contain dowels or original tie bars.

Placement of concrete shall be as specified for original construction. Prior to placement of new concrete, the underlying material (unless it is stabilized) shall be re-compacted and shaped as specified in the appropriate section of these specifications. The surfaces of all four joint faces shall be cleaned of all loose material and contaminants and coated with a double application of membrane forming curing compound as bond breaker. Care shall be taken to prevent any curing compound from contacting dowels or tie bars. The resulting joints around the new slab shall be prepared and sealed as specified for original construction.

f. Repairing spalls along joints. Where directed, spalls along joints of new slabs, and along parallel cracks used as replacement joints, shall be repaired by first making a vertical saw cut at least one inch outside the spalled area and to a depth of at least 2 inch. Saw cuts shall be straight lines forming rectangular areas. The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete and at least 1/2 inch of visually sound concrete. The cavity thus formed shall be thoroughly cleaned with high-pressure water jets supplemented with compressed air to remove all loose material. Immediately before filling the cavity, a prime coat of epoxy resin, Type III, Grade I, shall be applied to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff-bristle brush. Pooling of epoxy resin shall be avoided. The cavity shall be filled with low slump Portland cement concrete or mortar or with epoxy resin concrete or mortar. Concrete shall be used for larger spalls, generally those more than 1/2 cu. ft. in size, and mortar shall be used for the smaller ones. Any spall less than 0.1 cu. ft. shall be repaired only with epoxy resin mortar or a Grade III epoxy resin. Portland cement concrete and mortar mixtures shall be proportioned as directed and shall be mixed, placed, consolidated, and cured as directed. Epoxy resin mortars shall be made with Type III, Grade 1, epoxy resin, using proportions and mixing and placing procedures as recommended by the manufacturer and approved by the Engineer. The epoxy resin materials shall be placed in the cavity in layers not over 2 inches thick. The time interval between placement of additional layers shall be such that the temperature of the epoxy resin material does not exceed 140°F at any time during hardening. Mechanical vibrators and hand tampers shall be used to consolidate the concrete or mortar. Any repair material on the surrounding surfaces of the existing concrete shall be removed before it hardens. Where the spalled area abuts a joint, an insert or other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints, or as required to be routed for cracks. The reservoir shall be thoroughly cleaned and sealed with the sealer specified for the joints. If any spall penetrates half the depth of the slab or more, the entire slab shall be removed and replaced as previously specified. If any spall would require over 25% of the length of any single joint to be repaired, the entire slab shall be removed and replaced. Repair of spalls as described in this section shall not be allowed if in the opinion of the Engineer the overall condition of the pavement indicates that such repair is unlikely to achieve an acceptable and durable finished pavement. No repair of spalls shall be allowed in any panel that demonstrates segregated aggregate with a significant absence of coarse aggregate in the upper one-eight (1/8th) inch of the pavement surface.

g. Diamond grinding of PCC surfaces. Diamond grinding of the hardened concrete with an approved diamond grinding machine should not be performed until the concrete is 14 days or more old and concrete has reached full minimum strength. When required, diamond grinding shall be accomplished by sawing

with saw blades impregnated with industrial diamond abrasive. The saw blades shall be assembled in a cutting head mounted on a machine designed specifically for diamond grinding that will produce the required texture and smoothness level without damage to the pavement. The saw blades shall be 1/8-inch wide and there shall be a minimum of 55 to 60 blades per 12 inches of cutting head width; the actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Each machine shall be capable of cutting a path at least 3 feet wide. Equipment that causes ravels, aggregate fractures, spalls or disturbance to the joints will not be permitted. The area corrected by diamond grinding the surface of the hardened concrete should not exceed 10% of the total area of any sublot. The depth of diamond grinding shall not exceed 1/2 inch and all areas in which diamond grinding has been performed will be subject to the final pavement thickness tolerances specified. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. All pavement areas requiring plan grade or surface smoothness corrections in excess of the limits specified above, may require removing and replacing in conformance with paragraph 501-4.19.

501-4.20 Existing concrete pavement removal and repair.

All operations shall be carefully controlled to prevent damage to the concrete pavement and to the underlying material to remain in place. All saw cuts shall be made perpendicular to the slab surface.

a. Removal of existing pavement slab.

When it is necessary to remove existing concrete pavement and leave adjacent concrete in place, unless there are dowels present, the joint between the removal area and adjoining pavement to stay in place, including dowels or tie bars, shall first be cut full depth with a standard diamond-type concrete saw. If dowels are present at this joint, the saw cut shall be made full depth just beyond the end of dowels. The edge shall then be carefully sawed on the joint line to within one inch) of the top of the dowel. Next, a full depth saw cut shall be made parallel to the joint at least 24 inches from the joint and at least 12 inches from the end of any dowels. All pavement between this last saw cut and the joint line shall be carefully broken up and removed using hand-held jackhammers, 30 lb or less, or the approved light-duty equipment which will not cause stress to propagate across the joint saw cut and cause distress in the pavement which is to remain in place. Where dowels are present, care shall be taken to produce an even, vertical joint face below the dowels. If the Contractor is unable to produce such a joint face, or if underbreak or other distress occurs, the Contractor shall saw the dowels flush with the joint. The Contractor shall then install new dowels, of the size and spacing used for other similar joints, by epoxy resin bonding them in holes drilled in the joint face as specified in paragraph 501-4.10g. All this shall be at no additional cost to the Owner. Dowels of the size and spacing indicated shall be installed as shown on the drawings by epoxy resin bonding them in holes drilled in the joint face as specified in paragraph 501-4.10g. The joint face shall be sawed or otherwise trimmed so that there is no abrupt offset in any direction greater than 1/2 inches and no gradual offset greater than one inch when tested in a horizontal direction with a 12-foot straightedge.

b. Edge repair.

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Areas that are damaged during construction shall be repaired at no cost to the Owner.

(1) Spall repair. Spalls shall be repaired where indicated and where directed by the Engineer. Repair materials and procedures shall be as previously specified in subparagraph 501-4.19f.

(2) Underbreak repair. All underbreak shall be repaired. First, all delaminated and loose material shall be carefully removed. Next, the underlying material shall be recompacted, without addition of any new material. Finally, the void shall be completely filled with paving concrete, thoroughly consolidated. Care shall be taken to produce an even joint face from top to bottom. Prior to placing concrete, the

underlying material shall be thoroughly moistened. After placement, the exposed surface shall be heavily coated with curing compound.

(3) Underlying material. The underlying material adjacent to the edge and under the existing pavement which is to remain in place shall be protected from damage or disturbance during removal operations and until placement of new concrete, and shall be shaped as shown on the drawings or as directed. Sufficient material shall be kept in place outside the joint line to prevent disturbance (or sloughing) of material under the pavement that is to remain in place. Any material under the portion of the concrete pavement to remain in place, which is disturbed or loses its compaction shall be carefully removed and replaced with concrete as specified in paragraph 501-4.20b(2). The underlying material outside the joint line shall be thoroughly compacted and moist when new concrete is placed.

MATERIAL ACCEPTANCE

501-5.1 Acceptance sampling and testing. All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section, with the exception of coring for thickness determination, will be performed by the Engineer at no cost to the Contractor. The Contractor shall bear the cost of providing curing facilities for the strength specimens, per paragraph 501-5.1a(3), and coring and filling operations, per paragraph 501-5.1b(1). Testing organizations performing these tests shall be accredited in accordance with ASTM C1077. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

Concrete shall be accepted for strength and thickness on a lot basis.

A lot shall consist of a day's production not to exceed 2,000 cubic yards**.**

a. Flexural strength.

(1) Sampling. Each lot shall be divided into four equal sublots. One sample shall be taken for each sublot from the plastic concrete delivered to the job site. Sampling locations shall be determined by the Engineer in accordance with random sampling procedures contained in ASTM D3665. The concrete shall be sampled in accordance with ASTM C172.

(2) Testing. Two (2) specimens shall be made from each sample. Specimens shall be made in accordance with ASTM C31 and the flexural strength of each specimen shall be determined in accordance with ASTM C78. The flexural strength for each sublot shall be computed by averaging the results of the two test specimens representing that sublot.

Immediately prior to testing for flexural strength, the beam shall be weighed and measured for determination of a sample unit weight. Measurements shall be made for each dimension; height, depth, and length, at the mid-point of the specimen and reported to the nearest 1/10 inch. The weight of the specimen shall be reported to the nearest 0.1 pound. The sample unit weight shall be calculated by dividing the sample weight by the calculated volume of the sample. This information shall be reported as companion information to the measured flexural strength for each specimen.

The samples will be transported while in the molds. The curing, except for the initial cure period, will be accomplished using the immersion in saturated lime water method.

Slump, air content, and temperature tests will also be conducted by the quality assurance laboratory for each set of strength test samples, per ASTM C31.

(3) Curing. The Contractor shall provide adequate facilities for the initial curing of beams. During the 24 hours after molding, the temperature immediately adjacent to the specimens must be maintained in the range of 60° to 80°F, and loss of moisture from the specimens must be prevented. The specimens may be stored in tightly constructed wooden boxes, damp sand pits, temporary buildings at construction sites, under wet burlap in favorable weather, or in heavyweight closed plastic bags, or using other suitable methods, provided the temperature and moisture loss requirements are met.

(4) Acceptance. ***Materials not meeting the required minimum flexural strength shall be removed and replaced at the Contractors expense***.

b. Pavement thickness.

(1) Sampling. Each lot shall be divided into four equal sublots and one core shall be taken by the Contractor for each sublot. Sampling locations shall be determined by the Engineer in accordance with random sampling procedures contained in ASTM D3665. Areas, such as thickened edges, with planned variable thickness, shall be excluded from sample locations.

Cores shall be neatly cut with a core drill. The Contractor shall furnish all tools, labor, and materials for cutting samples and filling the cored hole. Core holes shall be filled by the Contractor with a non-shrink grout approved by the Engineer within one day after sampling. *The Engineer may elect to have sampling performed by surveying the before and after thickness of each layer of the pavement structure.*

(2) Testing. The thickness of the cores shall be determined by the Engineer by the average caliper measurement in accordance with ASTM C174.

(3) Acceptance. ***Materials not meeting the required thickness shall be removed and replaced at the Contractors expense. Thickness shall be determined by the topographic survey of Limerock Base Course and Final Surface of P-501 Surface.***

c. Partial lots. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or minor placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

Where three sublots have been produced, they shall constitute a lot. Where one or two sublots have been produced, they shall be incorporated into the next lot or the previous lot and the total number of sublots shall be used in the acceptance criteria calculation, that is, n=5 or n=6.

~~**d. Outliers.** All individual flexural strength tests within a lot shall be checked for an outlier (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers shall be discarded, and the percentage of material within specification limits (PWL) shall be determined using the remaining test values.~~

501-5.2 Acceptance criteria.

a. General. Acceptance will be based on the following characteristics of the completed pavement discussed in paragraph 501-5.2e:

(1) Flexural strength

(2) Thickness

(3) Smoothness

(4) Grade

(5) Edge slump

Flexural strength and thickness shall be evaluated for acceptance *as specified in Paragraph 501-5.1 above*.

The Engineer may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of concrete mixture which is rendered unfit for use due to contamination, segregation, or improper slump. 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 it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

e. Acceptance criteria.

(1) Flexural Strength. *As specified in Paragraph 501-5.1 above.*

(2) Thickness. *As specified in Paragraph 501-5.1 above.*

(3) Smoothness. As soon as the concrete has hardened sufficiently, but not later than 48 hours after placement, the surface of each lot shall be tested in both longitudinal and transverse directions for smoothness to reveal all surface irregularities exceeding the tolerances specified. The Contractor shall furnish paving equipment and employ methods that produce a finished surface of the pavement *which* shall not vary more than 1/4 inch when evaluated with a 12-foot straightedge. When the surface smoothness exceeds specification tolerances which cannot be corrected by diamond grinding of the pavement, full depth removal and replacement of pavement shall be to the limit of the longitudinal placement. Corrections involving diamond grinding will be subject to the final pavement thickness tolerances specified.

(4) Grade. An evaluation of the surface grade shall be made by the Engineer for compliance to the tolerances contained below. The finish grade will be determined by running levels at intervals of 50 feet or less longitudinally and all breaks in grade transversely (not to exceed 50 feet) to determine the elevation of the completed pavement. The Contractor shall pay the costs of surveying the level runs, and this work shall be performed by a licensed surveyor. The documentation, stamped and signed by a licensed surveyor, shall be provided by the Contractor to the Engineer.

(a) Lateral deviation. Lateral deviation from established alignment of the pavement edge shall not exceed ±0.10 feet in any lane.

(b) Vertical deviation. Vertical deviation from established grade shall not exceed ±0.04 feet at any point.

(5) Edge slump. When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump shall be removed and replaced at the expense of the Contractor as directed by the Engineer in accordance with paragraph 501-4.8a.

f. Removal and replacement of concrete. Any area or section of concrete that is removed and replaced shall be removed and replaced back to planned joints. The Contractor shall replace damaged dowels and the requirements for doweled longitudinal construction joints in paragraph 501-4.10 shall apply to all contraction joints exposed by concrete removal. Removal and replacement shall be in accordance with paragraph 501-4.20.

CONTRACTOR QUALITY CONTROL

501-6.1 Quality control program. The Contractor shall develop a Quality Control Program in accordance with Section 100 of the General Provisions. The program shall address all elements that 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

f. Mixing and Transportation

g. Placing and Consolidation

h. Joints

i. Dowel Placement and Alignment

j. Flexural or Compressive Strength

k. Finishing and Curing

l. Surface

501-6.2 Quality control testing. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to this specification and as set forth in the Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for aggregate gradation, aggregate moisture content, slump, and air content.

A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

a. Fine aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily in accordance with ASTM C136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C70 or ASTM C566.

b. Coarse Aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily for each size of aggregate. Tests shall be made in accordance with ASTM C136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C566.

c. Slump. Four slump tests shall be performed for each lot of material produced in accordance with the lot size defined in paragraph 501-5.1. One test shall be made for each sublot. Slump tests shall be performed in accordance with ASTM C143 from material randomly sampled from material discharged from trucks at the paving site. Material samples shall be taken in accordance with ASTM C172.

d. Air content. Four air content tests, shall be performed for each lot of material produced in accordance with the lot size defined in paragraph 501-5.1. One test shall be made for each sublot. Air content tests shall be performed in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag or other porous coarse aggregate, from material randomly sampled from trucks at the paving site. Material samples shall be taken in accordance with ASTM C172.

e. Four unit weight and yield tests shall be made in accordance with ASTM C138. The samples shall be taken in accordance with ASTM C172 and at the same time as the air content tests.

501-6.3 Control charts. The Contractor shall maintain linear control charts for fine and coarse aggregate gradation, slump, moisture content and air content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept up to date at all times. 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, or Specification limits, applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a potential problem and the Contractor is not taking satisfactory corrective action, the Engineer may halt production or acceptance of the material.

a. Fine and coarse aggregate gradation. The Contractor shall record the running average of the last five gradation tests for each control sieve on linear control charts. Specification limits contained in the Lower Specification Tolerance Limit (L) table above and the Control Chart Limits table below shall be superimposed on the Control Chart for job control.

b. Slump and air content. The Contractor shall maintain linear control charts both for individual measurements and range (that is, difference between highest and lowest measurements) for slump and air content in accordance with the following Action and Suspension Limits.

Control Chart Limits

Control Parameter	**Individual Measurements**		**Range Suspension Limit**
	Action Limit	**Suspension Limit**	
Slip Form:			
Slump	+0 to -1 inch	+0.5 to -1.5 inch	±1.5 inch
Air Content	±1.2%	±1.8%	±2.5%
Side Form:			
Slump	+0.5 to -1 inch	+1 to -1.5 inch	±1.5 inch
Air Content	±1.2%	±1.8%	±2.5%

The individual measurement control charts shall use the mix design target values as indicators of central tendency.

501-6.4 Corrective action. The Contractor Quality Control Program shall indicate that appropriate action shall be taken when the process is believed to be out of control. The Contractor Quality Control Program shall detail what action will be taken to bring the process into control and shall contain sets of rules to gauge when a process is out of control. As a minimum, a process shall be deemed out of control and corrective action taken if any one of the following conditions exists.

a. Fine and coarse aggregate gradation. When two consecutive averages of five tests are outside of the specification limits in paragraph 501-2.1, immediate steps, including a halt to production, shall be taken to correct the grading.

b. Fine and coarse aggregate moisture content. Whenever the moisture content of the fine or coarse aggregate changes by more than 0.5%, the scale settings for the aggregate batcher and water batcher shall be adjusted.

c. Slump. The Contractor shall halt production and make appropriate adjustments whenever:

(1) one point falls outside the Suspension Limit line for individual measurements or range

OR

(2) two points in a row fall outside the Action Limit line for individual measurements.

d. Air content. The Contractor shall halt production and adjust the amount of air-entraining admixture whenever:

(1) one point falls outside the Suspension Limit line for individual measurements or range

OR

(2) two points in a row fall outside the Action Limit line for individual measurements.

Whenever a point falls outside the Action Limits line, the air-entraining admixture dispenser shall be calibrated to ensure that it is operating correctly and with good reproducibility.

METHOD OF MEASUREMENT

501-7.1 Portland cement concrete pavement shall be measured by the number of **square yards** of either plain or reinforced pavement as specified in-place, completed and accepted.

BASIS OF PAYMENT

501-8.1 Payment. Payment for concrete pavement meeting all acceptance criteria as specified in paragraph 501-5.2 Acceptance Criteria shall be based on results of smoothness, strength and thickness tests.

Payment shall be full compensation for all labor, materials, tools, equipment, and incidentals required to complete the work as specified herein and on the drawings.

Payment. Payment shall be made under:

Item P-501-1 6 inch Portland Cement Concrete Pavement – per square yard

TESTING REQUIREMENTS

ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C70	Standard Test Method for Surface Moisture in Fine Aggregate
ASTM C78	Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer Than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C138	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173	Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C174	Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C227	Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C289	Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
ASTM C295	Standard Guide for Petrographic Examination of Aggregates for Concrete
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland Cement Concrete
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregates by Drying
ASTM C642	Standard Test Method for Density, Absorption, and Voids in Hardened Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1567	Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

ASTM D3665 Standard Practice for Random Sampling of Construction Materials

ASTM D4791 Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

ASTM E178 Standard Practice for Dealing With Outlying Observations

ASTM E1274 Standard Test Method for Measuring Pavement Roughness Using a Profilograph

U.S. Army Corps of Engineers (USACE) Concrete Research Division (CRD) C662 Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture and Aggregate (Accelerated Mortar-Bar Method)

MATERIAL REQUIREMENTS

ASTM A184 Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement

ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A704 Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement

ASTM A706 Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

ASTM A714 Standard Specification for High-Strength Low-Alloy Welded and Seamless Steel Pipe

ASTM A775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars

ASTM A934 Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars

ASTM A996 Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

ASTM A1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

ASTM A1078 Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement

ASTM C33 Standard Specification for Concrete Aggregates

ASTM C94 Standard Specification for Ready-Mixed Concrete

ASTM C150 Standard Specification for Portland Cement

ASTM C171 Standard Specification for Sheet Materials for Curing Concrete

ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete

ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C494 Standard Specification for Chemical Admixtures for Concrete

ASTM C595 Standard Specification for Blended Hydraulic Cements

ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C881	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber and Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving And Structural Construction
ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 305R	Guide to Hot Weather Concreting
ACI 306R	Guide to Cold Weather Concreting
ACI 309R	Guide for Consolidation of Concrete
AC 150/5320-6	Airport Pavement Design and Evaluation
PCA	Design and Control of Concrete Mixtures

END ITEM P-501

Item P-602 Bituminous Prime Coat

DESCRIPTION

602-1.1 This item shall consist of an application of bituminous material on the prepared base course in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

602-2.1 Bituminous material. The bituminous material shall be an emulsified asphalt indicated in ASTM D3628 as a bituminous application for prime coat appropriate to local conditions or as designated by the Engineer.

CONSTRUCTION METHODS

602-3.1 Weather limitations. The prime coat shall be applied only when the existing surface is dry; the atmospheric temperature is 50°F or above, and the temperature has not been below 35°F for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the Engineer.

602-3.2 Equipment. The equipment shall include a self-powered pressure bituminous material distributor and equipment for heating bituminous material.

Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 65.0 psi of tire width to prevent rutting, shoving or otherwise damaging the base, surface or other layers in the pavement structure. Design and equip the distributor to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with a pressure range of 25 to 75 psi and with an allowable variation from the specified rate of not more than ±5%, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the bituminous material during the heating process. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the Owner.

A power broom and power blower suitable for cleaning the surfaces to which the bituminous coat is to be applied shall be provided.

602-3.3 Application of bituminous material. Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The bituminous material shall be uniformly applied with a bituminous distributor at the rate of 0.15 to 0.30 gallons per square yard depending on the base course surface texture. The type of bituminous material and application rate shall be approved by the Engineer prior to application.

Following application of the bituminous material and prior to application of the succeeding layer of pavement, allow the bituminous coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up and cure excess bituminous material. Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

602-3.4 Trial applications. Before providing the complete bituminous coat, the Contractor shall apply three lengths of at least 100 feet for the full width of the distributor bar to evaluate the amount of bituminous material that can be satisfactorily applied with the equipment. Apply three different trial application rates of bituminous materials within the application range specified in paragraph 602-3.3. Other trial applications will be made using various amounts of material as deemed necessary by the Engineer.

602-3.5 Bituminous material Contractor's responsibility. The Contractor shall provide a statement of source and character of the proposed bituminous material which must be submitted to and approved by the Engineer before any shipment of bituminous materials to the project. The Contractor shall furnish vendor's certified test reports for each carload, or equivalent, of bituminous material shipped to the project. The test reports shall be provided to and approved by the Engineer before the bituminous material is applied. If the bituminous material does not meet the specifications, it shall be replaced at the Contractor's expense. Furnishing the vendor's certified test report for the bituminous material shall not be interpreted as basis for final acceptance.

602-3.6 Freight and weigh bills. The Contractor shall submit waybills and delivery tickets during the progress of the work. Before the final estimate is allowed, file with the Engineer certified waybills and certified delivery tickets for all bituminous materials used in the construction of the pavement covered by the contract. Do not remove bituminous material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

METHOD OF MEASUREMENT

602-4.1 The bituminous material for prime coat shall be measured by the gallon. Volume shall be corrected to the volume at 60°F in accordance with ASTM D1250. The bituminous material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of bituminous material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the bituminous material is necessary. Water added to emulsified asphalt will not be measured for payment.

BASIS OF PAYMENT

602-5.1 Payment shall be made at the contract unit price per gallon for bituminous prime coat. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and applying the materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item P-602-**1** Bituminous Prime Coat - per gallon

TESTING REQUIREMENTS

ASTM D1250	Standard Guide for Use of the Petroleum Measurement Tables

MATERIAL REQUIREMENTS

ASTM D977	Standard Specification for Emulsified Asphalt
ASTM D2028	Standard Specification for Cutback Asphalt (Rapid-Curing Type)
ASTM D2397	Standard Specification for Cationic Emulsified Asphalt
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts

END OF ITEM P-602

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Item P-620 Runway and Taxiway Marking

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer. The terms "paint" and "marking material" as well as "painting" and "application of markings" are interchangeable throughout this specification.

MATERIALS

620-2.1 Materials acceptance. The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers 55 gallons or smaller for inspection by the Engineer. Material shall not be loaded into the equipment until inspected by the Engineer.

620-2.2 Marking materials. Paint shall be waterborne in accordance with the requirements of paragraph 620-2.2**, Black paint shall be furnished in number 37038, and yellow paint shall be furnished in number 33538** in accordance with Federal Standard No. 595.

a. Waterborne. Paint shall meet the requirements of Federal Specification TT-P-1952E, Type I **or** Type II. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

620-2.3 Reflective media. Glass beads shall meet the requirements for Federal Specification TT-B-1325D, Type III. Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Federal Specification TT-B-1352D; Type III, Gradation A shall be used on all runway and taxiway markings. Initial readings shall yield at least 600 mcd/m^2/lux on white markings and at least 300 mcd/m^2/lux on yellow markings after installation.

Paint Color	Glass Beads, Type III
Yellow	See Table 1
Black	Not Used

CONSTRUCTION METHODS

620-3.1 Weather limitations. The painting shall be performed only when the surface is dry and when the surface temperature is at least 45°F and rising and the pavement surface temperature is at least 5°F above the dew point or meets the manufacturer's recommendations. Markings shall not be applied when the pavement temperature is greater than 130°F . Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns.

620-3.2 Equipment. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray.

620-3.3 Preparation of surface. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material that would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by sandblasting or by other methods as required to remove all contaminants without damage to the pavement surface. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the Engineer. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

At least 24 hours prior to remarking existing markings, the existing markings must be removed such that **90 percent** of the existing markings are removed with low (3,500-10,000 psi) waterblaster. After waterblasting, the surface shall be cleaned of all residue or debris either with sweeping or blowing with compressed air or both.

Prior to the initial application of markings, the Contractor shall certify in writing that the surface has been prepared in accordance with the paint manufacturer's requirements, that the application equipment is appropriate for the type of marking paint and that environmental conditions are appropriate for the material being applied. This certification along with a copy of the paint manufacturer's surface preparation and application requirements must be submitted and approved by the Engineer prior to the initial application of markings.

620-3.4 Layout of markings. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads **are** shown on the plans.

620-3.5 Application. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the Engineer. The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and marking dimensions and spacings shall be within the following tolerances:

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted. A period of **28 days** shall elapse between placement of a bituminous surface course, **rejuvenator** or seal coat and **final** application of the paint.

Prior to the initial application of markings, the Contractor shall certify in writing that the surface has been prepared in accordance with the paint manufacturer's requirements, that the application equipment is

appropriate for the marking paint and that environmental conditions are appropriate for the material being applied. This certification along with a copy of the paint manufactures application and surface preparation requirements must be submitted to the Engineer prior to the initial application of markings.
620-3.6 Test strip. Prior to the full application of airfield markings, the Contractor shall produce a test strip in the presence of the Engineer. The test strip shall include the application of a minimum of 5 gallons of paint and application of 35 lbs of Type I/50 lbs of Type III glass beads. The test strip shall be used to establish thickness/darkness standard for all markings. The test strip shall cover no more than the maximum area prescribed in Table 1 (e.g., for 5 gallons of waterborne paint shall cover no more than 575 square feet .

Table 1. Application Rates For Paint And Glass Beads
(See Note regarding Red and Pink Paint)

Paint Type	**Paint** **Square feet per gallon, ft^2/gal**	**Glass Beads, Type III** **Pounds per gallon of paint-lb/gal**
Waterborne Type I or II	115 ft^2/gal max	10 lb/gal min

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine from two directions at 50% with no glass beads in the first direction, and 100% with glass beads or sand in the other direction.

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment should be performed.

All emptied containers shall be returned to the paint storage area for checking by the Engineer. The containers shall not be removed from the airport or destroyed until authorized by the Engineer.

METHOD OF MEASUREMENT

620-4.1 The quantity of runway and taxiway markings to be paid for shall be the number of square feet - of painting performed in accordance with the specifications and accepted by the Engineer. **No separate payment shall be made for reflective media.**

BASIS OF PAYMENT

620-5.1 Payment shall be made at the respective contract price per square foot for runway and taxiway painting This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-620-1	**Yellow Reflective Runway and Taxiway Marking (100% application, Type III Beads) per square foot**
Item P-620-2	**Black non-reflective marking outlines per square foot**

TESTING REQUIREMENTS

ASTM C371	Standard Test Method for Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
ASTM D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
ASTM D711	Standard Test Method for No-Pick-Up Time of Traffic Paint
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

MATERIAL REQUIREMENTS

ASTM D476 Standard Classification for Dry Pigmentary Titanium Dioxide Products

40 CFR Part 60, Appendix A-7, Method 24
Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings

29 CFR Part 1910.1200 Hazard Communication

FED SPEC TT-B-1325D
Beads (Glass Spheres) Retro-Reflective

American Association of State Highway and Transportation Officials (AASHTO) M247
Standard Specification for Glass Beads Used in Pavement Markings

FED SPEC TT-P-1952E
Paint, Traffic and Airfield Marking, Waterborne

Commercial Item Description A-A-2886B
Paint, Traffic, Solvent Based

FED STD 595 Colors used in Government Procurement

AC 150/5340-1 Standards for Airport Markings

END OF ITEM P-620

Item D-701 PIPE FOR STORM DRAINS AND CULVERTS

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below.

701-2.2 Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter

701-2.3 Concrete. Concrete for pipe cradles shall have a minimum compressive strength of 2000 psi at 28 days and conform to the requirements of ASTM C94.

701-2.4 Rubber gaskets. Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C443. Rubber gaskets for PVC pipe, polyethylene, and polypropylene pipe shall conform to the requirements of ASTM F477. Rubber gaskets for zinc-coated steel pipe and precoated galvanized pipe shall conform to the requirements of ASTM D1056, for the "RE" closed cell grades. Rubber gaskets for steel reinforced thermoplastic ribbed pipe shall conform to the requirements of ASTM F477.

701-2.5 Joint mortar. Pipe joint mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

701-2.6 Joint fillers. Poured filler for joints shall conform to the requirements of ASTM D6690.

701-2.7 Plastic gaskets. Plastic gaskets shall conform to the requirements of AASHTO M198 (Type B).

701-2.8. Controlled low-strength material (CLSM). Controlled low-strength material shall conform to the requirements of Item P-153. When CLSM is used all joints shall have gaskets.

CONSTRUCTION METHODS

701-3.1 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than

the external diameter of the pipe plus 6 inches on each side. The trench walls shall be approximately vertical.

The Contractor shall comply with all current Federal, state and local rules and regulations governing the safety of men and materials during the excavation, installation and backfilling operations. Specifically, the Contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail. The trench bottom shall be shaped to fully and uniformly support the bottom quadrant of the pipe.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inch or 1/2 inch for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 inches in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The Engineer shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

701-3.2 Bedding. The pipe bedding shall conform to the class specified on the plans. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. When no bedding class is specified or detailed on the plans, the requirements for Class C bedding shall apply.

a. Rigid pipe. Class A bedding shall consist of a continuous concrete cradle conforming to the plan details.

Class B bedding shall consist of a bed of granular material having a thickness of at least 6 inches below the bottom of the pipe and extending up around the pipe for a depth of not less than 30% of the pipe's vertical outside diameter. The layer of bedding material shall be shaped to fit the pipe for at least 10% of the pipe's vertical diameter and shall have recesses shaped to receive the bell of bell and spigot pipe. The bedding material shall be sand or select sandy soil with 100% passing a 3/8 inch (9 mm) sieve and not more than 10% passing a No. 200 sieve.

Class C bedding shall consist of bedding the pipe in its natural foundation material to a depth of not less than 10% of the pipe's vertical outside diameter. The bed shall be shaped to fit the pipe and shall have recesses shaped to receive the bell of bell and spigot pipe.

b. Flexible pipe. For flexible pipe, the bed shall be roughly shaped to fit the pipe, and a bedding blanket of sand or fine granular material shall be provided as follows:

Pipe Corrugation Depth	Minimum Bedding Depth
inch	**inch**
1/2	1
1	2
2	3
2-1/2	3-1/2

c. PVC, polyethylene, and polypropylene pipe. For PVC, polyethylene, and polypropylene pipe, the bedding material shall consist of coarse sands and gravels with a maximum particle size of 3/4 inches. For pipes installed under paved areas, no more than 12% of the material shall pass the No. 200sieve. For all other areas, no more than 50% of the material shall pass the No. 200 sieve. The bedding shall have a thickness of at least 6 inches below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of the pipe's vertical outside diameter.

701-3.3 Laying pipe. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced concrete pipes shall be placed with the manufacturer's reference lines designating the top of the pipe within five degrees of a vertical plane through the longitudinal axis of the pipe.

701-3.4 Joining pipe. Joints shall be made with (1) Portland cement mortar, (2) Portland cement grout, (3) rubber gaskets, (4) plastic gaskets, or (5) coupling bands.

Mortar joints shall be made with an excess of mortar to form a continuous bead around the outside of the pipe and shall be finished smooth on the inside. Molds or runners shall be used for grouted joints to retain the poured grout. Rubber ring gaskets shall be installed to form a flexible watertight seal.

a. Concrete pipe. Concrete pipe may be either bell and spigot or tongue and groove. The method of joining pipe sections shall be so the ends are fully entered and the inner surfaces are reasonably flush and even. Joints shall be thoroughly wetted before applying mortar or grout.

b. PVC, polyethylene and polypropylene pipe. Joints for PVC, Polyethylene, and Polypropylene pipe shall conform to the requirements of ASTM D3212 when water tight joints are required. Joints for PVC and Polyethylene pipe shall conform to the requirements of AASHTO M304 when soil tight joints are required. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M252 or ASTM M294. Fittings for polypropylene pipe shall conform to ASTM F2881, ASTM F2736, or ASTM F2764.

701-3.5 Backfilling. Pipes shall be inspected before any backfill is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense.

Material for backfill shall be fine, readily compatible soil or granular material selected from the excavation or a source of the Contractor's choosing**.** It shall not contain frozen lumps, stones that would be retained on a 2-inch sieve, chunks of highly plastic clay, or other objectionable material. Granular backfill material shall have 95% or more passing the a 1/2 inch sieve, with 95% or more being retained on the No. 4 sieve.

When the top of the pipe is even with or below the top of the trench, the backfill shall be compacted in layers not exceeding 6 inches on each side of the pipe and shall be brought up one foot above the top of the pipe or to natural ground level, whichever is greater. Thoroughly compact the backfill material under the haunches of the pipe without displacing the pipe. Material shall be brought up evenly on each side of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the backfill shall be compacted in layers not exceeding 6 inches and shall be brought up evenly on each side of the pipe to one foot above the top of the pipe. The width of backfill on each side of the pipe for the portion above the top of the trench shall be equal to twice the pipe's diameter or 12 feet, whichever is less.

For PVC, polyethylene, and polypropylene pipe, the backfill shall be placed in two stages; first to the top of the pipe and then at least 12 inches over the top of the pipe. The backfill material shall meet the requirements of paragraph 701-3.2c.

All backfill shall be compacted to the density required under Item P-152.

It shall be the Contractor's responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

METHOD OF MEASUREMENT

701-4.1 The length of pipe shall be measured in linear feet of pipe in place, completed, and approved. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types and size shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

BASIS OF PAYMENT

701-5.1 Payment will be made at the contract unit price per linear foot for each kind of pipe of the type and size designated; These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-701-1 12 inch x 18 inch Elliptical Reinforced Concrete Pipe (Class V) per linear foot

Item D-701-2 Item 701-2 per linear foot per linear foot

Item D-701-3 4 inch HDPE DR9 per linear foot

Item D-701-4 4 ½ inch HDPE DR9 per linear foot

MATERIAL REQUIREMENTS

AASHTO M167	Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M190	Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M198	Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
AASHTO M219	Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M243	Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO MP20	Standard Specification for Steel Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm Diameter
ASTM A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A761	Standard Specification for Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM A849	Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM B745	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
ASTM C14	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C94	Standard Specification for Ready Mixed Concrete
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe

ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM D1056	Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber
ASTM D3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F667	Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F894	Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings
ASTM F2435	Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
ASTM F2736	Standard Specification for 6 to 30 in. Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe
ASTM F2764	Standard Specification for 30 to 60 in. Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM F2881	Standard Specification for 12 to 60 in. Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications

END ITEM D-701

Item D-751 Manholes, Catch Basins, Inlets and Inspection Holes

DESCRIPTION

751-1.1 This item shall consist of construction of manholes, catch basins, inlets, and inspection holes, in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the Engineer.

MATERIALS

751-2.2 Mortar. Mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

751-2.3 Concrete. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

751-2.4 Precast concrete pipe manhole rings. Precast concrete pipe manhole rings shall conform to the requirements of ASTM C478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches nor more than 48 inches. There shall be a gasket between individual sections and sections cemented together with mortar on the inside of the manhole.

751-2.6 Frames, covers, and grates. The castings shall conform to one of the following requirements:

a. ASTM A48, Class 35B: Gray iron castings

b. ASTM A47: Malleable iron castings

c. ASTM A27: Steel castings

d. ASTM A283, Grade D: Structural steel for grates and frames

e. ASTM A536, Grade 65-45-12: Ductile iron castings

f. ASTM A897:Austempered ductile iron castings

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

751-2.7 Steps. The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of bituminous paint, when directed.

751-2.8 Precast inlet structures. Manufactured in accordance with and conforming to ASTM C1433.

CONSTRUCTION METHODS

751-3.1 Unclassified excavation.

a. The Contractor shall excavate for structures and footings to the lines and grades or elevations, shown on the plans, or as staked by the Engineer. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the Engineer may direct, in writing, changes in dimensions or elevations of footings necessary for a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. Where concrete will rest on a surface other than rock, the bottom of the excavation shall not be disturb and excavation to final grade shall not be made until immediately before the concrete or reinforcing is placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. All bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall not disturb or damage finished masonry. The cost of removal shall be included in the unit price bid for the structure.

e. After excavation is completed for each structure, the Contractor shall notify the Engineer. No concrete or reinforcing steel shall be placed until the Engineer has approved the depth of the excavation and the character of the foundation material.

751-3.3 Concrete structures. Concrete structures shall be built on prepared foundations, conforming to the dimensions and shape indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the Engineer before the concrete is placed.

All invert channels shall be constructed and shaped accurately to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped to the outlet.

751-3.4 Precast concrete structures. Precast concrete structures shall conform to ASTM C478. Precast concrete structures shall be constructed on prepared or previously placed slab foundations conforming to the dimensions and locations shown on the plans. All precast concrete sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure. The top of the upper precast concrete section shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal steps that are embedded or built into the side walls shall be aligned and placed at vertical intervals of 12 inches. When a metal ladder replaces the steps, it shall be securely fastened into position.

751-3.6 Inlet and outlet pipes. Inlet and outlet pipes shall extend through the walls of the structures a sufficient distance beyond the outside surface to allow for connections. They shall be cut off flush with the wall on the inside surface of the structure, unless otherwise directed. For concrete or brick structures, mortar shall be placed around these pipes to form a tight, neat connection.

751-3.7 Placement and treatment of castings, frames, and fittings. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the Engineer, and shall be set true to line and elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

When frames or fittings are placed on previously constructed masonry, the bearing surface of the masonry shall be brought true to line and grade and shall present an even bearing surface so the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed by the Engineer. All units shall set firm and secure.

After the frames or fittings have been set in final position, the concrete or mortar shall be allowed to harden for seven (7) days before the grates or covers are placed and fastened down.

751-3.8 Installation of steps. The steps shall be installed as indicated on the plans or as directed by the Engineer. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is placed. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least seven (7) days. After seven (7) days, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete structures, they shall be cast into the side of the sections at the time the sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 inches.

Instead of steps, prefabricated ladders may be installed. For brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. For metal structures, the ladder shall be secured by welding the top support to the structure and grouting the bottom support into drilled holes in the foundation or as directed by the Engineer.

751-3.9 Backfilling.

a. After a structure has been completed, the area around it shall be backfilled with approved material, in horizontal layers not to exceed 8 inches in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited evenly around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Engineer.

b. Backfill shall not be placed against any structure until approved by the Engineer. For concrete structures, approval shall not be given until the concrete has been in place seven (7) days, or until tests establish that the concrete has attained sufficient strength to withstand any pressure created by the backfill and placing methods.

c. Backfill shall not be measured for direct payment. Performance of this work shall be considered an obligation of the Contractor covered under the contract unit price for the structure involved.

751-3.10 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as approved by the Engineer. The Contractor shall restore all disturbed areas to their original condition. The Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

METHOD OF MEASUREMENT

751-4.1 Manholes, catch basins, inlets, and inspection holes shall be measured by the unit.

BASIS OF PAYMENT

751-5.1 The accepted quantities of manholes, catch basins, inlets, and inspection holes will be paid for at the contract unit price per each in place when completed. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials; furnishing and installation of such specials and connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

Item D-751-**1**	**Type C Inlet** - per each
Item D-751-**2**	**Type 8 Manhole** - per each
Item D-751-**3**	**Mitered End Section** - per each
Item D-751-**4**	**2 feet x 2 feet Utility Box** - per each
Item D-751-**5**	**4 feet x 4 feet Utility Box** - per each
Item D-751-**6**	**Type F Inlet** - per each

MATERIAL REQUIREMENT

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C32	Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C478	Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
AASHTO M36	Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains

END OF ITEM D-751

Item T-904 Sodding

DESCRIPTION

904-1.1 This item shall consist of furnishing, hauling, and placing approved live sod on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

904-2.1 Sod. Sod furnished by the Contractor shall have a good cover of living or growing grass. This shall be interpreted to include grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials that might be detrimental to the development of the sod or to future maintenance. At least 70% of the plants in the cut sod shall be composed of the species stated in the special provisions, and any vegetation more than 6 inches in height shall be mowed to a height of 3 inches or less before sod is lifted. Sod, including the soil containing the roots and the plant growth showing above, shall be cut uniformly to a thickness not less than that stated in the special provisions.

904-2.3 Fertilizer. Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-soluble potash. They shall be applied at the rate and to the depth specified, and shall meet the requirements of applicable state laws. They shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers.

The fertilizers may be supplied in one of the following forms:

a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;

b. A finely-ground fertilizer soluble in water, suitable for application by power sprayers; or

c. A granular or pellet form suitable for application by blower equipment.

Fertilizers shall be **10-10-10** commercial fertilizer and shall be spread at the rate of **400 lbs per acre**.

904-2.4 Water. The water shall be sufficiently free from oil, acid, alkali, salt, or other harmful materials that would inhibit the growth of grass. It shall be subject to the approval of the Engineer prior to use.

904-2.5 Soil for repairs. The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the Engineer before being placed.

CONSTRUCTION METHODS

904-3.1 General. Areas to be solid, strip, or spot sodded shall be shown on the plans. Areas requiring special ground surface preparation such as tilling and those areas in a satisfactory condition that are to remain undisturbed shall also be shown on the plans.

Suitable equipment necessary for proper preparation of the ground surface and for the handling and placing of all required materials shall be on hand, in good condition, and shall be approved by the Engineer before the various operations are started. The Contractor shall demonstrate to the Engineer before starting the various operations that the application of required materials will be made at the specified rates.

904-3.2 Preparing the ground surface. After grading of areas has been completed and before applying fertilizer and limestone, areas to be sodded shall be raked or otherwise cleared of stones larger than 2 inches in any diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes occurs after grading of areas and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

904-3.3 Applying fertilizer and ground limestone. Following ground surface preparation, fertilizer shall be uniformly spread at a rate which will provide not less than the minimum quantity of each fertilizer ingredient, as stated in the special provisions. If use of ground limestone is required, it shall then be spread at a rate that will provide not less than the minimum quantity stated in the special provisions. These materials shall be incorporated into the soil to a depth of not less than 2 inches by discing, raking, or other suitable methods. Any stones larger than 2 inches in any diameter, large clods, roots, and other litter brought to the surface by this operation shall be removed.

904-3.4 Obtaining and delivering sod. After inspection and approval of the source of sod by the Engineer, the sod shall be cut with approved sod cutters to such a thickness that after it has been transported and placed on the prepared bed, but before it has been compacted, it shall have a uniform thickness of not less than 2 inches. Sod sections or strips shall be cut in uniform widths, not less than 10 inches, and in lengths of not less than 18 inches, but of such length as may be readily lifted without breaking, tearing, or loss of soil. Where strips are required, the sod must be rolled without damage with the grass folded inside. The Contractor may be required to mow high grass before cutting sod.

The sod shall be transplanted within 24 hours from the time it is stripped, unless circumstances beyond the Contractor's control make storing necessary. In such cases, sod shall be stacked, kept moist, and protected from exposure to the air and sun and shall be kept from freezing. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Where the soil is too dry, permission to cut sod may be granted only after it has been watered sufficiently to moisten the soil to the depth the sod is to be cut.

904-3.5 Laying sod. Sodding shall be performed only during the seasons when satisfactory results can be expected. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the Engineer, provided the sod bed is watered to moisten the soil to a depth of at least 4 inches immediately prior to laying the sod.

The sod shall be moist and shall be placed on a moist earth bed. Pitch forks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be carefully placed by hand, edge to

edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and ensure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod may be displaced during sodding operations, the workmen, when replacing it, shall work from ladders or treaded planks to prevent further displacement. Screened soil of good quality shall be used to fill all cracks between sods. The quantity of the fill soil shall not cause smothering of the grass. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately one inch below the pavement edge. Where the flow will be over the sodded areas and onto the paved surfaces around manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges.

On slopes steeper than one (1) vertical to 2-1/2 horizontal and in v-shaped or flat-bottom ditches or gutters, the sod shall be pegged with wooden pegs not less than 12 inches in length and have a cross-sectional area of not less than 3/4 sq inch. The pegs shall be driven flush with the surface of the sod.

904-3.6 Watering. Adequate water and watering equipment must be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. In all cases, watering shall be done in a manner that will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface.

904-3.7 Establishing turf.

a. General. The Contractor shall provide general care for the sodded areas as soon as the sod has been laid and shall continue until final inspection and acceptance of the work.

b. Protection. All sodded areas shall be protected against traffic or other use by warning signs or barricades approved by the Engineer.

c. Mowing. The Contractor shall mow the sodded areas with approved mowing equipment, depending upon climatic and growth conditions and the needs for mowing specific areas. In the event that weeds or other undesirable vegetation are permitted to grow to such an extent that, either cut or uncut, they threaten to smother the sodded species, they shall be mowed and the clippings raked and removed from the area.

904-3.8 Repairing. When the surface has become gullied or otherwise damaged during the period covered by this contract, the affected areas shall be repaired to re-establish the grade and the condition of the soil, as directed by the Engineer, and shall then be sodded as specified in paragraph 904-3.5.

METHOD OF MEASUREMENT

904-4.1 This item shall be measured on the basis of the area in square yards of the surface covered with sod and accepted.

BASIS OF PAYMENT

904-5.1 This item will be paid for on the basis of the contract unit price per square yard for sodding, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item T-904-1 Sodding - per square yard

MATERIAL REQUIREMENTS

ASTM C602 Standard Specification for Agricultural Liming Materials

END OF ITEM T-904

Item T-905 Topsoiling

DESCRIPTION

905-1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from areas to be stripped on the site or from approved sources off the site, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

905-2.1 Topsoil. Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches or more in diameter), and clay lumps or similar objects. Brush and other vegetation that will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sod and herbaceous growth such as grass and weeds are not to be removed, but shall be thoroughly broken up and intermixed with the soil during handling operations. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means, shall be removed. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the Association of Official Agricultural Chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). There shall be not less than 20% nor more than 80% of the material passing the 200 mesh sieve as determined by the wash test in accordance with ASTM C117.

Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

905-2.2 Inspection and tests. Within 10 days following acceptance of the bid, the Engineer shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected to determine if the selected soil meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in paragraph 905-2.1.

CONSTRUCTION METHODS

905-3.1 General.. **All areas under sodding locations shall be topsoiled** If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

Suitable equipment necessary for proper preparation and treatment of the ground surface, stripping of topsoil, and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the Engineer before the various operations are started.

905-3.2 Preparing the ground surface. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other means approved by the Engineer, to a minimum depth of 2 inches to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 inches in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and compacted condition to prevent the formation of low places or pockets where water will stand.

905-3.3 Obtaining topsoil. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the Engineer. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed.

When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the Engineer. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the Engineer. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoiling purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the Engineer. The Contractor shall notify the Engineer sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

905-3.4 Placing topsoil. The topsoil shall be evenly spread on the prepared areas to a uniform depth of inches after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

After spreading, any large, stiff clods and hard lumps shall be broken with a pulverizer or by other effective means, and all stones or rocks (2 inches or more in diameter), roots, litter, or any foreign matter shall be raked up and disposed of by the Contractor. after spreading is completed, the topsoil shall be satisfactorily compacted by rolling with a cultipacker or by other means approved by the Engineer. The compacted topsoil surface shall conform to the required lines, grades, and cross-sections. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed.

METHOD OF MEASUREMENT

905-4.1 Topsoil obtained on the site shall **not** be measured **separately**

BASIS OF PAYMENT

905-5.1 Payment **shall be incidental to the unit price of sod.**

TESTING MATERIALS

ASTM C117 Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing

END OF ITEM T-905

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Item X-1000-Oil/Water Separator

DESCRIPTION

1000-1.1 This item shall consist of furnishing, hauling, and constructing an oil/water separator in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

1000-2.1 Oil/Water Separator The materials shall include a XERXES 4' diameter – 1,000 gallon double wall oil/water separator with a prefabricated deadman or approved equal.

CONSTRUCTION METHODS

1000-3.1 Oil/water Separator Installation. Refer to XERXES Oil/Water Separator Operating & Maintenance Manual for installation of the oil/water separator.

1000-3.2 Oil/Water Separator Backfill Requirements. Refer to XERXES Primary Backfill Requirements for backfill required for the XERXES Oil/Water Separator.

1000-3.3 Oil/water Separator Deadman Installation. Refer to XERXES Prefabricated Deadmen Installation Instructions for installation instructions of the Oil/Water Separator Deadman.

METHOD OF MEASUREMENT

1000-4.1 This item shall be measured for the furnishing, hauling, and constructing a XERXES 4' diameter – 1,000 gallon double wall oil/water separator or approved equal. The Oil/Water Separator backfill and XERXES Prefabricated Deadman or approved equal shall be incidental to the XERXES Oil/Water Separator.

BASIS OF PAYMENT

1000-5.1 This item will be paid for on the basis of the contract unit price per each for **XERXES 4 foot diameter 1,000 gallon double wall oil/water separator or as approved equal**, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item X-1000-1 XERXES 4 foot diameter 1,000 gallon double wall oil/water separator or approved equal - per each

END OF ITEM X-1000

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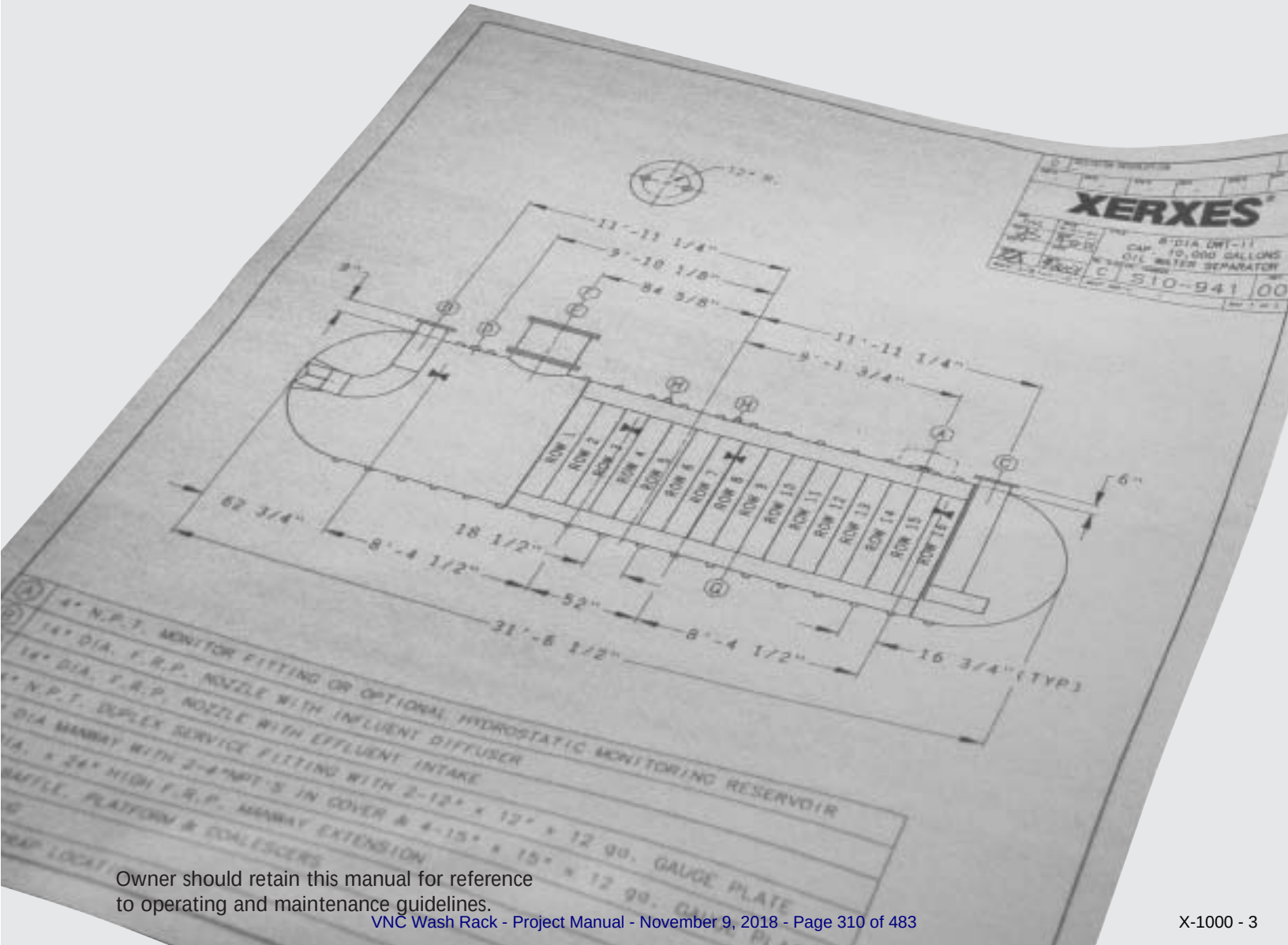
XERXES®
CORPORATION

Oil/Water Separator
Operating & Maintenance Manual

For Single-Wall and Double-Wall
Fiberglass Underground Storage Tanks



Owner should retain this manual for reference to operating and maintenance guidelines.

This Oil/Water Separator (OWS) Operating and Maintenance Manual gives instructions for single-wall and double-wall OWS applications. It must be used in combination with the Xerxes Installation Manual and Operating Guidelines for Single-Wall and Double-Wall Fiberglass Underground Storage Tanks.

TABLE OF CONTENTS

Read all instructions before installing oil/water separator (OWS).

To Installer:
Before OWS installation, read Xerxes OWS Operating and Maintenance Manual and Xerxes Installation Manual and Operating Guidelines for Single-Wall and Double-Wall Fiberglass Underground Storage Tanks. After OWS installation, give both manuals to OWS owner.

To Owner:
After OWS installation, retain Xerxes OWS Operating and Maintenance Manual and Xerxes Installation Manual and Operating Guidelines for Single-Wall and Double-Wall Fiberglass Underground Storage Tanks for future reference to operating and maintenance guidelines.

1. INTRODUCTION

1.1. SAFETY

1.1.1. Before beginning the oil/water separator (subsequently referred to as “OWS”) installation, read through the entire OWS Operating and Maintenance Manual (subsequently referred to as "OWS Manual") and the Xerxes Installation Manual and Operating Guidelines for Single-Wall and Double-Wall Fiberglass Underground Storage Tanks (subsequently referred to as "Installation Manual"). It is the responsibility of the owner, installer and operator to follow all requirements contained in this OWS Manual and the Installation Manual, and comply with all federal, state and local regulations that may apply to OWS installations, operations and maintenance.

1.1.2. No instructions or procedures presented in this OWS Manual and the Installation Manual should be interpreted so as to put at risk any person’s health or safety, or to harm any property or the environment.

1.1.3. The following definitions will serve as a guide when reading the OWS Manual:

⚠ WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

CAUTION

A Caution without the safety alert symbol indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

1.1.4. Keep this OWS Manual and the Installation Manual available at the installation site to refer to safety procedures as needed.

1.1.5. A Xerxes oil/water separator is a high-quality system for removing oil from water. It is comprised of a standard single-wall or double-wall tank that has been modified with piping and internal components to separate oil from water.

1.2. GENERAL

1.2.1. It is important to follow the procedures and instructions in both this OWS Manual and the Installation Manual in order to safely and properly install, operate and maintain a Xerxes oil/water separator and accessories. Failure to follow these instructions will void the OWS warranty, and may cause OWS failure, serious personal injury or property damage.

1.2.2. The Xerxes warranty applies only to an OWS installed according to the instructions contained in this OWS Manual and the Installation Manual. Since Xerxes does not control the parameters of any installation, Xerxes’ sole responsibility in any installation is that presented in our warranty.

1.2.3. It is the responsibility of the owner and operator to always follow the operating and maintenance guidelines set forth in Xerxes’ applicable warranty and SECTION 18 of the Installation Manual. A Xerxes warranty is found in the product brochure or is available upon request from the UST coordinator at the Xerxes plant nearest you. It is the responsibility of the owner to retain this OWS Manual and the Installation Manual for future reference to operating and maintenance guidelines.

1.2.4. Use the Tank Installation Checklist (included in the Installation Manual) as the installation proceeds. Retain a copy of the completed Tank Installation Checklist, and any correspondence, certification, etc., related to the OWS. Each OWS requires a separate Tank Installation Checklist. Consult your Xerxes representative or distributor if additional Tank Installation Checklist forms are needed.

1.2.5. The OWS owner should retain a copy of the Tank Installation Checklist to facilitate any warranty claim. Xerxes recommends that the installing contractor also retain a copy.

1.2.6. For additional information, contact your state, county and city authorities, including health, fire or building departments, and environmental agencies. All work must be performed according to standard industry practices and OSHA regulations.

1.2.7. Comply with all applicable regulations and standards regarding the disposal of separated oil and solids.

1.2.8. Federal, state and local codes and regulations always take precedence over a Xerxes requirement.

1.2.9. Xerxes must authorize – in writing and prior to OWS installation – any variation to, or deviation from, these OWS Manual instructions.

1.2.10. All correspondence regarding variations must be retained.

1.2.11. If you have questions or encounter situations not covered in this OWS Manual or the Installation Manual, contact technical support at Xerxes Minneapolis, 952-887-1890.

1.3. DEFINITIONS

1.3.1. For terms related to the Xerxes OWS, see FIGURE 1-1 (for 4-foot-diameter OWS), FIGURE 1-2 (for 6-foot-diameter OWS) and FIGURE 1-3 (for 8-foot-diameter OWS and 10-foot-diameter OWS). These drawings are for purposes of terminology only.

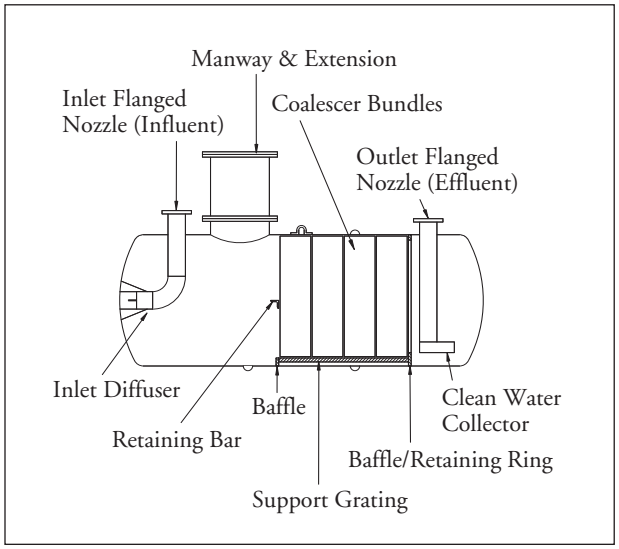


FIGURE 1-1

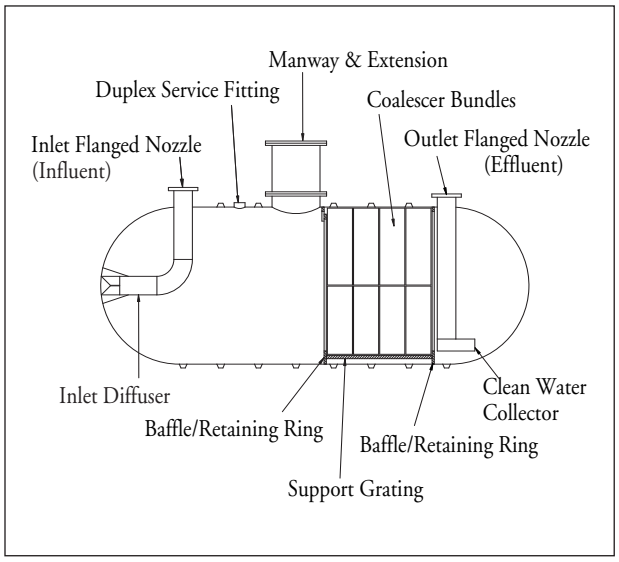


FIGURE 1-2

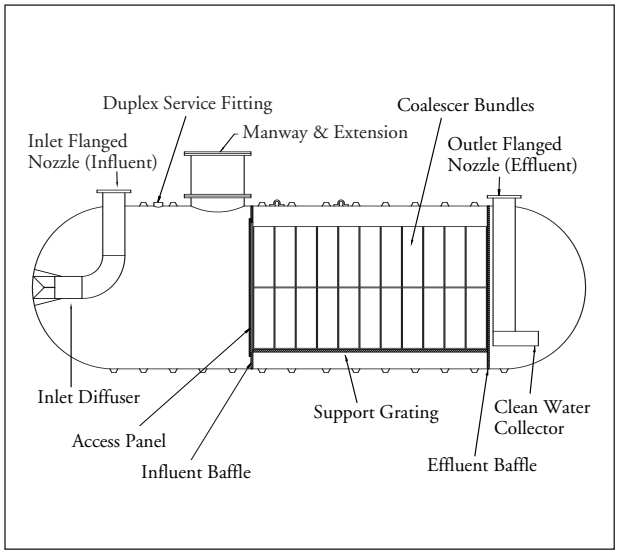


FIGURE 1-3

1.3.2. Nominal oil storage is defined as the maximum amount of oil the Xerxes OWS can store (recover) while maintaining the performance specifications for which the OWS was designed.

1.3.3. Emergency spill capacity is defined as the maximum amount of oil the Xerxes OWS can store (capture) in an emergency spill situation. This capacity includes the nominal oil storage in the OWS at the time of the spill. Exceeding this capacity may lead to a sudden oil release.

Note: If the nominal oil storage capacity is exceeded (which can occur in emergency spill situations) in high-flow conditions, the effluent quality may not meet Xerxes' performance specifications.

2. PREPARATION FOR INSTALLATION

2.1. GENERAL

2.1.1. Although Xerxes oil/water separators are rugged, the OWS owner and/or tank owner's representative must take care so that the OWS is not dropped or damaged during delivery, unloading and handling on the job site.

2.1.2. See Installation Manual for specific instructions on unloading and handling the OWS on the job site.

2.1.3. See Installation Manual for specific instructions on inspecting the OWS prior to installation.

2.1.4. In addition, remove the manway cover and inspect baffles, coalescer and internal piping for damage.

3. PREINSTALLATION TESTING

3.1. GENERAL

3.1.1. See Installation Manual for instructions on testing the OWS tank on the job site.

4. BACKFILL MATERIAL

4.1. GENERAL
4.1.1. See Installation Manual for backfill instructions.

4.1.2. In addition, avoid freeze damage to the OWS by installing the OWS so that the highest liquid level (most frequently, the height of the inlet and outlet tee/elbow) is below the frost line, and/or by installing a temperature-activated heating device (with appropriate overheat prevention) at the highest liquid-level point.

⚠ CAUTION

Do not exceed 120˚F temperature in the OWS or its contents. Excessive heat in the OWS may result in minor or moderate injury, or in failure of or damage to the OWS.

5. EXCAVATION PARAMETERS

5.1. GENERAL
5.1.1. See Installation Manual for excavation instructions.

6. ANCHORING TANKS

6.1. GENERAL
6.1.1. See Installation Manual for anchoring instructions.

7. INSTALLATION

7.1. GENERAL
7.1.1. See Installation Manual for installation instructions.

7.1.2. In addition, install the OWS in one of the following positions: a.) in a level and plumb position, or b.) with the outlet side 1/2 inch to 1 inch lower than the inlet side.

7.1.3. The OWS is designed to be gravity-fed. If an installation requires a lift station, the lift station should be located downstream of the OWS.

8. PIPING

8.1. GENERAL
8.1.1. See Installation Manual for piping instructions.

8.1.2. In addition, follow these instructions:

8.1.2.1. All piping must be properly sized and influent piping must be gravity-fed.

CAUTION

Turbulence caused by improperly sized piping or pumping influent into the OWS may damage the OWS, reduce its efficiency or require flow conditioners to augment the system.

8.1.2.2. Make sure the diameters of the inlet piping and the outlet piping are no larger than the diameters of the inlet nozzle and the outlet nozzle.

8.1.2.3. Install expansion joints or loops on any inlet or outlet tee/elbow connections.

CAUTION

All connections to the OWS must be flexible. Provisions must be made to accommodate movement and misalignment between the piping and the OWS. Failure to do this may damage the tank or surrounding property.

8.1.2.4. Slope the inlet piping to the OWS downward to establish a proper gravity flow.

8.1.2.5. Slope the outlet piping away from the OWS according to job specifications (typically between 1/16 inch and 1/4 inch per foot) to establish a proper gravity flow.

8.1.2.6. Xerxes recommends installing a dropout box large enough to collect debris (such as leaves, gravel, sand, rags, etc.) upstream of the OWS.

8.1.2.7. A butterfly or gate valve can be installed upstream of the inlet tee/elbow connection.

8.1.2.8. An outlet butterfly or gate valve can be installed downstream of the outlet tee/elbow connection.

8.1.2.9. Make sure inlet valves have no valve seat or reductions and are the same size as the piping.

8.1.2.10. To prevent debris from entering the OWS, plug the inlet piping and outlet piping until the drainage site is paved and the dropout box (if present) is installed.

8.1.2.11. If installed, keep the inlet valves completely open during normal operation to prevent flow turbulence.

9. VENTING

9.1. GENERAL
9.1.1. See Installation Manual for venting instructions.

9.1.2. In addition, follow these instructions:

9.1.2.1. Vent the OWS to atmospheric pressure to ensure proper operation.

9.1.2.2. Vent the OWS inlet and outlet piping to atmospheric pressure to ensure proper operation.

9.1.2.3. For instructions on venting an interstitial space (applicable in a double-wall OWS), see the section in Installation Manual on Venting Interstitial Space.

9.1.2.4. Provide flame arrestors when required by regulations and standards, and when appropriate for safety reasons.

10. POSTINSTALLATION TESTING

10.1. GENERAL
10.1.1. Perform any postinstallation testing required by the Installation Manual and by local codes.

11. FILLING THE OWS

11.1. GENERAL
11.1.1. Open the OWS inlet and outlet valves if present.

11.1.2. Fill the OWS through the manway or stormwater inlet piping.

11.1.3. Place the fill hose through the fitting and secure it so it does not spray directly on the coalescer.

11.1.4. Fill the OWS at least half-full with clean water using a garden hose, fire hose or tanker truck.

11.1.5. If probes are present, Xerxes recommends that the OWS be filled completely to check probe operation during a startup.

⚠ WARNING

The OWS shall be adequately vented to prevent the development of vacuum or pressure when filling or emptying the tank. Failure to properly vent the OWS could cause tank failure and result in death or serious injury.

12. CONNECTING OWS TO SENSOR (FOR UL 2215 OWS)

12.1. GENERAL
12.1.1. Connect the LS800 sensor to the appropriate panel wiring on the LU2-OWP controller.

12.1.2. Switch on the panel of the LU2-OWP controller.

12.1.3. Check the connection between the sensor and the controller by following this procedure:

12.1.3.1. Keeping the top interface float in its top position, move the bottom interface float up and down on the sensor stem. The high-oil-level alarm light will activate as the bottom float approaches the stem bottom.

12.1.3.2. Move the top interface float up and down. The caution-oil-level alarm light will activate as the top interface float moves off the upper stop.

12.1.3.3. If the alarm lights do not activate and deactivate, check the panel and sensor wiring for proper connections. If the connections appear to be in proper condition but the panel alarm lights do not operate, contact technical support at sensor manufacturer.

12.1.3.4. The caution-oil-level and high-oil-level alarm lights will be activated whenever the OWS is being filled with water, before the water reaches the sensor. If the connections appear to be in proper condition but the panel alarm lights do not operate, contact technical support at sensor manufacturer.

13. OPERATING THE OWS

13.1. GENERAL
13.1.1. Operating the OWS as specified in this OWS Manual increases the efficiency and effectiveness of the OWS.

13.1.2. Take ordinary fire prevention measures around separated oil to ensure that all flames, sparks, and other ignition devices and materials are kept away from the OWS.

⚠ WARNING

Safeguard against sparks or fire in the vicinity of the OWS. Vapors and liquid oil may be flammable and cause a fire or explosion, which could cause death, serious injury or property damage.

13.1.3. The oil/water interface is the point at which oil is detected above the water. Oil will be floating on the water. The accumulated oil should be pumped out of the OWS if the oil/water interface is below the levels listed in TABLE 13-1. (See page 11 of this OWS Manual.)

13.1.3.1. The nominal oil storage capacity shown in TABLE 13-1 does not include oil that may accumulate within the manways or fittings. Add the amount in the manways and/or fittings to the figure listed as the nominal oil storage capacity when you calculate oil storage capacity.

CAUTION

If the oil is not pumped out after reaching the level indicated in TABLE 13-1, and more oily water enters the OWS, the effluent oil concentration may exceed allowable levels. Exceeding the nominal oil storage level may result in environmental contamination, property damage, damage to the OWS or loss of efficiency of the OWS.

13.1.4. Check oil level after every rainstorm or in accordance with local codes.

13.1.5. Dispose of oil from the OWS as required by federal, state and local regulations and codes.

CAUTION

Do not collect “waste” oils in the OWS as they may contain chemicals that may damage the OWS, piping and internal components.

13.2. REMOVING OIL
13.2.1. Remove oil only during non-flow conditions so that only oil is drawn off.

13.2.2. Remove the oil before the oil accumulates to the level given in TABLE 13-1. (See page 11 of this OWS Manual.)

13.2.3. To determine oil level in a non-alarm situation, use the following procedure:

13.2.3.1. Apply oil/water sensing paste to a gauge stick.

13.2.3.2. Insert the gauge stick into the OWS through the 4-inch fitting or manway to determine the oil/water interface location.

13.2.3.3. If the oil/water interface level is below the level specified for each OWS model in TABLE 13-1, pump out oil.

13.2.4. To remove oil if the optional alarm is activated follow this procedure:

13.2.4.1. If the oil/water interface level is below the level specified for each OWS model in TABLE 13-1, pump out oil.

13.2.4.2. The optional alarm may stay on until the water level in the OWS is high enough to deactivate it.

13.2.5. After pumping out oil, charge the OWS with clean water to deactivate the alarm lights by following instructions in SECTION 11 or wait until the next rainfall, which should deactivate the alarm lights.

14. MAINTAINING THE OWS

14.1. GENERAL

14.1.1. The OWS requires regular maintenance, including the following cleaning and inspection procedures, to operate most efficiently and effectively.

⚠ WARNING

Never enter the OWS, the riser, the manway extension or any other enclosed space without proper training and OSHA-approved equipment. See OSHA guidelines 29 CFR, Part 1910 "Permit Required Confined Spaces." Failure to follow this warning could result in death or serious injury.

⚠ WARNING

Ventilate all enclosed spaces according to methods described in applicable regulations and codes before entering an OWS to avoid asphyxiation or ignition of vapors or liquid oil, which are flammable. Failure to properly ventilate could result in death or serious injury.

⚠ WARNING

OWS interior surfaces are slippery. A slip or fall could result in death or serious injury.

14.1.2. Perform maintenance at least once a year.

14.1.3. Under the following conditions, maintenance is required more frequently:

- if the OWS bottom sludge accumulation is more than 12 inches deep;
- when the effluent water exceeds the effluent quality level mandated by applicable federal, state and local codes and regulations;
- after a major oil spill has occurred (See SECTION 16.).

14.2. CLEANING THE OWS

14.2.1. Begin maintenance by cleaning the OWS, using the following procedure:

14.2.1.1. Remove all liquid from the OWS before entering the OWS.

CAUTION

Properly dispose of oil removed from the OWS as required by federal, state and local laws, codes and regulations.

14.2.1.2. Close inlet and outlet piping valves if present or plug the piping before entering the OWS.

⚠ WARNING

Failure to close inlet and outlet piping valves or plug the piping before entering the OWS could result in death or serious injury.

14.2.1.3. Remove the coalescer for cleaning. (See SECTION 15 for instructions.)

⚠ WARNING

Do not stand on the coalescer support grating. This grating is slippery and a slip or fall could result in death or serious injury.

14.2.1.4. Suction or shovel out sludge and debris from the OWS.

CAUTION

Do not use picks, axes, hammers or other heavy tools or objects when breaking apart sludge in the OWS. Such tools may damage the OWS.

CAUTION

When using a shovel to remove sludge, do not strike the OWS. Striking the OWS may damage it.

14.2.1.5. Loosen any caked oily solids in the OWS by spraying with a standard garden hose (with or without a spray nozzle) at a pressure between 40 and 70 psig.

14.2.1.6. Use hot water for best results. Do not use detergent or soap.

CAUTION

Do not use soaps or detergents when cleaning the coalescers. Soaps or detergents may damage the coalescers and/or reduce the efficiency of the OWS.

14.2.1.7. Aim the flow of water at the OWS walls — top, sides and bottom.

14.2.1.8. Shovel out the slurry, being careful not to damage the OWS.

14.2.1.9. Check the oil/water sensor (if installed) for movement.

14.2.1.10. Remove and clean the sensor if the floats do not easily slide on the stem or if there is sludge on the floats.

14.2.1.11. Visually inspect the OWS interior (walls, components and inlet piping) for damage. If you observe any damage, contact the Xerxes manufacturing facility from which the OWS was shipped. (See telephone numbers on back of OWS Manual.)

14.2.1.12. Install the cleaned coalescer packs, support grating and retaining pieces by reversing the steps as shown in SECTION 15.

14.2.1.13. If the coalescer packs are not properly installed, the OWS will not work properly or efficiently.

CAUTION

Check to see that the coalescer packs, support grating and retaining pieces are reinstalled properly. Improper installation may result in damage to the OWS and/or reduce its efficiency.

14.2.1.14. Attach the manway lid.

14.2.1.15. Check to see that the gaskets are not damaged.

14.2.1.16. Replace gaskets as necessary.

14.2.1.17. Charge the OWS by filling it half-full with clean water. (See SECTION 11 for instructions.)

14.2.1.18. Restart the OWS. (See SECTION 11 for instructions.)

14.3. OPTIONAL PROCESS FOR CLEANING THE OWS
14.3.1. If it has been less than one year since the last OWS cleaning, and if only the bottom sludge has built up and the effluent water is contaminant-free, the following procedure may be sufficient for proper maintenance:

14.3.1.1. Pump out sludge from inlet chamber.

14.3.1.2. Pump out sludge from under the vertical-tube coalescer packs.

14.3.1.3. Charge the OWS by filling it half-full with clean water. (See SECTION 11 in this OWS Manual.)

14.4. INSPECTING THE OWS
14.4.1. Continue maintenance by performing the following inspections as usage and environment requires:

14.4.1.1. Inspect and clean the dropout boxes.

14.4.1.2. Inspect the inside of the OWS for sand, trash, sludge and oil build-up.

14.4.1.3. Inspect effluent water for oils or other contaminants during or immediately after a heavy rainfall.

14.4.1.4. Inspect gaskets when the OWS is shut down for maintenance.

15. REMOVING AND CLEANING THE COALESCER

CAUTION

Keep coalescers covered or out of contact with ultraviolet light. Ultraviolet light from sunshine may damage the coalescer and/or reduce the efficiency of the OWS.

15.1. REMOVING AND CLEANING 4-FOOT-DIAMETER OWS COALESCER
15.1.1. To remove a coalescer in a 4-foot-diameter OWS, follow this procedure (See FIGURE 15-1 and FIGURE 15-2.):

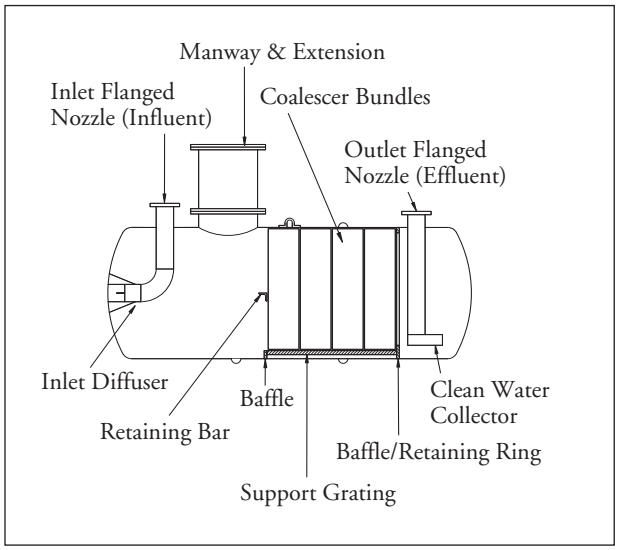


FIGURE 15-1

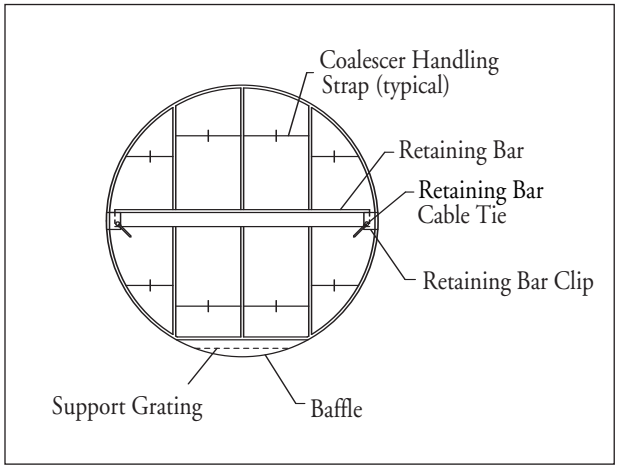


FIGURE 15-2

⚠ WARNING

Never enter the OWS, the riser, the manway extension or any other enclosed space without proper training and OSHA-approved equipment. See OSHA guidelines 29 CFR, Part 1910 "Permit Required Confined Spaces." Failure to follow this warning could result in death or serious injury.

15.1.1.1. From inside the OWS, lift up on the retaining bar to clear the clips and remove the bar.

15.1.1.2. Take hold of the coalescer handling straps on one of the center coalescer bundles and tilt the top of the bundle towards you.

15.1.1.3. Pull the bundle out of the pack and lift it through the manway.

15.1.1.4. Repeat Points 15.1.1.2. and 15.1.1.3. to remove the other center bundle.

15.1.1.5. Then, one at a time, slide each remaining bundle towards the center of the OWS.

15.1.1.6. Using the coalescer handling straps, lift each bundle through the manway, lifting high enough to clear the baffle.

15.1.1.7. Then, after that row is completely removed, remove the coalescer support grating section.

15.1.1.8. Depending on the OWS model, there can be several rows of bundles for each OWS. Repeat Points 15.1.1.2. through 15.1.1.7. until all bundles and support grating sections are removed.

⚠ CAUTION

Always remove coalescer packs using the handling straps. Never pull coalescer packs by individual tubes. Pulling coalescer packs by individual tubes may damage the coalescer packs and/or reduce the efficiency of the OWS.

15.2. REMOVING AND CLEANING 6-FOOT-DIAMETER OWS COALESCER

15.2.1. To remove a coalescer in a 6-foot-diameter OWS, follow this procedure (See FIGURE 15-3 and FIGURE 15-4.):

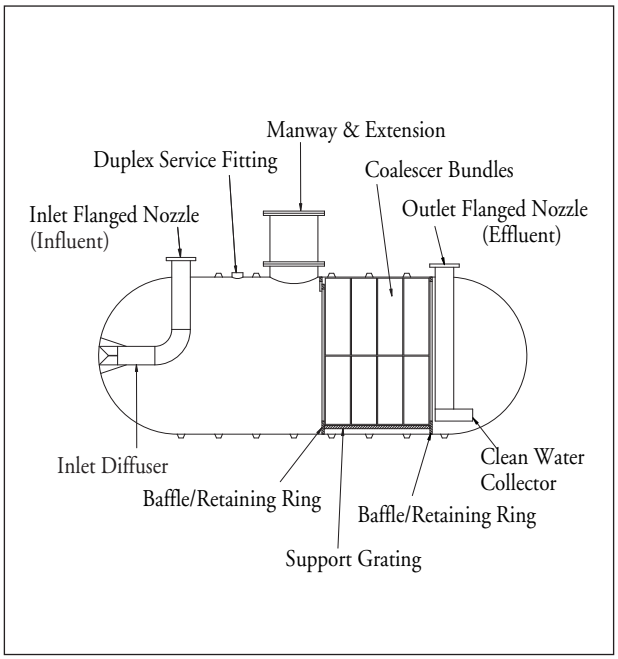


FIGURE 15-3

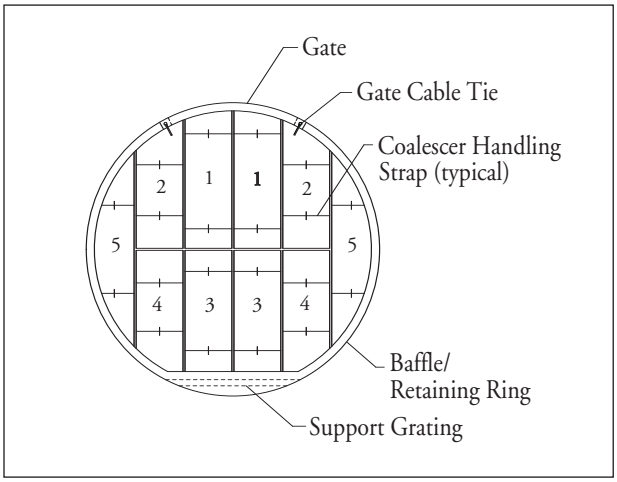


FIGURE 15-4

⚠ WARNING

Never enter the OWS, the riser, the manway extension or any other enclosed space without proper training and OSHA-approved equipment. See OSHA guidelines 29 CFR, Part 1910 "Permit Required Confined Spaces." Failure to follow this warning could result in death or serious injury.

15.2.1.1. From inside the OWS, remove the gate cable ties at the top of the retaining ring.

15.2.1.2. Remove the gate at the top of the OWS.

15.2.1.3. Take hold of the coalescer handling straps of one of the center coalescer bundles and pull it toward you.

15.2.1.4. Pull the bundle out of the pack and lift it through the manway.

15.2.1.5. Repeat Points 15.2.1.3. and 15.2.1.4. to remove the other center bundle.

15.2.1.6. Then, one at a time, slide each remaining bundle towards the center of the OWS.

15.2.1.7. Using the coalescer handling straps, lift each bundle through the manway, lifting high enough to clear the baffle.

15.2.1.8. Then, after that row is completely removed, remove the coalescer support grating section.

15.2.1.9. Depending on the OWS model, there can be up to five rows of bundles for each OWS. Repeat Points 15.2.1.3. through 15.2.1.8. until all bundles and support grating sections are removed.

15.3. REMOVING AND CLEANING 8-FOOT-DIAMETER OWS COALESCER AND 10-FOOT-DIAMETER OWS COALESCER

15.3.1. To remove a coalescer in an 8-foot- and 10-foot-diameter OWS, follow this procedure (See FIGURE 15-5 and FIGURE 15-6.):

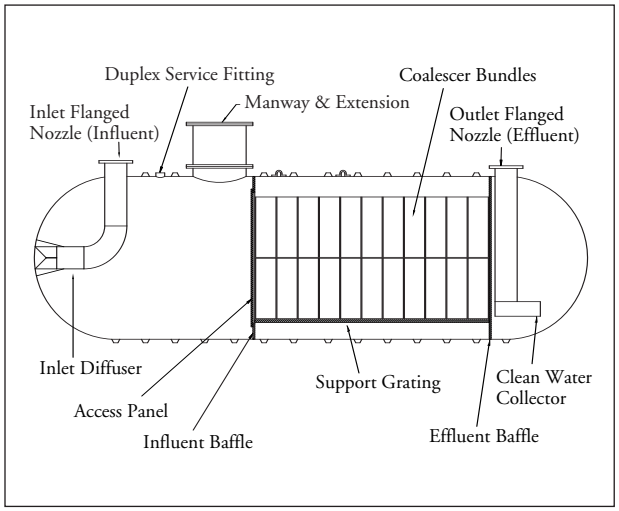


FIGURE 15-5

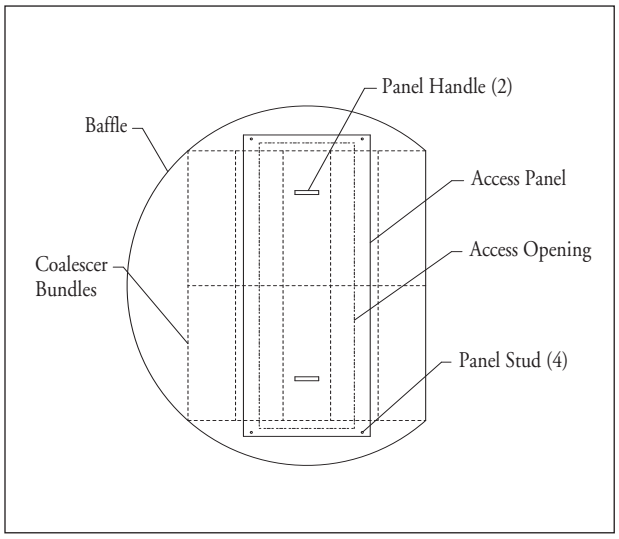


FIGURE 15-6

⚠ WARNING

Never enter the OWS, the riser, the manway extension or any other enclosed space without proper training and OSHA-approved equipment. See OSHA guidelines 29 CFR, Part 1910 "Permit Required Confined Spaces." Failure to follow this warning could result in death or serious injury.

15.3.1.1. From inside the OWS, remove the 4 retaining clips from the panel studs.

15.3.1.2. Remove the panel door.

15.3.1.3. Take hold of the coalescer handling straps of one center coalescer bundle and tilt the top toward the door.

15.3.1.4. Pull the bundle out of the pack and lift it through the manway.

15.3.1.5. Then, after each bundle is removed, remove the coalescer support grating section.

15.3.1.6. Depending on the OWS model, there can be several bundles for each OWS. Repeat Points 15.3.1.3. through 15.3.1.5. until all bundles and support grating sections are removed.

15.4. CLEANING THE COALESCER PACK

15.4.1. Use the following procedure to clean the coalescer pack:

15.4.1.1. Clean the coalescer pack in an area where the runoff from cleaning can be controlled.

⚠ WARNING

Discharge from cleaning the coalescers may have high concentrations of oil and other contaminates. Contact with skin or breathing in vapors could result in death or serious injury.

15.4.1.2. Dispose of oil from the OWS as required by federal, state and local regulations and codes.

15.4.1.3. Remove any large foreign objects stuck to the coalescer packs.

15.4.1.4. Wash the coalescer packs with a hose or pressure washer to remove accumulated oil and grit.

CAUTION

Do not use soaps or detergents when cleaning the coalescers. Soaps or detergents may damage the coalescers and/or reduce the efficiency of the OWS.

15.4.1.5. Remove the sludge from under the coalescer support grating in the coalescing chamber.

⚠ WARNING

OWS interior surfaces are slippery. A slip or fall could result in death or serious injury.

15.4.1.6. Replace the support grating, coalescer packs and retaining pieces. (When replacing the coalescer packs in the 6-foot-diameter OWS, use the numbers in FIGURE 15-4 as a guide for replacing same-size packs simultaneously.)

CAUTION

If the oil is not pumped out after reaching the level indicated in TABLE 13-1, and more oily water enters the OWS, the effluent oil concentration may exceed allowable levels. Excessive effluent oil concentration may damage and/or reduce the efficiency of the OWS.

16. HANDLING A MAJOR OIL SPILL

16.1. GENERAL

16.1.1. When the oil exceeds the nominal oil storage capacity of the OWS because of a spill, it may be considered a major oil spill. Take the following actions:

16.1.1.1. Notify the authorities required by applicable federal, state and local regulations and codes.

16.1.1.2. Pump out the oil in the OWS by following instructions in SECTION 13.

16.1.1.3. Charge the OWS with clean water.

16.1.1.4. Wait one hour for possible oil-level build-up that may release from the coalescer.

16.1.1.5. Check oil level again.

16.1.2. Repeat Points 16.1.1.2. and 16.1.1.3. if necessary to make sure all oil is removed from the OWS.

17. OPERATING GUIDELINES

17.1. GENERAL
17.1.1. See this manual and the Installation Manual for operating guidelines.

18. LIMITED WARRANTIES

18.1. GENERAL
18.1.1. Each product is covered by a product-specific limited warranty, which contain operating guidelines and parameters that should be reviewed as applicable. Copies of the limited warranties are found in Xerxes' product brochures and are available upon request from the UST coordinator at the plant nearest you.

19. SELECTED LIST OF SUPPLEMENTAL MATERIALS

19.1. GENERAL
19.1.1. See Installation Manual for list of supplemental materials.

20. RETAINING THE OWS MANUAL

20.1. GENERAL
20.1.1. After installation, tank installer must give OWS Manual and Installation Manual to OWS owner and operator.

20.1.2. After installation, tank owner must retain OWS Manual and Installation Manual for future reference to operating and maintenance guidelines.

Table 13-1
OWS Nominal Oil Storage Capacity and Oil/Water Interface Levels

Nominal OWS Diameter (Feet)	Nominal OWS Capacity (Gallons)	Nominal Oil Storage Capacity (Gallons)	Oil Interface Level	
			Height from Bottom of OWS for Dipstick Monitoring	Depth from Top of OWS
4	600 SW	60	40"	7-3/4"
	700 DW	70	40"	7-3/4"
	1,000 SW/DW	103	40"	7-3/4"
6	2,000 SW	206	59-3/4"	11-3/8"
	3,000 DW	275	58-7/8"	11-3/8"
	4,000 SW	396	59-3/4"	11-3/8"
	4,000 DW	367	58-7/8"	11-3/8"
	6,000 SW	556	59-3/4"	11-3/8"
	6,000 DW	580	58-7/8"	11-3/8"
8	6,000 SW	584	76-1/4"	14-3/4"
	6,000 DW	576	75-1/2"	14-3/4"
	8,000 SW	774	76-1/4"	14-3/4"
	8,000 DW	771	75-1/2"	14-3/4"
	10,000 SW	970	76-1/4"	14-3/4"
	10,000 DW	966	75-1/2"	14-3/4
	12,000 SW	1,166	76-1/4"	14-3/4"
	12,000 DW	1,161	75-1/2"	14-3/4"
10	12,000 SW	1,140	100"	19-3/8"
	12,000 DW	1,135	98-3/4"	19-3/8"
	15,000 SW	1,475	100"	19-3/8"
	15,000 DW	1,469	98-3/4"	19-3/8"
	20,000 SW	1,981	100"	19-3/8"
	20,000 DW	1,972	98-3/4"	19-3/8"
	25,000 SW	2,584	100"	19-3/8"
	25,000 DW	2,573	98-3/4"	19-3/8"
	30,000 SW	3,090	100"	19-3/8"
	30,000 DW	3,076	98-3/4"	19-3/8"

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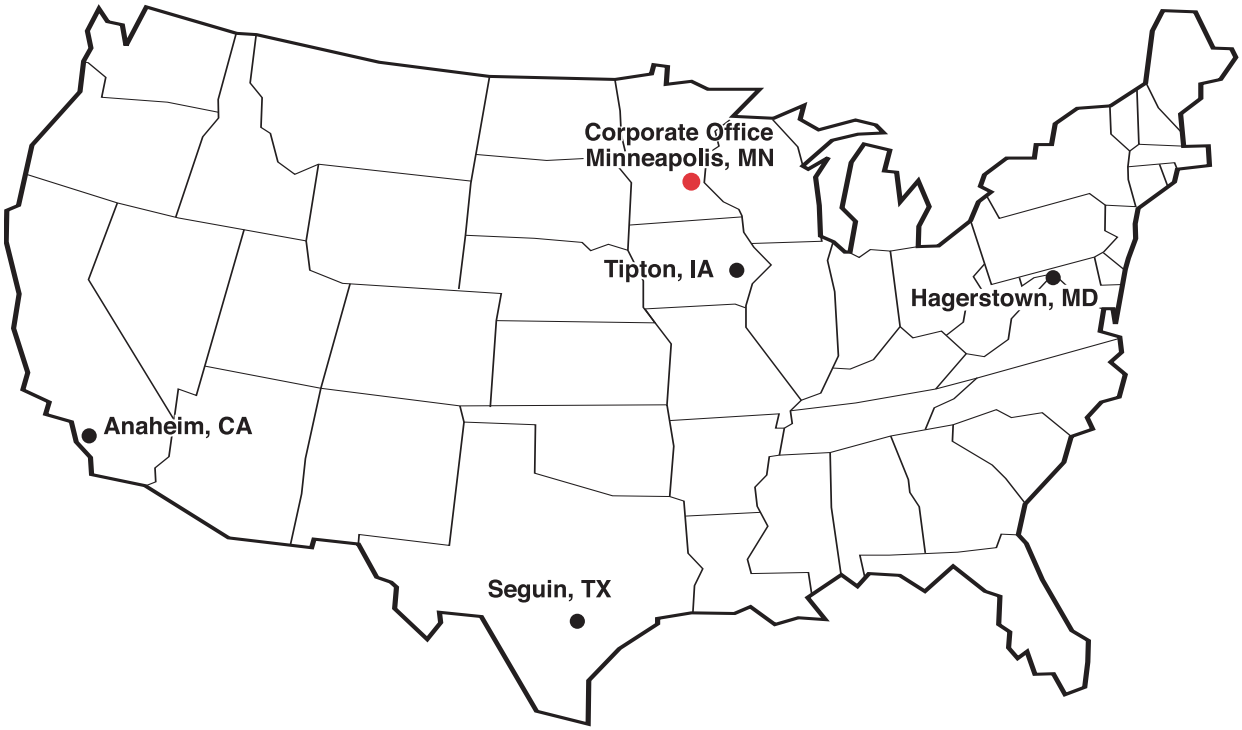

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Fax: (301) 223-6836

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Fax: (830) 372-0321

Tipton, Iowa
Phone: (563) 886-6172
Fax: (563) 886-2042

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Xerxes Primary Backfill Requirements
Appendix B from Xerxes IMOG

B1.GENERAL

B1.1. The backfill material surrounding an underground storage tank (UST) is a critical part of a proper tank installation. This document gives guidelines for choosing the primary backfill material to use when installing Xerxes fiberglass tanks.

B1.2. The Xerxes Installation Manual specifies that select rounded stones or crushed stones are to be used as primary backfill material.

B1.3. Primary backfill material is to be clean, free-flowing, and free of dirt, sand, large rocks, roots, organic materials, debris, ice and snow.

B1.4. No backfill material shall be frozen or contain lumps of frozen material at any time during placement.

B1.5. Another important characteristic of good backfill material is hardness or stability when exposed to water or loads. Most materials have no problems meeting the hardness requirement.

B1.5.1. Materials like soft limestone, sandstone, sea shells or shale should not be used as backfill because they break down over time.

B2. ACCEPTABLE BACKFILL MATERIALS

B2.1. Coarse aggregate is a technical term for the material (rounded stones and crushed stones) that meets Xerxes' backfill size requirements.

B2.2. ASTM International and The American Association of State Highway and Transportation Officials (AASHTO) have specifications for standard sizes of coarse aggregate.

B2.3. TABLE B1-1 gives the standard sizes of coarse aggregate that meet Xerxes' backfill material specifications for rounded stones and crushed stones. It identifies standard sieve sizes used to grade aggregate material. For each aggregate size, the amount of material finer than each laboratory sieve (square openings) is given as a percentage of the total weight of the sample.

NOTE: ASTM uses size numbers 6, 67, 7 and 8 to describe specific gradation profiles for materials that pass through a series of sieves. Do not confuse these gradation profiles with sieve sizes.

B2.3.1. The percentages give an indication of the particle size distribution or gradation within a given aggregate size. With aggregate size number 6 of rounded stones, for example, 20–55 percent of the sample (measured by weight) should pass through a 1/2-inch sieve. And, with aggregate size number 7 of crushed stones, 0–15 percent of the sample (measured by weight) should pass through a No. 4 sieve.

B2.4. Some material suppliers may produce materials that meet Xerxes' requirements but are not identified by a standard coarse aggregate size number. The supplier should be able to provide a specification that identifies the size or gradation of the material.

B2.4.1. If the material supplier is unable to supply a gradation report, an independent testing laboratory can perform a sieve analysis on a sample of the material according to the ASTM C 136 testing specifications. The test results can then be compared against the size requirements for rounded or crushed stones shown in table B1-1.

B3. ROUNDED STONES

B3.1. When using select rounded stones, the material is to be a mix of rounded particles, sizes between 1/8 inch and 3/4 inch.

B3.2. The rounded stones must conform to the specifications of ASTM C 33, sizes 6, 67 or 7.

B3.3. No more than 5 percent (by weight) of the backfill may pass through a #8 sieve. See TABLE B1-1 for additional information about specifications.

NOTE: Generally, rounded stones that meet the gradation requirements are larger than allowable crushed stones.

B4. CRUSHED STONES

B4.1. When using crushed stones, the material is to be a mix of angular particles, sizes between 1/8 inch and 1/2 inch.

B4.2. The crushed stones must conform to the specifications of ASTM C 33, sizes 7 or 8.

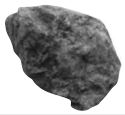
B4.3. No more than 5 percent (by weight) of the backfill may pass through a #8 sieve. See TABLE B1-1 for additional information about specifications.

TABLE B1-1 - Percent of Stones Passing Through Sieve by Sieve Size

Rounded Stones

ASTM C 33 Size #	#6 Stone	$67 Stone	#7 Stone
1 inch (25 mm)	100%	100%	- - -
3/4 inch (19 mm)	90 - 100%	90 - 100%	100%
1/2 inch (12.5 mm)	10 - 55%	- - -	90 - 100%
3/8 inch (9.5 mm)	0 - 15%	20 - 55%	40 - 70%
No. 4 .0187 inch (4.75 mm)	0 - 5%	0 - 10%	0 - 15%
No. 8 .094 inch (2.36 mm)	- - -	0-5%	0 - 5%

Crushed Stone



ASTM C 33 Size #	#7 Stone	$8 Stone
1 inch (25 mm)	- - -	- - -
3/4 inch (19 mm)	100%	- - -
1/2 inch (12.5 mm)	90 - 100%	100%
3/8 inch (9.5 mm)	40 - 70%	85 - 100%
No. 4 .0187 inch (4.75 mm)	0 - 15%	10 - 30%
No. 8 .094 inch (2.36 mm)	0 - 5%	0 - 10%

Prefabricated Deadmen Installation Instructions

For Fiberglass Underground Storage Tanks and Oil/Water Separators

1. GENERAL

1.1. These instructions supplement the Anchoring Tanks section of the Xerxes Installation Manual and Operating Guidelines (subsequently referred to as "Installation Manual"). They apply to pre-engineered, prefabricated deadmen supplied by Xerxes.

1.2. It is important to follow the procedures and instructions in the Installation Manual in order to safely and properly install a Xerxes underground storage tank and accessories. Failure to follow those instructions may void the tank warranty and cause tank failure, death, serious personal injury or property damage.

1.3. Deadmen help anchor tanks in installations in which there is potential for a high water table or trapped water.

1.4. Deadmen come in various lengths. Generally, there are 1 to 4 deadman sections per side of the tank, with both sides having an equal number.

2. ANCHORING TANKS

2.1. Xerxes Prefabricated Deadmen

2.1.1. Xerxes-supplied prefabricated deadmen are pre-engineered and sized to the tank ordered and include galvanized adjustable anchor points (subsequently referred to as "anchor points"). As with any deadman, water-table height, number of attached collar risers and burial depth must be considered in sizing the deadman system.

2.2. Placement of deadmen

2.2.1. The minimum spacing between tanks must be increased as needed to accommodate deadmen.

2.2.2. Always provide sufficient clearance to allow the deadmen to be set outside of the tank "shadow." See Tank Spacing subsection in the Excavation Parameters section of the Installation Manual. (See FIGURE 2-1.)

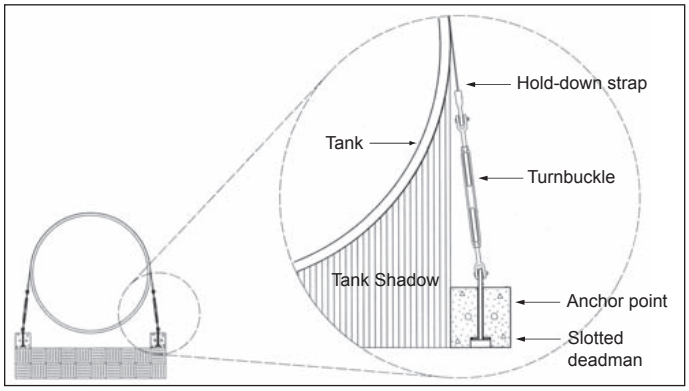


Figure 2.1

2.2.3. When multiple sections are used, the deadmen are to be butted together end-to-end on each side of the tank.

⚠ WARNING

Only use the anchor points when lifting and positioning the deadmen. A spreader bar may be required to lift longer sections of deadmen. Use guy ropes to guide the deadmen when lifting. Failure to do so could result in death or serious injury.

2.3. Positioning of anchor points

2.3.1. Xerxes deadmen are supplied with 3/4-inch-diameter anchor points.

These anchor points protrude up through the slots in the deadmen and are temporarily supported with cotter pins. (See FIGURE 2-2.)

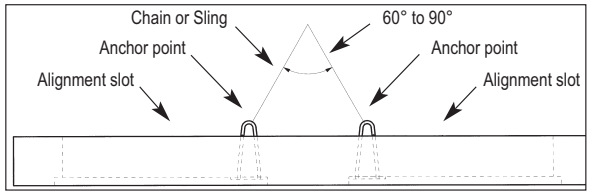


Figure 2-2

2.3.2. Use only one strap per anchor point.

2.3.3. Align the anchor points with the hold-down strap locations on the tank (marked by arrowhead symbols). See Anchoring Tanks section of the Installation Manual.

2.3.4. When using deadmen in man-out-of-hole strapping applications, align the anchor points with the proper ribs before setting the deadmen in the hole.

2.3.5. Care should be taken to keep backfill from entering the alignment slots until final adjustment is made. Placing something (for example, a piece of wood) over the slots during backfill placement may help keep backfill from entering the alignment slots.

2.4. Installation of deadmen

2.4.1. The top of the deadmen should be aligned to the bottom of the tank.

2.4.2. The deadmen are typically placed directly on the excavation floor.

2.4.3. If Xerxes 18-inch wide low-profile deadmen are used as a construction guide, they may need to be elevated. This can be accomplished by putting 3-1/2 inch of backfill or a wood 4x4 (or equivalent) underneath, so that the top of the deadmen are 12 inches off of the bottom of the excavation. (See FIGURE 2-3.)

2.4.4. Make sure the anchor points are positioned correctly.

2.4.5. Some contractors use the deadmen as a guide for proper depth of bedding. (Note that low-profile deadmen are not 12 inches high.)

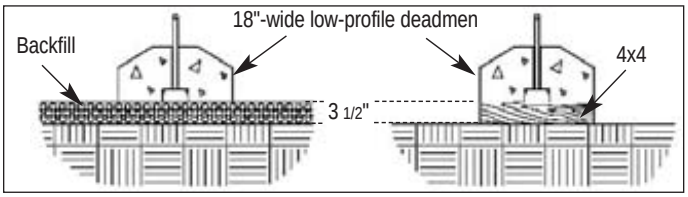


Figure 2-3

3. OPTIONAL TURNBUCKLES

3.1. General

3.1.1. Xerxes also offers a turnbuckle (See FIGURE 3-1.) that will connect the deadman anchor point to the Xerxes FRP hold-down strap. When the deadman is properly positioned, this will eliminate the use of cables and cable clamps. See Hold-down Straps subsection in the Anchoring Tanks section of the Installation Manual for more detail. (Also see FIGURE 2-1.)

Figure 3-1

Deadmen Dimensions

Nominal Tank Capacity (Gallons)	Number of Deadmen	Width x Depth of a Deadman (Inches)	Length of a Deadman (Feet)	Weight of a Deadman (Pounds/each)	Number of Straps Required
4' - 600	2	12 x 12	12	1,800	2
4' - 1,000	2	12 x 12	12	1,800	2
4' - 1,500	2	12 x 12	12	1,800	2
6' - 1,500	2	12 x 12	12	1,800	2
6' - 2,000	2	12 x 12	12	1,800	2
6' - 3,000	2	12 x 12	16	2,400	2
6' - 4,000	2	12 x 12	18	2,700	2
6' - 5,000	4	12 x 12	12	1,800	4
6' - 6,000	4	12 x 12	16	2,400	4
8' - 2,000	2	12 x 12	12	1,800	2
8' - 3,000	2	12 x 12	12	1,800	2
8' - 4,000	2	12 x 12	12	1,800	2
8' - 5,000	2	12 x 12	16	2,400	2
8' - 6,000	2	12 x 12	18	2,700	2
8' - 7,000	4	12 x 12	12	1,800	4
8' - 8,000	4	12 x 12	12	1,800	4
8' - 9,000	2 2	12 x 12	16 12	2,400 1,800	4
8' - 10,000	4	12 x 12	16	2,400	4
8' - 11,000	4	12 x 12	16	2,400	4
8' - 12,000	4	12 x 12	18	2,700	4
8' - 13,000	4 2	12 x 12	16 12	2,400 1,800	6
8' - 14,000	4 2	12 x 12	16 12	2,400 1,800	6
8' - 15,000	6	12 x 12	16	2,400	6
10' - 10,000	2	18 x 8 3/4	22	3,000	4
10' - 11,000	2	18 x 8 3/4	22	3,000	4
10' - 12,000	2	18 x 8 3/4	22	3,000	4
10' - 13,000	4	18 x 8 3/4	14	1,900	4
10' - 14,000	4	18 x 8 3/4	14	1,900	4
10' - 15,000	4	18 x 8 3/4	14	1,900	4
10' - 16,000	2 2	18 x 8 3/4	18 14	2,400 1,900	4
10' - 17,000	2 2	18 x 8 3/4	18 14	2,400 1,900	4
10' - 18,000	4	18 x 8 3/4	18	2,400	4
10' - 19,000	4	18 x 8 3/4	18	2,400	4
10' - 20,000	4	18 x 8 3/4	18	2,400	6
10' - 22,000	4	18 x 8 3/4	22	3,000	8
10' - 25,000	4 2	18 x 8 3/4	14 18	1,900 2,400	8
10' - 30,000	6	18 x 8 3/4	18	2,400	10
10' - 35,000	4 2	18 x 8 3/4	22 18	3,000 2,400	12
10' - 40,000	8	18 x 8 3/4	18	2,400	14

Item WF-1100-E-ONE Grinder Pump Station

DESCRIPTION

1100-1.1 This item shall consist of furnishing, hauling, and constructing an E-ONE Grinder Pump Station or approved equal in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

1100-2.1 E-ONE Grinder Pump Station The materials shall include an E-ONE Grinder Pump Station (Model WH472-77, with hard wired level controls) or approved equal and concrete ballast.

CONSTRUCTION METHODS

1100-3.1 E-ONE Grinder Pump Station Installation. Refer to WH47 & WR47 Series Simplex & Duplex Typical Installation Instruction & Warranty Information for installation of the E-ONE Grinder Pump Station.

METHOD OF MEASUREMENT

1100-4.1 This item shall be measured for the furnishing, hauling, and constructing an E-ONE Grinder Pump Station (Model WH472-77, with hard wired level controls) or approved equal and concrete ballast.

1100-4.2 This item shall be measured for the furnishing, hauling, and constructing an E-ONE 2" Tapping Sleeve or approved equal, Resilient Gate Valve Box, and 1 ¼" Check Valve and connection to the existing force main.

BASIS OF PAYMENT

1100-5.1 This item will be paid for on the basis of the contract unit price per each for an E-ONE Grinder Pump Station (Model WH472-77, with hard wired level controls) or approved equal and concrete ballast, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

1100-5.2 This item will be paid for on the basis of the contract unit price per each for an E-ONE 2" Tapping Sleeve or approved equal, Resilient Gate Valve & Box, and 1 ¼" check valve, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item WF-1100-1	E-ONE Grinder Pump Station (Model WH472-77, with hard wired level controls or approved equal **- per each**
Item WF-1100-2	E-ONE 2" Tapping Sleeve or approved equal, Resilient Gate Valve & Box, and 1 ¼" check valve **- per each**

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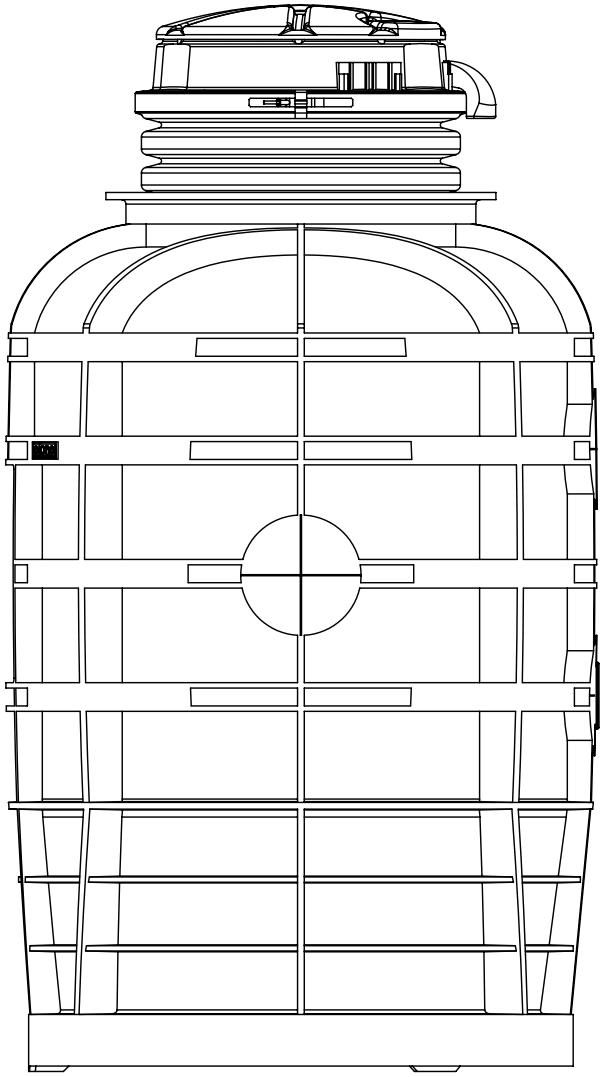
E/ONE EXTREME SERIES



WH47 & WR47 Series Simplex & Duplex Typical Installation Instructions & Warranty Information

476-Gal. Capacity Grinder Pump Station

Environment One Grinder Pump Feature Identification

1. GRINDER PUMP BASIN – Polyethylene

2. ACCESSWAY COVER – High density polyethylene (HDPE)

3. ELECTRICAL QUICK DISCONNECT (EQD) – Cable from pump core terminates here

4. POWER AND ALARM CABLE – Circuits to be installed in accordance with local codes

5. ALARM PANEL – NEMA 4X enclosure and equipped with circuit breakers. Locate according to local codes.

6. ALARM DEVICE – Every installation is to have an alarm device to alert the homeowner of a potential malfunction. Visual devices should be placed in very conspicuous locations.

7. INLET – EPDM grommet (4.5" ID). For 4.5" OD DWV pipe (standard).

8. WET WELL VENT – 2.0" tank vent

9. GRAVITY SERVICE LINE – 4" DWV, (4.5 OD). Supplied by others.

9a. STUB-OUT – 4" X 5' long **watertight** stub-out, to be installed at time of burial unless the gravity service line is connected during installation. Supplied by others.

10. DISCHARGE FTG – 1-1/4" Female NPT, stainless steel

11. DISCHARGE LINE – 1-1/4" Nominal pipe size. Supplied by others.

12. CONCRETE ANCHOR – See Ballast Calculations for specific weight for your station height. Supplied by others.

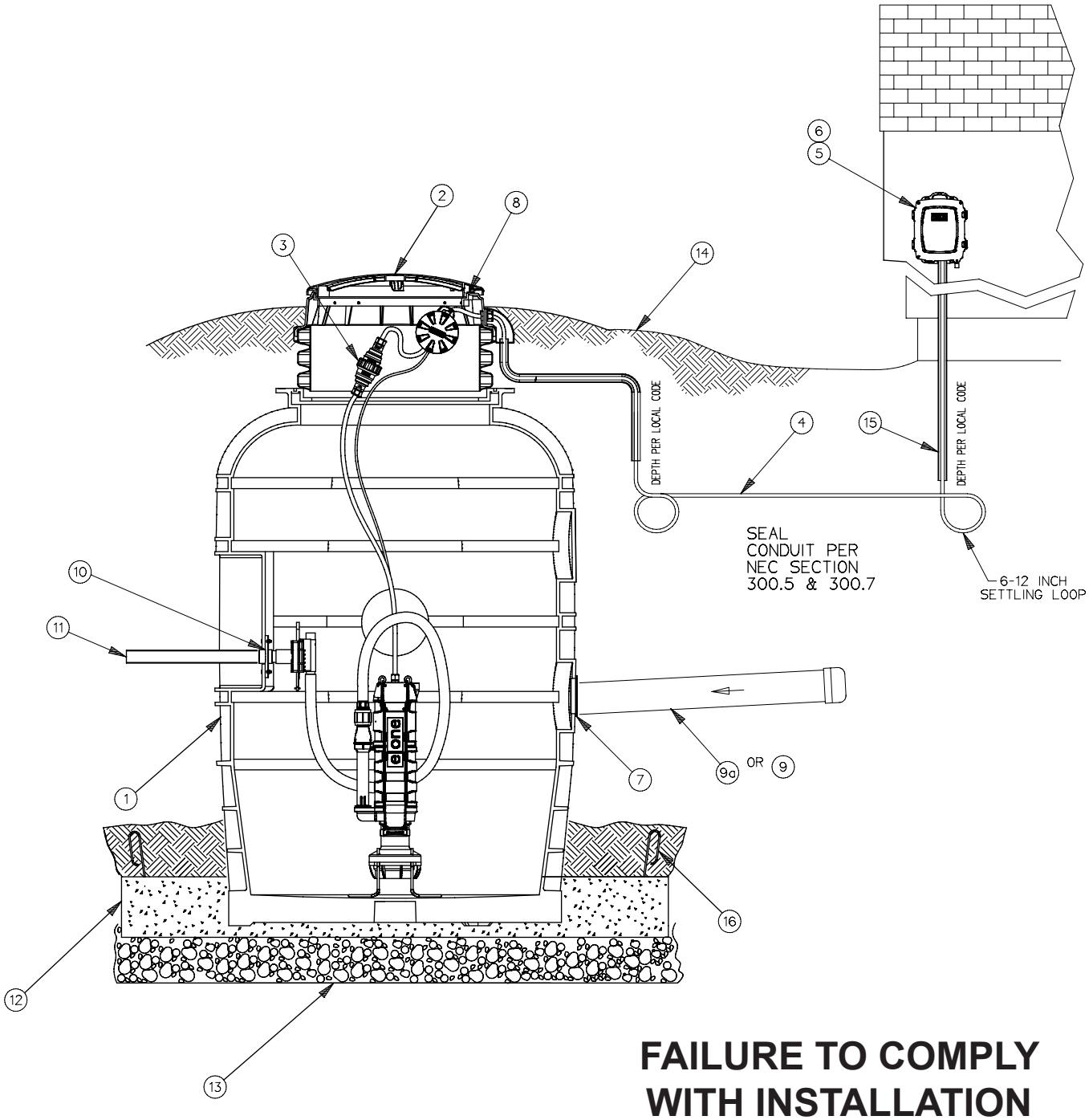
13. BEDDING MATERIAL – 6" minimum depth, round aggregate, (gravel). Supplied by others.

14. FINISHED GRADE – Grade line to be 1" to 2" below removable lid and slope away from the station.

15. CONDUIT – 1" or 1-1/4", material and burial depth as required per national and local codes. Conduit must enter panel from bottom and be sealed per NEC section 300.5 & 300.7. Supplied by others.

16. REBAR – For use with precast concrete ballast. Required to lift tank after ballast (concrete anchor) has been attached, 4 places, evenly spaced around tank.

Figure 1



FAILURE TO COMPLY WITH INSTALLATION INSTRUCTIONS WILL VOID WARRANTY

The following instructions define the recommended procedure for installing the Model WH/WR47 grinder pump station.

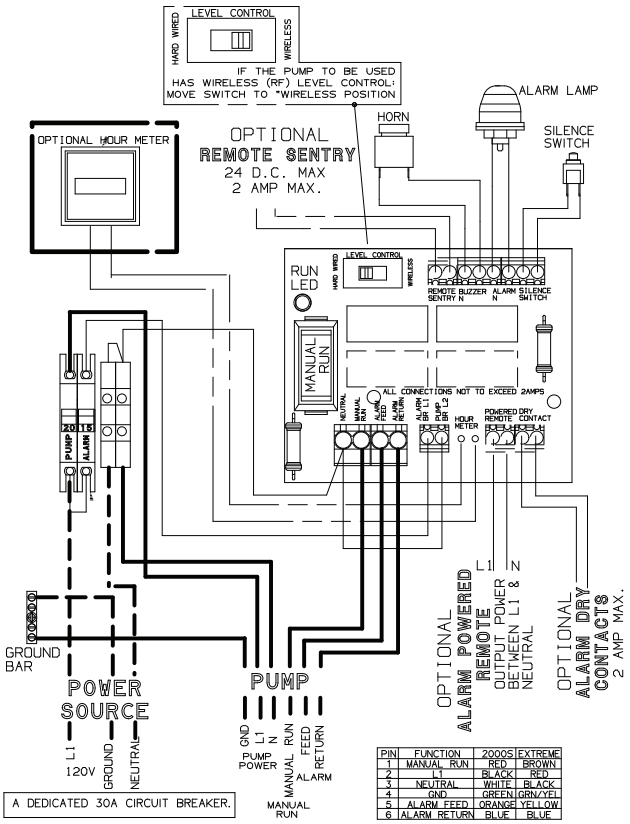
This is a sewage handling pump and must be vented in accordance with local plumbing codes. This pump is not to be installed in locations classified as hazardous in accordance with National Electric Code, ANSI / NFPA 70. All piping and electrical systems must be in compliance with applicable local and state codes.

1. REMOVE PACKING MATERIAL: The User Instructions must be given to the owner. Hardware supplied with the unit, if any, will be used at installation.

2. TANK INSTALLATION: The tank is typically supplied with a standard grommet for connecting the 4” DWV (4.50” outside dia.) incoming sewer drain. Other inlet types and sizes are optional. Caution: 4” DR-35 pipe has a smaller diameter and won’t create a watertight joint with the standard 4” SCH 40 inlet grommet. Confirm that you have the correct inlet before continuing. **Do not drop, roll, or lay tank on its side. This will damage the unit and void the warranty.**

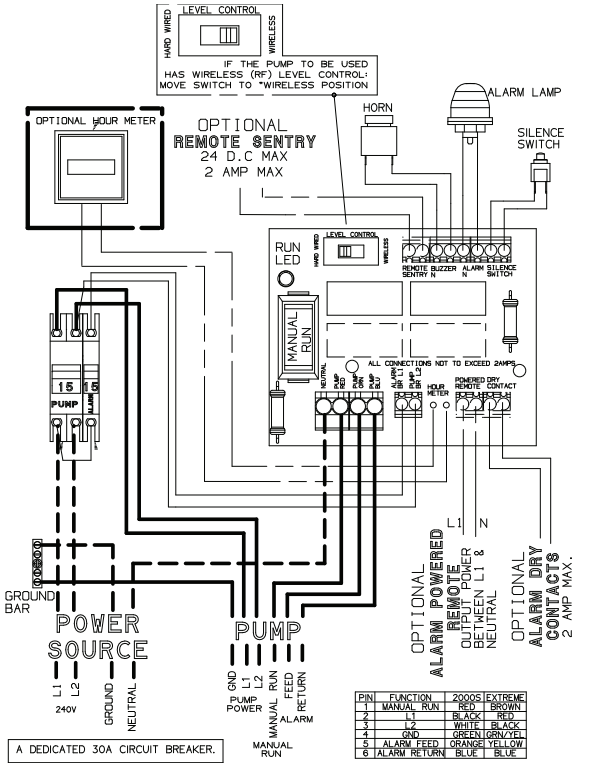
Excavate a hole to a depth so that the station cover extends 1” to 3” above the finished grade line. The finished grade must slope away from the station cover to prevent surface water from entering the station. The diameter of the hole shall be large enough to allow for the concrete ballast anchor. The size, shape and shoring requirements of the excavation will be based on

Figure 2a



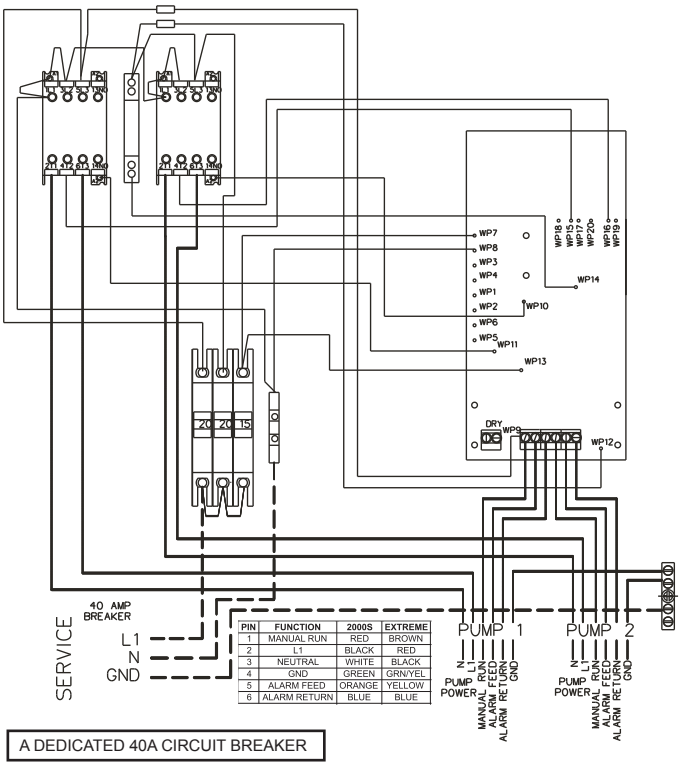
120 VOLT WIRING – SIMPLEX

Figure 2b



240 VOLT WIRING – SIMPLEX

Figure 2c

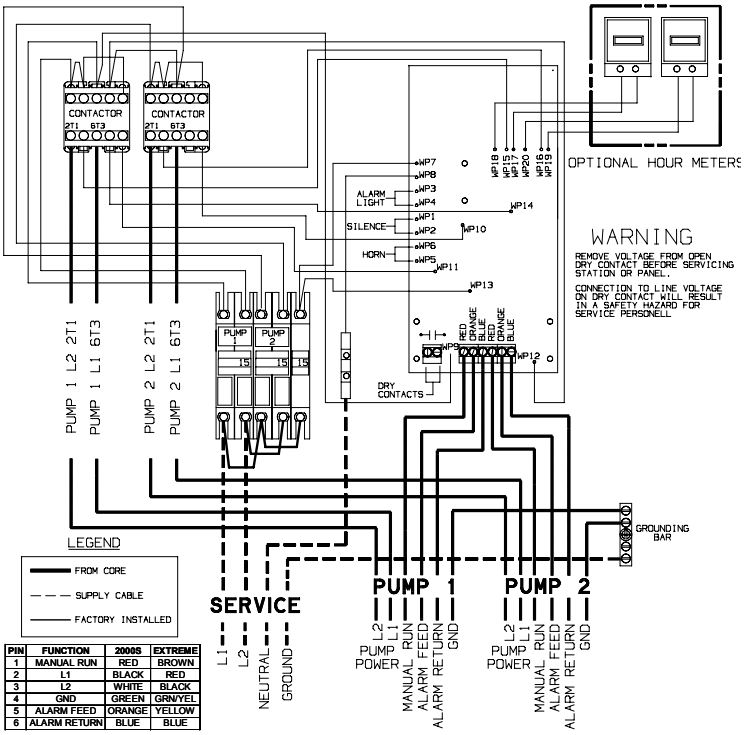


PIN	FUNCTION	2000S	EXTREME
1	MANUAL RUN	RED	BROWN
2	L1	BLACK	RED
3	NEUTRAL	WHITE	BLACK
4	GND	GREEN	GRN/YEL
5	ALARM FEED	ORANGE	YELLOW
6	ALARM RETURN	BLUE	BLUE

A DEDICATED 40A CIRCUIT BREAKER

120 VOLT DUPLEX WIRING

Figure 2d



PIN	FUNCTION	2000S	EXTREME
1	MANUAL RUN	RED	BROWN
2	L1	BLACK	RED
3	L2	WHITE	BLACK
4	GND	GREEN	GRN/YEL
5	ALARM FEED	ORANGE	YELLOW
6	ALARM RETURN	BLUE	BLUE

A DEDICATED 30A CIRCUIT BREAKER

240 VOLT WIRING – DUPLEX

the soil conditions and must be in accordance with the site engineer's recommendation and safety requirements. Care must be taken during lifting and placement to prevent impacting or otherwise damaging the tank (see Lifting Instructions). Only a non-marring sling, rated for the load being lifted, should be used in contact with the tank surfaces. A pre-ballasted tank must not be lifted with a sling (see Lifting Instructions). Lifting chains or cables should not be placed in direct contact with the tank surfaces. Fill the excavation bottom with a 6" deep bed of gravel, naturally rounded aggregate, clean and free flowing, with particles not less than 1/8" or more than 3/4" in size.

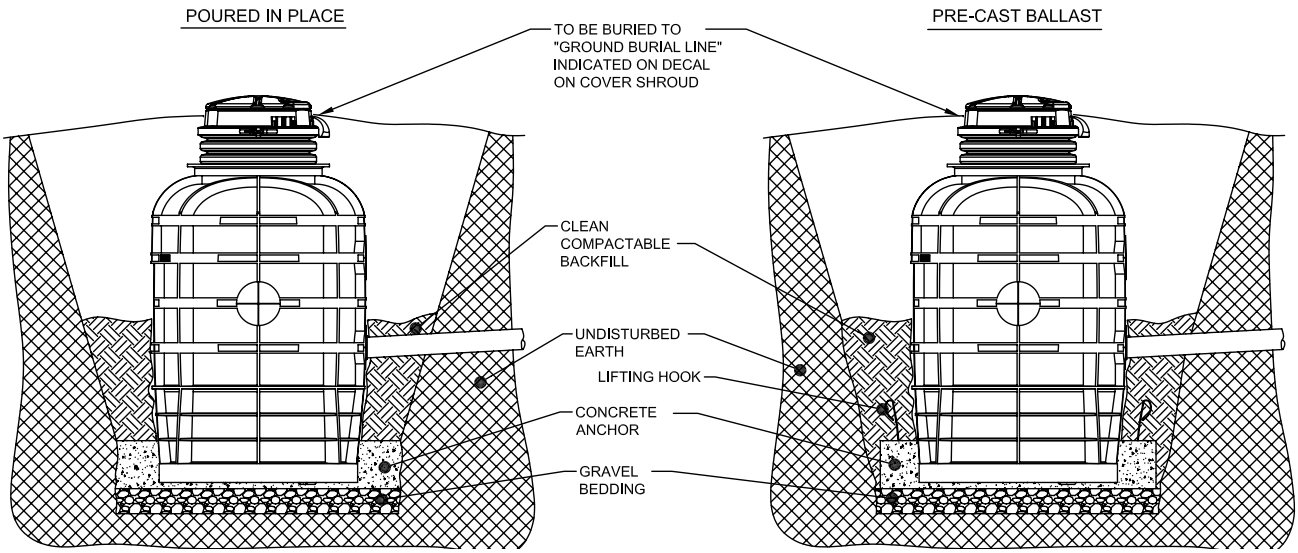
A concrete ballast anchor is required to prevent flotation of the tank when groundwater is present. The concrete anchor is not optional. The **MINIMUM** concrete anchor requirements for the WH/WR 47 station are shown in Chart 1 of the Ballast Calculation section.

Pour approximately 1" to 2" of concrete onto the gravel bed and place the tank into the excavation. Ensure the tank is properly positioned in the excavation to support inlet pipe (Section 3) and discharge pipe (Section 5) connections before pouring the concrete ballast. The unit should be leveled and filled with water, about 24" deep, to prevent shifting while the remaining ballast is being poured. The concrete should be vibrated, as necessary, to eliminate voids. If it is necessary to pour the concrete above the inlet level (Section 3), the inlet must be sleeved with an 8" tube before pouring.

Concrete ballast should be cast in-place around the tank in the excavation (Figure 3). Alternatively, pre-cast ballast around the base of the tank, may be used. Ensure that 1” to 2” of concrete is placed beneath the tank base if pre-cast ballast is used. If the concrete is pre-cast, lifting hooks must be anchored in the ballast to support subsequent handling of the tank (see Lifting Instructions). The lifting hooks used must be adequate to support the combined weight of the tank and concrete ballast and shall be sized and installed in accordance with the site engineer’s recommendation. **Place the ballasted tank on the gravel bedding in the excavated hole using the lifting hooks. Do not lift by any of the tank surfaces if pre-cast ballast is utilized**.

3. INLET LOCATIONS: A 4” DWV (standard) inlet grommet was provided with the station for sealing the inlet pipe at the tank wall. If the inlet grommet penetration was not factory installed, the location of the tank inlet must be determined to support final positioning of the tank prior to ballast installation (see Section 2). The inlet pipe location corresponds with the actual or projected point where the building sewer line intersects the tank wall. The grade of the inlet pipe and required burial depth (per national and local code requirements) must be accounted for when determining the inlet location. The supply cable path should be considered when selecting the inlet location (see Section 8). A 5” diameter field penetration of the tank wall is required to support installation of the (standard) inlet grommet. This penetration must not remove or interfere with any of the structural ribbing on the polyethylene tank. The inlet grommet may be installed in any of the allowable locations shown in Figure 7. The inlet penetration **must** be centered in the location selected to prevent interference with the tank ribbing. Typical inlet installation will be on one of the four, 10.5” diameter raised pads on the tank body. The pads have been marked with a series of locating lines to support centering of the 5” (standard) drilled penetration. Any inlet installed in the depressed panels between the horizontal and vertical ribbing must be centered within the panel to provide adequate clearance for the 6” diameter flange on the standard 4” inlet grommet (Figure 7). Once the location of the inlet penetration is selected, mark the inlet center location on the tank and position the tank. Using a 5” diameter hole saw for a standard 4” grommet, drill through the tank wall at the marked location. Remove any chips or burrs from the drilled hole. Install the provided inlet grommet into the drilled hole. The grommet is self-sealing and does not require the use of

Figure 3



TYPICAL IN-GROUND SECTION VIEW

additional sealant or adhesive.

4. INLET PIPE INSTALLATION: Mark the inlet pipe 3.5” from the end to be inserted. Inlet pipe leading edge should be beveled with a grinder and lubricated with a soap solution. Lubricate the inlet grommet with soap solution as well. Insert the pipe into the grommet up to the 3.5” mark. Inspect to ensure the grommet has remained intact and in place (Figure 7).

5. DISCHARGE: The use of 1.25” PVC pressure pipe SCH 40 and polyethylene pipe SDR 11 or SIDR 7 are recommended. If polyethylene is chosen, use compression-type fittings to provide a smooth inner passage. E/One requires that an E/One Uni-Lateral assembly (E/One part number NB0184PXX or NC0193GXX) or E/One Redundant Check Valve (E/One part number PC0051GXX) be installed in the pipe lateral outside the home between the pump discharge and the street main on all installations. Never use a ball-type valve as a check valve. E/One recommends the valve be installed as close to the public right-of-way as possible. Check local codes for applicable requirements.

CAUTION: *Redundant check valves on station laterals and anti-siphon/check valve assemblies on grinder pump cores should not be used as system isolation valves during line tests.*

There is a slide face valve and a quick disconnect pre-installed in the tank for grinder pump connection. There is a stainless steel 1.25” NPT female discharge connection on the outside of the tank to support discharge piping connection.

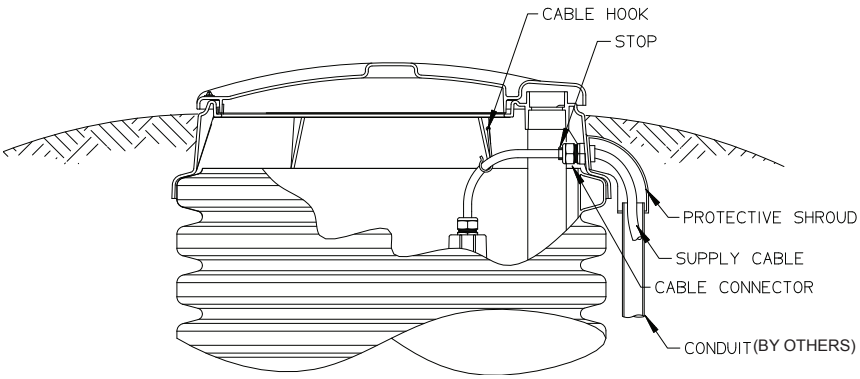
6. BACKFILL REQUIREMENTS: Proper backfill is essential to the long term reliability of any underground structure. Several methods of backfill are available to produce favorable results with different native soil conditions.

The recommended method of backfilling is to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321. Class 1A and Class 1B are recommended where frost heave is a concern; Class 1B is a better choice when the native soil is sand or if a high, fluctuating water table is expected. Class I, angular crushed stone, offers an added benefit in that it needs minimal compaction. Class II, naturally rounded stone, may require more compactive effort, or tamping, to achieve the proper density.

If the native soil condition consists of clean compactible soil, with less than 12% fines, free of ice, rocks, roots, and organic material, it may be an acceptable backfill. Such soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density between 85% and 90%. Non-compactible clays and silts are **not** suitable backfill for this or any underground structure such as inlet or discharge lines. If you are unsure of the consistency of the native soil, it is recommended that a geotechnical evaluation of the material be obtained before specifying backfill.

Another option is the use of a flowable fill (i.e., low slump concrete). This is particularly attractive when installing grinder pump stations in augured holes where tight clearances make it difficult to assure proper backfilling and compaction with dry materials. Flowable fills should not be dropped with more than 4

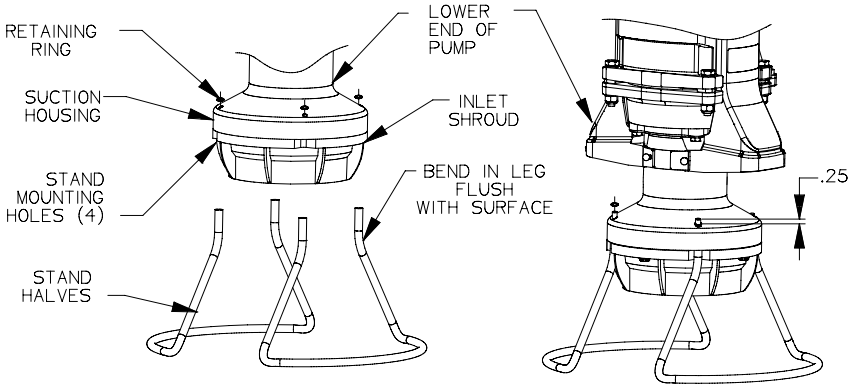
Figure 4



Power at the station must not drop below 10% of nameplate voltage. Maximum Recommended Length:
120 Volt 60’ (min. voltage at pump — 108V)
240 Volt 150’ (min. voltage at pump — 216V)
Consult factory for longer lengths

TYPICAL SUPPLY CABLE CONFIGURATION

Figure 5



GRINDER PUMP STAND

feet between the discharge nozzle and the bottom of the hole because this can cause separation of the constituent materials.

7. VENTING: The unit must be properly vented to assure correct operation of the pump. The units are supplied with a 2” vent opening in the cover assembly. Failure to *properly vent* the tank will result in faulty operation and will void the warranty.

If the water level outside of the station is expected to rise above the surrounding grade (flooding), a cover vent system cannot be used. If flood conditions are expected, an underground (lateral) vent system and solid cover must be used. **Consult the factory if flood conditions are possible where the station will be installed.**

8. ELECTRICAL CONNECTION: (Supply panel to E/One alarm panel) Before proceeding, verify that the service voltage is the same as the motor voltage shown on the name plate. An alarm device is to be installed in a conspicuous location where it can be readily seen. An alarm device is required on every installation. There shall be no exceptions.

Wiring of supply panel and alarm panel shall be per Figures 2a–2d, alarm panel wiring diagrams and local codes. A dedicated 30 amp breaker is required before all simplex alarm panels. A dedicated 30 amp breaker is required before a 240V duplex alarm panel, and a dedicated 40 amp breaker is required before a 120V duplex alarm panel.

9. ELECTRICAL CONNECTION: (Pump to Panel) (Fig. 4) The grinder pump station is provided with a cable for connection between the station and the alarm panel (supply cable) for each grinder pump. The supply cable, a six conductor tray cable, meets NEC requirements for direct burial as long as a minimum of 24” burial depth is maintained. Those portions of the cable which have less than 24” of cover must be contained in suitable conduit. This includes the vertical portion dropping to a 24” depth at the station and the length rising out of the ground at the control panel (conduit by others). *NOTE: Wiring must be installed per national and local codes. Conduit must enter panel from bottom and be sealed per NEC section 300.5 & 300.7.*

9a. Installing E/One supply cable:

1) Open the lid of the station and locate the cable and the feed-thru connector on the wall of the shroud or on the inside wall of the tank (Model WH/WR47 x 77”). Loosen the nut on the connector and pull the supply cable out through the connector until it hits the crimped-on stop feature on the cable, approximately 36” from the EQD. ****IMPORTANT:** *All but 36” of the cable must be pulled out of the station, and the Equalizer and EQD should be secured in the hook provided to ensure that the pump functions properly.* ***Do* not *leave the excess cable in the station.***

2) Retighten the nut. This connection must be tight or ground water will enter the station.

3) Feed the wire through the length of conduit (contractor provided), which will protect it until it is below the 24” burial depth.

4) On models WH/WR47 x 92” and taller, position the conduit vertically below the cable connector along side of the station reaching down into the burial depth. Attach the small protective shroud provided with the station to protect the exposed cable where it enters the station. Four self-tapping screws are

provided.

5) Run the cable underground, in a trench or tunnel, to the location of the alarm panel. Leave a 6- to 12-inch loop of cable at each end to allow for shifting and settling. Connections made at the panel are shown in the panel wiring diagram (Figures 2a–2d).

10. GRINDER PUMP STAND ASSEMBLY: Temporarily rest the grinder pump on its side. Using a block of wood or similar object, prop up the lower pump end to allow installation of the pump stand. Align the two legs of each pump stand half with two of the holes in the pump lower end (Figure 5). Push the stand legs into the pump lower end. Using a mallet, ensure that the stand legs bottom into the mounting holes. Repeat for the other stand half. Turn the pump upright on the installed stand.

11. DEBRIS REMOVAL: Prior to start-up test procedure, the incoming sewer line must be flushed to force all miscellaneous debris into the tank. Next, all liquid and debris must be removed. Once the tank is clean, install the pump(s) and proceed with the test.

12. INSTALL THE PUMP:

Lower the pump into the tank. Position the pump so the pump's discharge is on the opposite side of the pump relative to the discharge in the tank. Position the pump in the center of the tank. Rotate to coil the discharge hose and slide the adapter on the discharge hose into the receiver in the tank wall until it seats. Push the white slider down to open the discharge valve. Refer to Figures 8–11 for slideface connection and operation.

Hang power cable, breather tubing with Equalizer, and lifting rope to prevent them from laying in sewage. The Equalizer should be hung as high as possible in the tank.

13. TEST PROCEDURE

The following steps should be taken to verify proper installation and operation:

a) Make sure that the discharge slide face valve(s) is fully open. This valve(s) must not be closed when the pump is operating. In some installations, there may be a valve, or valves, at the street main that must also be open.

(Ignore all Trouble indications, LEDs and/or messages until the panel is reset at the end of this procedure.)

For model WH/WR 471:

b) Fill the tank with approximately 200 gallons of water (approximately up to the top of the grinder pump).

c) Turn on the pump power and alarm circuit breakers in the alarm panel. The grinder pump and alarm should turn on immediately.

d) Monitor the pump and alarm to ensure they are operating correctly. The alarm will shut off at a water level of approximately 18" from the bottom. The grinder pump will shut off at a water level of approximately 14" from the bottom. Proceed to Step i.

For model WH/WR 472:

b) Fill the tank with approximately 200 gallons of water (approximately up to the top of the grinder pump).

c) Turn on the Pump #1 power breaker and the alarm circuit breakers in the alarm panel. Grinder Pump #1 and the alarm should turn on immediately.

d) Monitor the pump and alarm to ensure they are operating correctly. The alarm will shut off at a water level of approximately 18" from the bottom. The grinder pump will shut off at a water level of approximately 14" from the bottom.

e) Turn off the Pump #1 and alarm circuit breakers.

f) Refill the tank with approximately 200 gallons of water (approximately up to the top of the grinder pump).

g) Turn on the Pump #2 power breaker and the alarm circuit breakers in the alarm panel. Grinder Pump #2 and the alarm should turn on immediately.

h) Monitor the pump and alarm to ensure they are operating correctly. The alarm will shut off at a water level of approximately 18" from the bottom. The grinder pump will shut off at a water level of approximately 14" from the bottom.

i) Clear/Reset the alarm panel:

Sentry and T260 panels: Reset is not required.

Protect Panel: Turn pump and alarm breakers off and back on simultaneously.

Protect Plus Panels: Perform a "cold start" from the Initialize System menu. Any user setting that were previously chosen will not be reset.

j) If any Trouble or alarm conditions are indicated after the panel is reset, contact your local service provider.

Field Joint Assembly Instructions

IT IS EXTREMELY IMPORTANT THAT THE JOINT IS SEALED PROPERLY BEFORE BACKFILLING. EXCAVATING A UNIT FOR REPAIR IS VERY EXPENSIVE AND CAN BE EASILY AVOIDED BY USING PROPER CAUTION DURING THE FOLLOWING PROCEDURE.

Parts included in Field Joint Kit: Identify all parts before proceeding with installation.

(16) 3/8-16 X 1-1/2 long screws
(16) 3/8-16 Elastic Stop Nuts
(32) Flat Washers
(1) Length Sealant (Sika) Tape
(1) Hole Punch

1) Carefully clean and dry both accessway flanges with solvent. **IMPORTANT: Sealing surfaces must be dry to ensure the sealant adheres correctly.**

2) Starting at one hole of tank flange, apply two layers of Sika Tape around the inside half of the flange. Align the outside edge of the tape with the bolt circle. Move to the adjacent hole and apply one layer of Sika Tape around the outside of the flange. Align inside of tape with the bolt circle. Remove the backing paper as you lay the adhesive on the flange. **Do not stretch Sika tape during application, it may result in a leak.** The tape should overlap at the end by approximately 1/2 inch, as shown in Figure 6a. If a section of Sika Tape is misapplied, the bad section may be cut out and replaced. Cut away the poorly laid portion cleanly with a knife and be sure to over lap the tape at each end about 1/2 inch.

3) Using the tool provided, punch a hole through the tape at each of the 16 existing bolt holes in the flange. **Be careful to keep the exposed sealant clean and dry.**

4) Insert three of the sixteen 3/8-16 x 1-1/2” long bolts, with a flat washer, into the flange attached to the upper part of the accessway. These will act as guides while aligning the bolt pattern of the two flanges.

5) Support the upper accessway section a few inches over the tank with the green stripes on each lined up. Once aligned, lower the upper section onto the mating flange using the three bolts to guide it to the proper position. See Figure 6b.

6) Insert the remaining 13 bolts with flat washers into the flanges. Place a flat washer and elastic stop nut on the end of each bolt, turning the nut on just enough to hold the washer in place.

7) Tighten up the bolts until the sealant begins to squeeze out from between the flanges. To ensure a consistent, sturdy seal tighten them in the following sequence: 1, 9; 5, 13; 3, 11; 7, 15; 2, 10; 4, 12; 6, 14; 8, 16. Always be sure to tighten one bolt and then the bolt at the position 180° from it, see Figure 6a for position numbers.

8) Using the same sequence as in step 7 tighten each bolt to 60 in-lbs. Visually inspect the joint, each bolt and each nut should have a flat washer between it and the flange, and a uniform amount of sealant should be protruding from the seam along the entire perimeter.

In the event that there are any voids in the sealant, the joint may leak. Take corrective actions if necessary and be sure that the joint is leak free before continuing.

Figure 6a

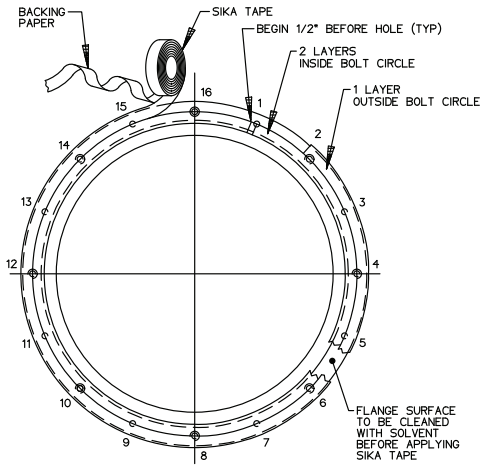


Figure 6b

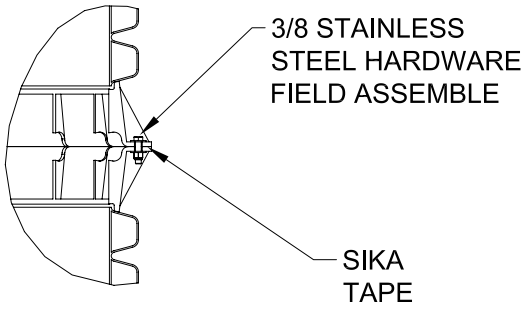
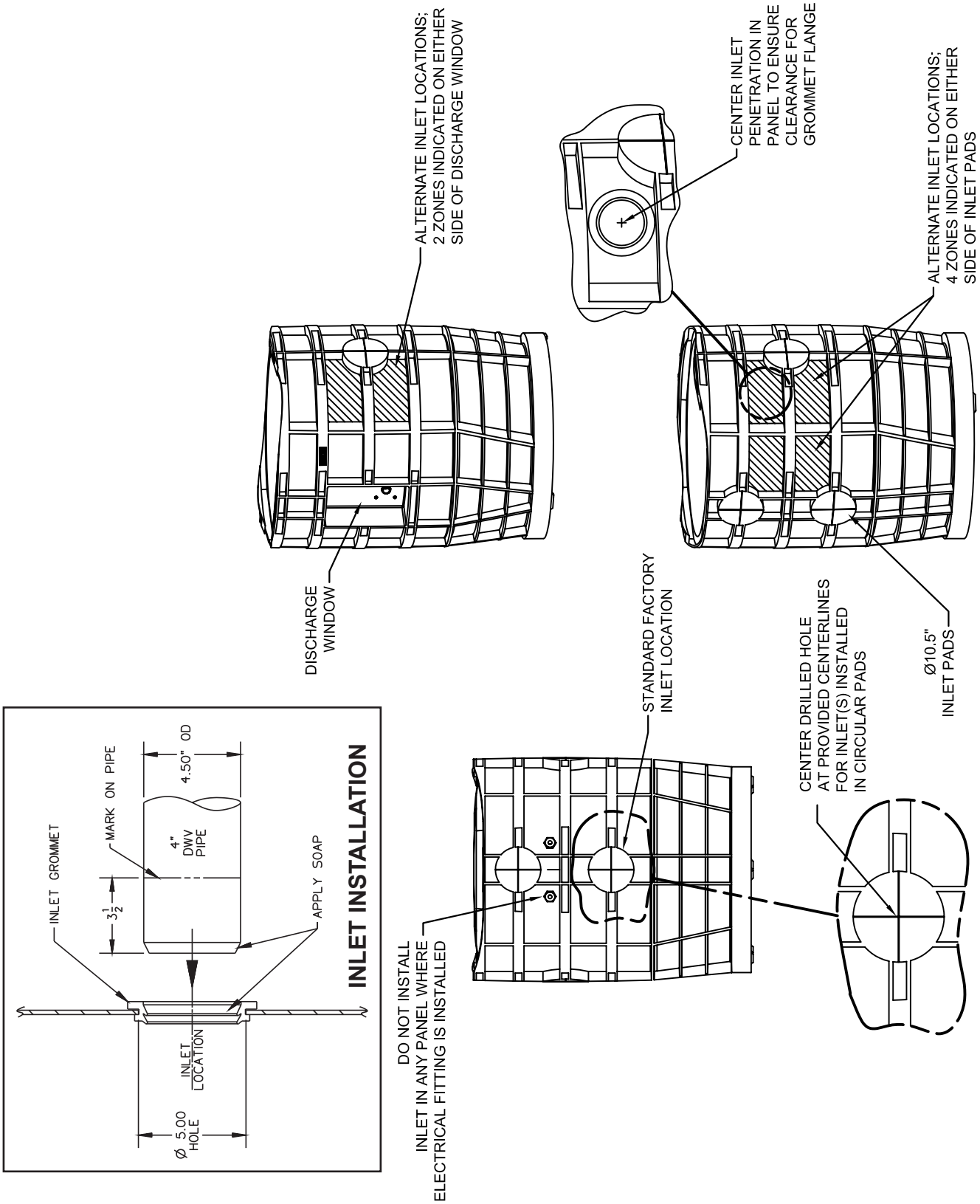


Figure 7



ALLOWABLE INLET LOCATIONS

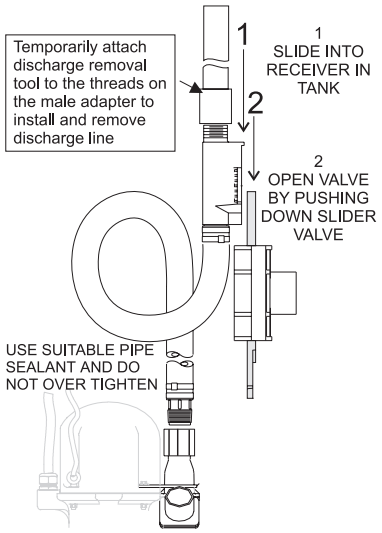


Figure 8

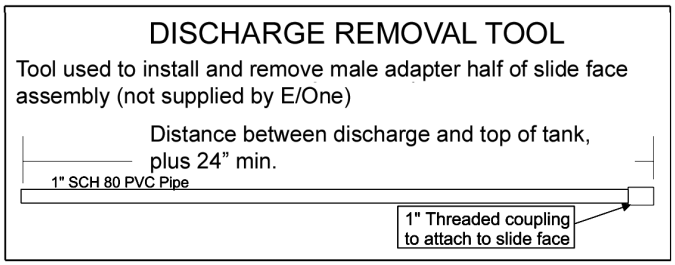


Figure 9

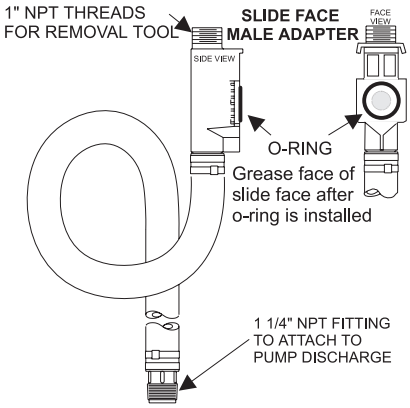


Figure 10

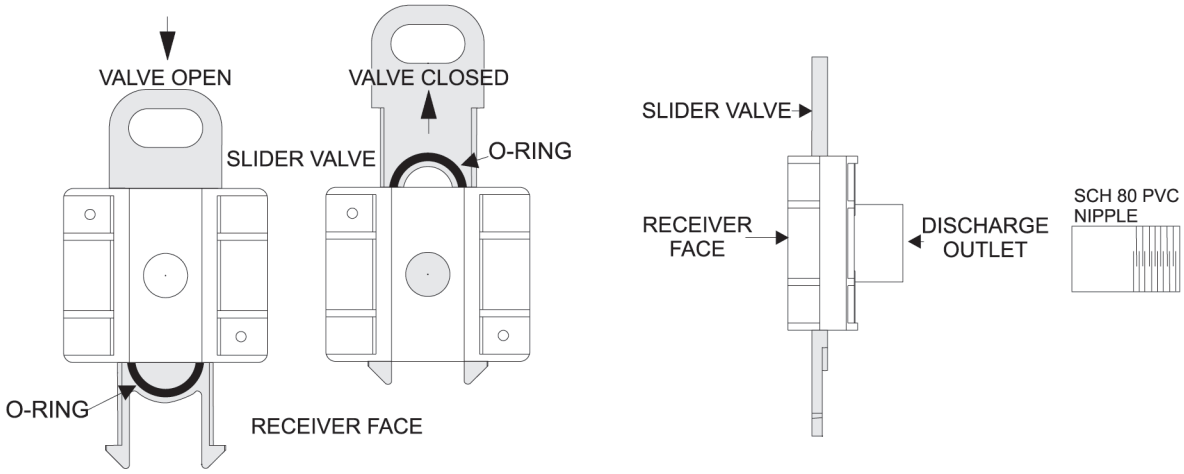


Figure 11

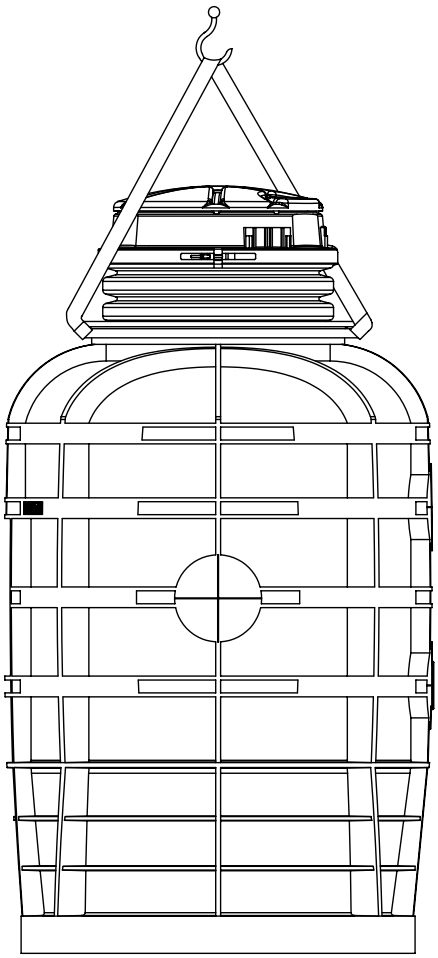
Lifting Instructions

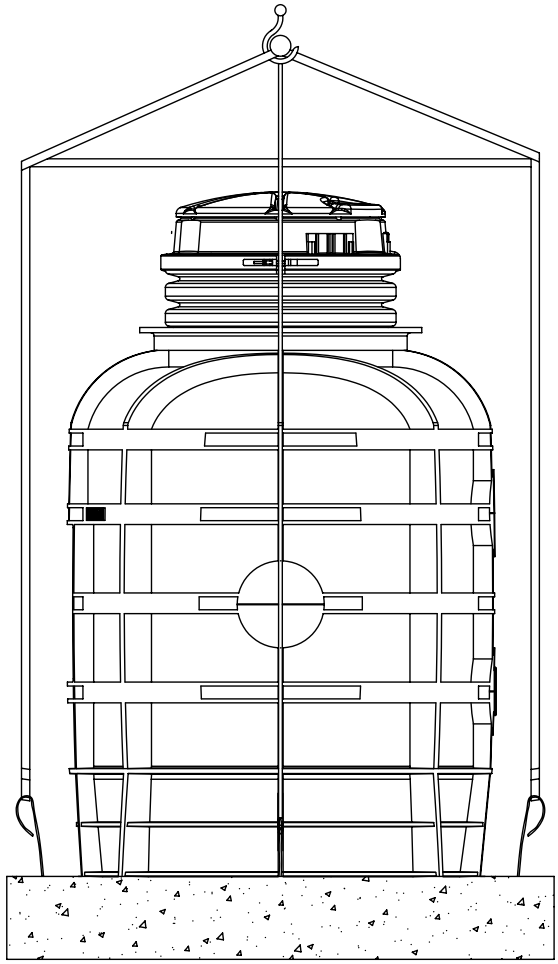
FAILURE TO FOLLOW THESE INSTRUCTIONS COMPLETELY WILL VOID WARRANTY.

1. Transporting unit to installation site: **Always lift a unit from the bottom for the purpose of transportation. The station should be received attached to a pallet for this purpose.** Never roll a station or move it on its side.

2. No Ballast (to be poured in place): If the concrete anchor is to be poured while the station is in place lift the unit using two nylon straps wrapped under the tank flange to make a sling, as shown below. Keep station oriented vertically to avoid any damage.

3. Precast Ballast: Never lift a station that has a ballast attached by any means except the rebar. The weight of the concrete will damage the station if you attempt to lift it from any part of the station.





E/One Grinder Pump Station Ballast Calculations

Sample Calculation — Station Height of 92”

Volume of Station = 73.1 ft^3
Station Weight = 350 lbs
Station Height = 7.3 ft

A. Buoyant Force

1. The buoyant force acting on the submerged WH/WR47 is equal to the weight of the displaced water for the section of the tank that is submerged.

$F_{buoyant}$ = (density of water)(volume of station)
= (62.4 lbs/cu ft)(73.1 cu ft)
= 4560 lbs

2. The net buoyant force acting on the station ($F_{net\text{-}buoyant}$) is equal to the buoyant force ($F_{buoyant}$) minus the weight of the station tank.

$F_{net\text{-}buoyant}$ = 4560 lbs – 350 lbs
= 4210 lbs

B. Ballast Force

1. Determine the volume of concrete and soil

Section I: Used To Determine The Volume Of Concrete
(Note: 4.0 ft = assumed inside diameter of concrete ballast ring around tank’s bottom flange)

Volume = (Height)(Area)
= (.83 ft)(π)((5.6 ft)^2 – (4.0 ft)^2) / 4
= (.83 ft)(12.06 ft^2)
= 10.1 ft^3

Section II: Used To Determine The Volume Of Saturated Soil
(Note: 4.3 ft = assumed inside diameter of soil column around tank’s maximum diameter)

Volume = (Height)(Area)
= (7.3 ft – .83 ft)(π)((5.6 ft)^2 – (4.26 ft)^2) / 4
= (6.46 ft)(10.1 ft^2)
= 65.2 ft^3

2. Determine the combined ballast

Ballast (total) = Ballast (concrete) + Ballast (saturated soil)
= ($V_{concrete}$)(density concrete in water) + (V_{soil})(density saturated soil)
= (10.1 ft^3)(87.52 lbs/ft^3) + (65.2 ft^3)(70 lbs/ft^3)
= 884 lbs + 4564 lbs
= 5450 lbs

C. Subtract the buoyant force from the ballast force to determine the final condition

Final Condition = Ballast Force – Net Buoyant Force
= 5450 lbs – 4210 lbs
= 1240 lbs (excess ballast)

E/One Grinder Pump Station Ballast Calculations

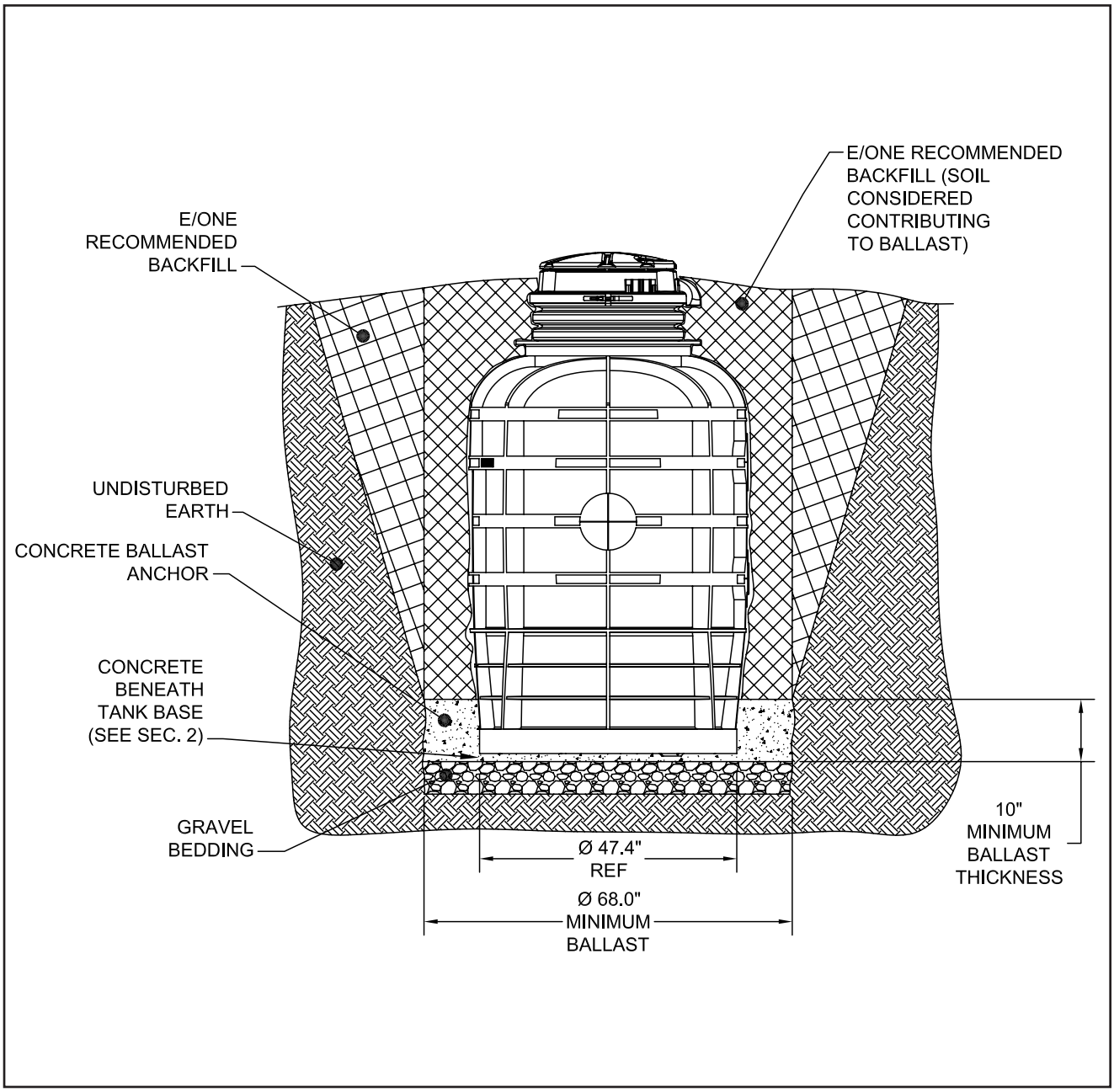
Sample Calculation

The approach outlined on the previous page may be used
to calculate the ballast requirements listed below.

Chart 1

Station Height (in)	Station Volume (cu ft)	F_{net} Buoyant (lbs)	Tank Weight (lbs)	$F_{ballast}$ (lbs)	Volume Concrete (cu ft)*	Weight Concrete in Air (cu ft)*	Min Diameter of Concrete Anchor (in)	Min Thickness of Concrete Anchor (in)
77	69.5	3997	340	4784	10.1	1515	68	10
92	73.1	4210	350	5450	10.1	1515	68	10
107	77.5	4476	363	6282	10.1	1515	68	10
110	78.5	4535	366	6467	10.1	1515	68	10
113	79.5	4594	369	6652	10.1	1515	68	10
117	80.5	4653	372	6837	10.1	1515	68	10
120	81.5	4712	375	7022	10.1	1515	68	10
122	82.5	4772	378	7207	10.1	1515	68	10

* Volume calculated is for minimum dimensions given. Minimum dimensions must be met or exceeded for actual application.



BALLAST INFORMATION

Adjusting the Height of a Grinder Pump Station

TO INCREASE STATION HEIGHT 6 INCHES

1. Increasing station height can be done without cutting the station. Use the E/One Extender cover shroud kit (ND0082G01) and follow the instructions that are included with the kit.

TO INCREASE STATION HEIGHT MORE THAN 6 INCHES or TO REDUCE THE STATION HEIGHT:

REMOVE EXISTING COVER ASSEMBLY (Fig. 12)

If your existing station has a welded-on cover shroud, you will need the appropriate replacement cover kit.

1. Turn off all power to the grinder pump station.
2. Remove the tank lid and the electrical shroud.
3. Unplug the electrical quick disconnect (EQD) and remove the EQD from the supply cable. *Note: DO NOT CUT CABLE*. Loosen liquid-tight cable connector and pull the supply cable out through the connector on the side of tank.

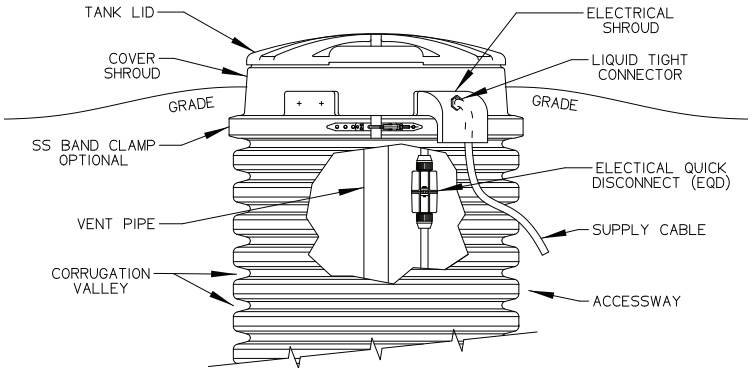


Figure 12

4. Remove the soil around the tank, exposing three of the tank corrugations below grade. Use caution not to damage buried cable.
5. Remove existing cover shroud.

5a. Welded-on shroud (standard) — Using a hand saw, cut the tank in the valley between the two corrugations at grade, discard existing welded on shroud and attached corrugations *(shroud is not to be reused)*. *Caution: Be careful not to cut the pump breather cable.*

5b. Clamped-on shroud — Remove band clamp and cover shroud.

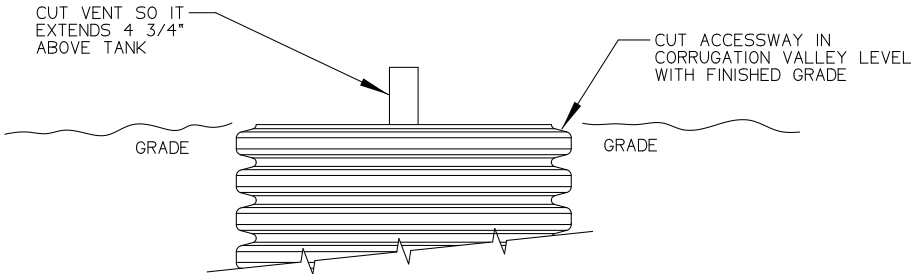


Figure 13

REDUCING STATION HEIGHT (Fig. 13)

6. Using a hand saw, cut the tank in the valley between the two corrugations at grade.

INSTALL REPLACEMENT COVER ASSEMBLY (Fig. 14)

7. Clean top corrugation on accessway extension and mating surface of replacement shroud with acetone.
8. Liberally apply the silicone sealer provided to the under side of the replacement shroud where it will come in contact with the accessway extension.
9. Place SS band clamp around top corrugation and the replacement shroud. Tap with a mallet around clamp to help seat the clamp. Torque stud assembly on band clamp to a maximum 125 inlb.
10. Reinstall the supply cable, EQD, tank lid and electrical shroud and tighten cable connector.

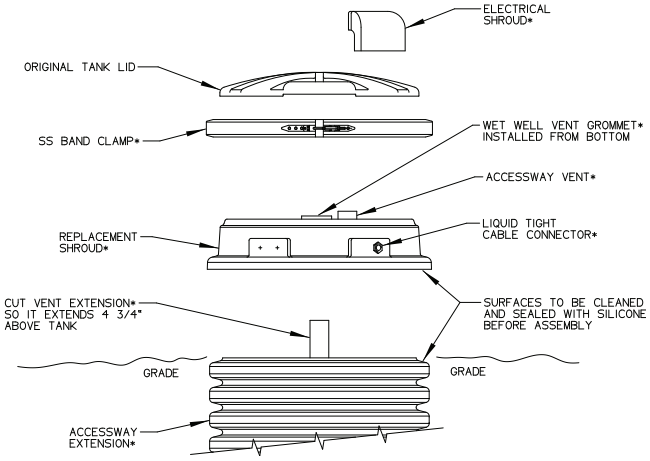


Figure 14

11. Follow start-up procedures to ensure proper pump operation (you will find the start-up instructions in the service manual).

A Precision Castparts Company

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NA0245P01 Rev E
1/16

User Instructions for the Environment One Grinder Pump

General Information

Your home is served by a low pressure sewer system; the key element is an Environment One grinder pump. The tank collects all solid materials and wastewater from the house. The solid materials are then ground to a small size suitable for pumping as a slurry with the wastewater. The grinder pump generates sufficient pressure to pump this slurry from your home to the wastewater treatment receiving line and/or disposal plant.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference; and 2) this device must accept any interference received, including interference that may cause undesired operation. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Care and Use of your Grinder Pump

The Environment One grinder pump is capable of accepting and pumping a wide range of materials, and an extensive grind test is required in order to obtain NSF approval. However, regulatory agencies advise that the following items should not be introduced into any sewer, either directly or through a kitchen waste disposal unit:

Glass	Seafood shells	Diapers, socks, rags or cloth	Syringes
Cotton swabs	Personal/cleaning wipes & sponges	Disposable toothbrushes	Latex/vinyl items
Metal	Plastic objects (toys, utensils, etc.)	Kitty litter	Dental floss
Aquarium gravel	Sanitary napkins or tampons	Cigarette butts	

Caution: Kitchen garbage disposals do not keep grease/oil out of the plumbing system

In addition, you must **never** introduce into any sewer:

Explosives	Strong chemicals	Lubricating oil and/or grease
Flammable material	Gasoline	

Items introduced into the sewer system from your home can potentially impact the water environment. Proper disposal of household wastes such as window cleaners, unused/expired pharmaceuticals, paint thinners, fats, fruit labels, etc. is important. For more information, visit http://www.wef.org.

Periods of Disuse

If your home or building is left unoccupied for longer than a couple of weeks, perform the following procedure:

Purge the System. Run clean water into the unit until the pump activates. Immediately turn off the water and allow the grinder pump to run until it shuts off automatically.

Duplex Units. Special attention must be taken to ensure that both pumps turn on when clean water is added to the tank.

Caution: Do not disconnect power to the unit

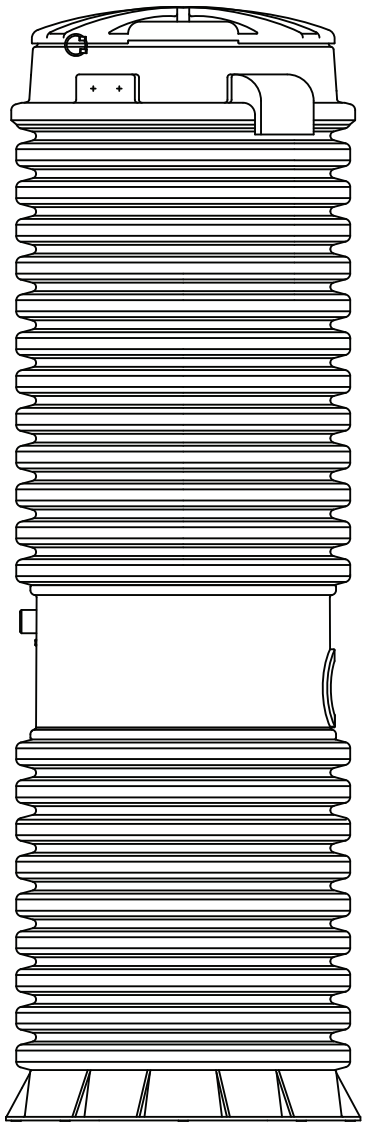
Power Failure

Your grinder pump cannot dispose of wastewater without electrical power. If electrical power service is interrupted, keep water usage to a minimum.

Pump Failure Alarm

Your Environment One grinder pump has been manufactured to produce an alarm signal (120 volt) in the event of a high water level in the basin. The installer must see that the alarm signal provided is connected to an audible and/or visual alarm in such a manner as to provide adequate warning to the user that service is required. During the interim prior to the arrival of an authorized service technician, water usage must be limited to the reserve capacity of the tank.

For service, please call your local distributor:



Limited Warranty

For E/One Extreme D-Series, W-Series & Upgrade

Environment One Corporation offers a limited warranty that guarantees its product to be free from defects in material and factory workmanship for a period of two years from the date of installation, or 27 months from the date of shipment, whichever occurs first, provided the product is properly installed, serviced and operated under normal conditions and according to manufacturer's instructions. Repair or parts replacement required as a result of such defect will be made free of charge during this period upon return of the defective parts or equipment to the manufacturer or its nearest authorized service center.

Model Number: _____

Serial Number:_____

Installation Date: _____

eone
SEWER SYSTEMS

2773 Balltown Rd • Niskayuna NY USA 12309
(01) 518.346.6161 • www.eone.com

Item R-1200 Ground Mounted Hose Reel

DESCRIPTION

1200-1.1 This item shall consist of furnishing, hauling, and constructing a Ground Mounted Hose Reel, hose assembly and a hose in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

1200-2.1 Ground Mounted Hose Reel The materials shall include a ground mounted hose reel (Reelcraft Heavy Duty Dual Pedestal Hose Reel, Part Number D83000 OLP or approved equal and shall be rated for 500 psi max pressure rated to hold a minimum of 75' hose).

1200-2.2 10 Foot Hose Assembly The materials shall include a 10' hose assembly (Reelcraft Part Number S601034-10, ¾ inch by 10 feet in length, 300 psi or approved equal).

1200-2.3 75 Foot Hose The materials shall include a 75 foot hose (Reelcraft Part Number S601026-75, ¾ inch by 75 feet in length, 250 PSI or approved equal).

CONSTRUCTION METHODS

1200-3.1 Ground Mounted Hose Reel, Hose Assembly and Hose. Refer to Operating Instructions Series D80000 Spring Driven Hose Reels for installation instructions of the Ground Mounted Hose Reel, Hose Assembly and Hose. The installation instructions include mounting, installing the input hose, installing the output hose.

METHOD OF MEASUREMENT

1200-4.1 This item shall be measured for the furnishing, hauling, and constructing the ground mounted hose reel (Reelcraft Heavy Duty Dual Pedestal Hose Reel, Part Number D83000 OLP or approved equal).

1200-4.2 This item shall be measured for the furnishing, hauling, and constructing the 10' hose assembly (Reelcraft Part Number S601034-10, ¾ inch by 10 feet in length or approved equal).

1200-4.3 This item shall be measured for the furnishing, hauling, and constructing the 75 foot hose (Reelcraft Part Number S601026-75, ¾ inch by 75 feet in length or approved equal).

BASIS OF PAYMENT

1200-5.1 This item will be paid for on the basis of the contract unit price per each for the ground mounted hose reel (Reelcraft Heavy Duty Dual Pedestal Hose Reel, Part Number D83000 OLP or approved equal), which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

1200-5.2 This item will be paid for on the basis of the contract unit price per each for a 10' hose assembly (Reelcraft Part Number S601034-10, ¾ inch by 10 feet in length) or approved equal, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

1200-5.3 This item will be paid for on the basis of the contract unit price per each for a 75 foot hose (Reelcraft Part Number S601026-75, ¾ inch by 75 feet in length) or approved equal, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item R-1200-1	Ground mounted hose reel (Reelcraft Heavy Duty Dual Pedestal Hose Reel, Part Number D83000 OLP) or approved equal**- per each**
Item R-1200-2	10' hose assembly (Reelcraft Part Number S601034-10, ¾ inch by 10 feet in length) or approved equal **- per each**
Item R-1200-3	75 foot hose (Reelcraft Part Number S601026-75, ¾ inch by 75 feet in length) or approved equal **- per each**

END OF ITEM R-1200

Operating Instructions

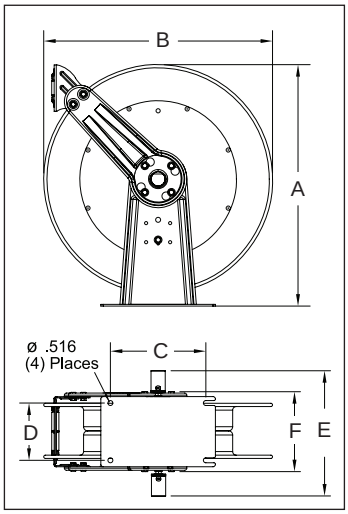
Series D80000 Spring Driven Hose Reels

Low and Medium Pressure Model Numbers:

D83000 OLP	FD83000 OLP	D83075 OLP-HTH
D83075 OLP	FD83075 OLP	D84050 OLP-HTH
D84000 OLP	FD84000 OLP	D84000 OMP
D84035 OLP	FD84035 OLP	D84050 OMP
D84050 OLP	FD84050 OLP	

IMPORTANT
Read this manual carefully before installing, operating or servicing this equipment.

Dimensional Data



	83000	84000
A	25.375”	25.375”
B	24”	24”
C	10.5”	10.5”
D	7.875”	7.875”
E	13”	15.75”
F	10.375”	10.375”

Personal Safety

Personal injury and/or equipment damage may result if proper safety precautions are not observed.

- Ensure that reel is properly installed before connecting input and output hoses.
- Bleed fluid/gas pressure from system before servicing reel.
- Before connecting reel to supply line, ensure that pressure does not exceed maximum working pressure rating of reel.
- Remember, even low pressure is very dangerous and can cause personal injury or death.
- Be aware of machinery and personnel in work area.
- If a leak occurs in the hose or reel, remove system pressure immediately.
- A high tension spring assembly is contained within the reel. Exercise extreme caution.
- Pull hose from reel by grasping the hose itself, not the control valve.
- If reel ceases to unwind or rewind, remove system pressure immediately. Do not pull or jerk on hose!
- Treat and respect the hose reel as any other piece of machinery, observing all common safety practices.

Form# 998-1099 Rev: 1/2018

Reelcraft Industries, Inc. • 2842 E Business Hwy 30, Columbia City, IN 46725
Ph: 800-444-3134 / 260-248-8188 • Fax: 800-444-4587 / 260-248-2605
Customer Service: 855-634-9109 • reelcraft@reelcraft.com • www.reelcraft.com

REELCRAFT®

INSTALLATION INSTRUCTIONS

WARNING: Ensure that reel, hose, and equipment are properly grounded. Use an ohmmeter to check ground continuity.

Mounting

CAUTION: Unless reel was specified differently when ordering, maximum installation height is 16 feet. Do not exceed this distance.

1. Unpack and inspect reel for damage. Turn by hand to check for smooth operation. Check for completeness.
2. Configure reel for top, side or bottom hose dispensing by removing the bolts (2) from one side of the guide roller bracket and loosening the four guide arm bolts (3) on each side of the hose reel. Rotate and remove each guide arm then reinstall in the desired configuration. If bottom wind is desired, bolts (13) and bolts (2) must be removed and replaced after the guide arm is in position.

CAUTION: When changing guide arm positions, the U-bolt must be placed in the proper location as instructed in figure A. The reel can "latch out" during use if this instruction is not adhered to.

3. Position reel on floor, wall, or ceiling. Secure into place using four (customer supplied) bolts.

Installing the Input Hose

WARNING: Ensure that supply line pressure does not exceed maximum working pressure rating of reel. Apply pipe thread sealant to all threads on standard reels. Do not overtighten connection. Recommended torque not to exceed 70 ft. lb.

CAUTION: Use flexible hose connection at input. Do not use rigid plumbing.

1. Apply thread sealant as directed and connect swivel (12) to main shaft input (5).
2. For standard shaft and swivel reels, connect customer supplied inlet hose (4) to swivel input as indicated in illustration.

Installing the Output Hose

WARNING: Use extreme caution; reel under tension. Avoid releasing latch mechanism.

CAUTION: Apply pipe thread sealant to all threads on standard reels. Do not overtighten connection. Recommended torque not to exceed 70 ft. lb.

1. Manually turn sheave (6) until spring is tight, back off 3 turns, then latch.
2. Route output hose (7) through roller bracket (1), U-bolts (8), then through cutout (9) in spool as indicated in illustration.
3. Connect output hose (7) to gooseneck (10) as indicated in illustration.
4. Verify U-bolt position conforms with guide arm position using label inside spool. Then tighten nuts (11) on U-bolt (8).
5. Charge hose. Momentarily open control valve to purge hose of gases. When fluid appears at control valve, close valve. With hose fully charged, release latch and wind output hose onto reel.
6. Install bumper stop assembly.

ADJUSTMENTS

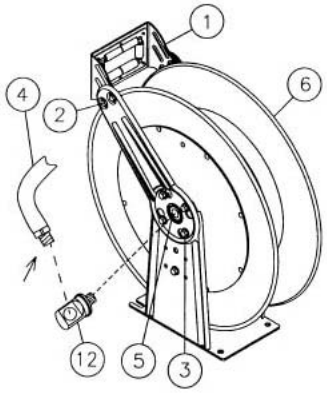
WARNING: Use extreme caution; reel under tension. Avoid releasing latch mechanism.

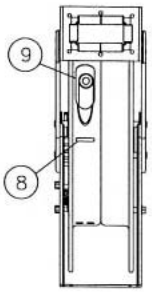
If necessary, adjust spring tension on reel by manually adding or removing wraps of hose from spool, one wrap at a time, until desired tension is obtained. Manually add wraps to increase tension. Remove wraps to decrease tension.

WARNING: Rewind hose on reel, then bleed pressure from system before performing the following procedures.

CAUTION: Remove all spring tension before disassembling the hose reel. Do not attempt to open the riveted spring case assembly.

1. Replace hoses in accordance with procedures given in "Installation Instructions" section of this manual.
2. All mating moving parts have been factory lubricated as required.





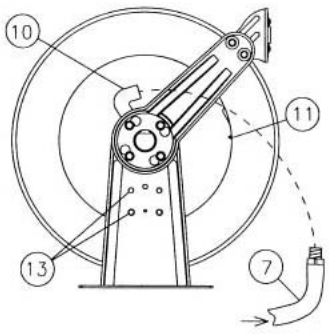
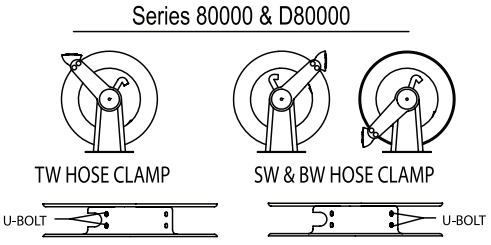
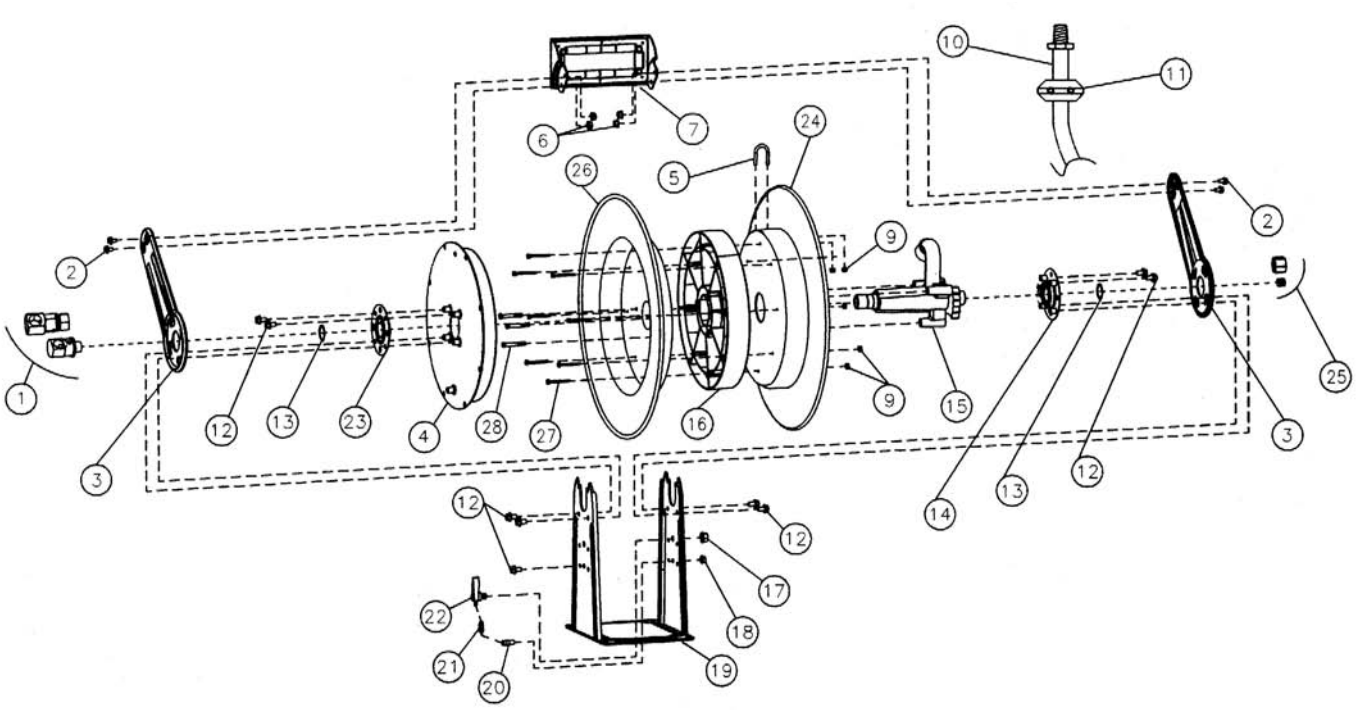


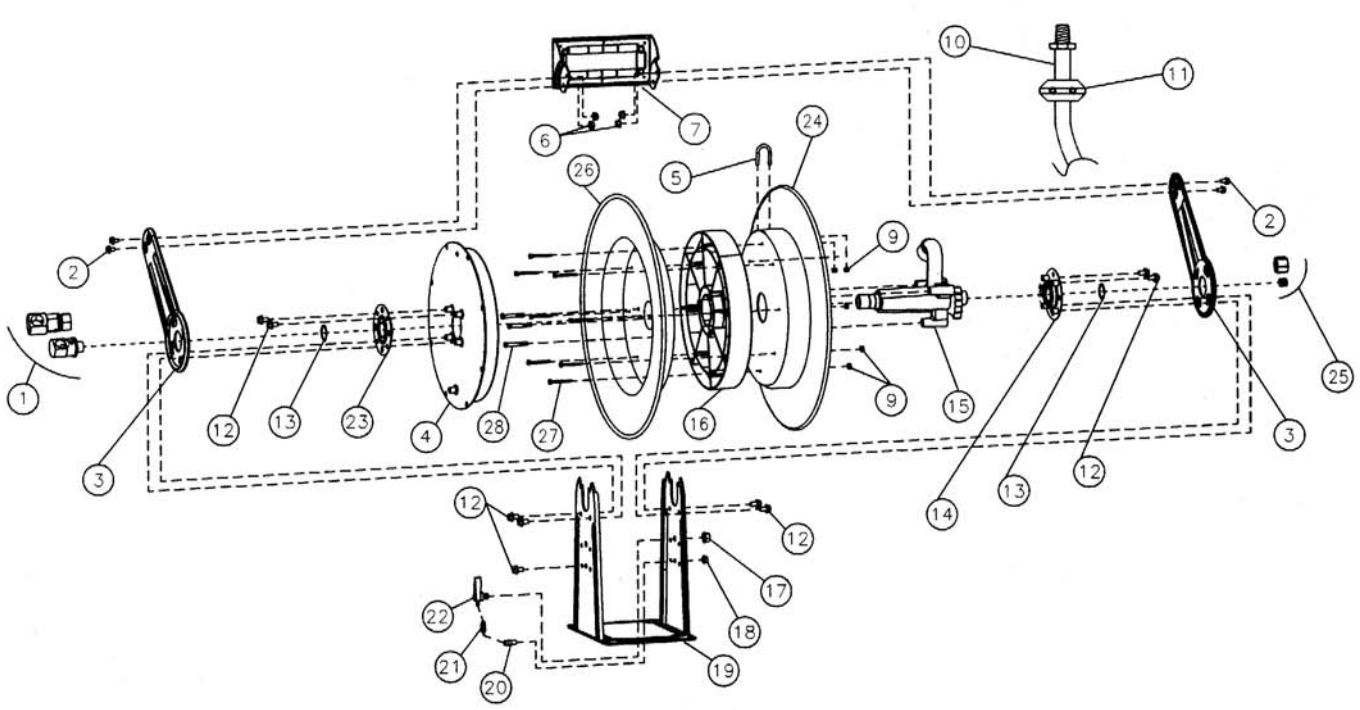
Figure A





ITEM	DESCRIPTION	QTY	D83000 OLP	D83075 OLP	D84000 OLP	D84035 OLP	D84050 OLP	FD83000 OLP	FD83075 OLP
1	Swivel assembly	1	S602026	S602026	S600682	S600682	S600682	S602026-2	S602026-2
2	5/16-18 x 1/2" flange screw	4	*	*	*	*	*	*	*
3	Guide arm	2	261299	261299	261299	261299	261299	261299	261299
4	Spring & case assembly	1	S600645-3	S600645-3	S600645-3	S600645-3	S600645-3	S600645-3	S600645-3
5	U-bolt	1	*	*	*	*	*	*	*
6	5/16-18 locknut	6	*	*	*	*	*	*	*
7	Roller bracket assembly	1	S600705	S600705	S600705	S600705	S600705	S600705	S600705
9	1/4-20 locknut	9	*	*	*	*	*	*	*
10	Hose assembly	1	None	S601026-75	None	601027-35	S601027-50	None	S600160-3
11	Bumper stop assembly	1	None	3-HR1004-3	None	4-HR1005	4-HR1005	None	3-HR1004-3
12	3/8-16 x 5/8" screw	9	*	*	*	*	*	*	*
13	1 3/8" snap ring	2	*	*	*	*	*	*	*
14	Flange w/bearing & nut-sert	1	S600651	S600651	S600651	S600651	S600651	S600651	S600651
15	Ratchet, flow casting	1	S261590-1	S261590-1	261591-1	261591-1	261591-1	S261590-1	S261590-1
16	Spool spacer	1	261393	261393	261393	261393	261393	261393	261393
17	1/2-20 x 5/8" hex nut	1	*	*	*	*	*	*	*
18	3/8-16 hex nut **	1	*	*	*	*	*	*	*
18	10-32 Nyloc nut	1	*	*	*	*	*	*	*
19	Base & upright assembly	1	600704	600704	600704	600704	600704	600704	600704
20	Latch spring stud **	1	261351	261351	261351	261351	261351	261351	261351
20	Shoulder screw	1	S393-2	S393-2	S393-2	S393-2	S393-2	S393-2	S393-2
21	Latch spring	1	S260067	S260067	S260067	S260067	S260067	S260067	S260067
22	Latch pawl assembly	1	S600018	S600018	S600018	S600018	S600018	S600018	S600018
23	Bearing & flange assembly	1	S600644	S600644	S600644	S600644	S600644	S600644	S600644
24	Sheave, hose opening	1	261307	261307	261307	261307	261307	261307	261307
25	Pipe plug	1	S183-54	S183-54	261396	261396	261396	S183-54	S183-54
26	Sheave, springcase	1	261308	261308	261308	261308	261308	261308	261308
27	Screw, 1/4-20 x 2 1/2"	8	S2-411	S2-411	S2-411	S2-411	S2-411	S2-411	S2-411
28	Screw, 5/16-18 x 2 1/2"	3	S2-511	S2-511	S2-511	S2-511	S2-511	S2-511	S2-511
---	Maximum pressure	--	500 PSI	250 PSI	500 PSI	250 PSI	250 PSI	500 PSI	50 PSI
---	Maximum temperature	--	210 °F	150 °F	210 °F	150 °F	150 °F	210 °F	150 °F

***Included in hardware kit part number 600654**
****Prior to March 2012**



ITEM	DESCRIPTION	QTY	FD84000 OLP	FD84035 OLP	FD84050 OLP	D83075 OLP-HTH	D84050 OLP-HTH	D84000 OMP	D84050 OMP
1	Swivel assembly	1	S600682-2	S600682-2	S600682-2	S602026-1	S600682-1	S600682-1	S600682-1
2	5/16-18 x 1/2" flange screw	4	*	*	*	*	*	*	*
3	Guide arm	2	261299	261299	261299	261299	261299	261299	261299
4	Spring & case assembly	1	S600645-3	S600645-3	S600645-3	S600645-3	S600645-3	262991	262991
5	U-bolt	1	*	*	*	*	*	*	*
6	5/16-18 locknut	6	*	*	*	*	*	*	*
7	Roller bracket assembly	1	S600705	S600705	S600705	S600705	S600705	S600705	S600705
9	1/4-20 locknut	9	*	*	*	*	*	*	*
10	Hose assembly	1	None	S600451-35	S600451-50	601146-75	601147-50	None	602765-50
11	Bumper stop assembly	1	None	4-HR1005	4-HR1005	3-HR1004-3	4-HR1005	None	4-HR1005
12	3/8-16 x 5/8" screw	9	*	*	*	*	*	*	*
13	1 3/8" snap ring	2	*	*	*	*	*	*	*
14	Flange w/bearing & nut-sert	1	S600651	S600651	S600651	S600651	S600651	S600651	S600651
15	Ratchet, flow casting	1	261591-1	261591-1	261591-1	S261590-1	261591-1	261591-1	261591-1
16	Spool spacer	1	261393	261393	261393	261393	261393	261393	261393
17	1/2-20 x 5/8" hex nut	1	*	*	*	*	*	*	*
18	3/8-16 hex nut **	1	*	*	*	*	*	*	*
18	10-32 Nyloc nut	1	*	*	*	*	*	*	*
19	Base & upright assembly	1	600704	600704	600704	600704	600704	600704	600704
20	Latch spring stud **	1	261351	261351	261351	261351	261351	None	None
20	Shoulder screw	1	S393-2	S393-2	S393-2	S393-2	S393-2	S393-2	S393-2
21	Latch spring	1	S260067	S260067	S260067	S260067	S260067	260067-1	260067-1
22	Latch pawl assembly	1	S600018	S600018	S600018	S600018	S600018	S600018	S600018
23	Bearing & flange assembly	1	S600644	S600644	S600644	S600644	S600644	S600644	S600644
24	Sheave, hose opening	1	261307	261307	261307	261307	261307	261307	261307
25	Pipe plug	1	261396	261396	261396	261396	261396	261396	261396
26	Sheave, springcase	1	261308	261308	261308	261308	261308	261308	261308
27	Screw, 1/4-20 x 2 1/2"	8	S2-411	S2-411	S2-411	S2-411	S2-411	S2-411	S2-411
28	Screw, 5/16-18 x 2 1/2"	3	S2-511	S2-511	S2-511	S2-511	S2-511	S2-511	S2-511
---	Maximum pressure	--	500 PSI	50 PSI	50 PSI	300 PSI	300 PSI	1500 PSI	1500 PSI
---	Maximum temperature	--	210 °F	150 °F	150 °F	212 °F (Air) 180 °F (Water)	212 °F (Air) 180 °F (Water)	210 °F	210 °F

***Included in hardware kit part number 600654**

****Prior to March 2012**

Item B-1300 Bollard

DESCRIPTION

1300-1.1 This item shall consist of furnishing, hauling, and constructing bollard in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

1300-2.1 Bollard The materials include concrete and yellow paint as shown in the construction plans.

CONSTRUCTION METHODS

1300-3.1 Bollard. The contractor shall construct the bollard as shown in the construction plans.

METHOD OF MEASUREMENT

1300-4.1 This item shall be measured for the furnishing, hauling, and constructing the bollard.

BASIS OF PAYMENT

1300-5.1 This item will be paid for on the basis of the contract unit price per each bollard, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item B-1300-1 Bollard **- per each**

END OF ITEM B-1300

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Item W-1400 Potable Water and Wastewater Main Piping and Appurtenances

DESCRIPTION

1400-1.1 This item shall consist of furnishing, hauling, and constructing potable water mains, wastewater mains, and appurtenances in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

1400-2.1 HDPE Pipe HDPE pipe for the water mains shall conform to the requirements of AWWA C901-17 (3/4" to 3") and shall be SDR 11 for all open cut and direct bury installations with a minimum depth of thirty-six (36) inches of cover. For shallower depth, the type of pipe and installation shall require City and Engineer approval prior construction. The manufacturer shall insure all quality control test and AWWA requirements are complied with during the production of HDPE pipe.

It can be manufactured with the color striping to identify application, such as a blue stripe for potable water, a green stripe for sewer applications and a purple stripe for reclaimed water.

1400-2.2 2 inch Backflow Assembly The materials shall include a 2" Backflow per the City of Venice Utility Detail.

1400-2.3 Electric Valve Actuator including stem The materials shall include an ASAHI/American Electric Valve Series 92 Actuator or approved equal and actuator stem or approved equal.

CONSTRUCTION METHODS AND TESTING

1400-3.1 Maintaining water service and shut downs The Contractor's attention is called to the fact that the existing system must be kept in operation at all times. Where connections are made to existing mains or other shutdowns are necessary, permission must be obtained and arrangements must be made with the Utilities Department for removing from service those mains that will be affected. Shutdowns must be held to a minimum in both number and duration.

No valve or other control device on the existing system shall be operated by the Contractor without first obtaining approval from the Utilities Department. The Contractor shall, at least forty-eight (48) hours in advance, notify citizens subject to interruption of service by means of door hangers or any other approved method of the starting time and duration of such interruption.

1400-3.2 Laying pipe All joints, fittings and other appurtenances shall not be covered until inspected by the City Inspector and Engineer. Non-compliance will require excavation of all joints and fittings.

Materials and construction pertaining to construction of water distribution systems shall be in accordance with the City and American Water Works Association (AWWA) Standards.

Prior to installation, all pipe shall be inspected for defects and all lump or excess coatings shall be removed. The inside of the bell and outside of the spigot shall be cleaned prior to joining of all pipe.

Caution shall be taken to prevent damage to the pipe during lowering into the trench. Caution shall be taken to prevent foreign matter from entering the pipe during installation. The Engineer may require covering of the end of the pipe to prevent debris from entering. No debris, tools, clothing or other material shall be placed in the pipe. After placement in the trench the spigot end of the pipe shall be centered in the bell and the pipe shall be driven home and then brought to the proper line and grade by tamping approved backfill material under it, except for the bell. Joint deflection shall not exceed manufacturer's limit. During the time that the pipe is in the trench but no work is in progress, the end shall be closed by a water-tight plug. This shall include the noon hour, as well as overnight. If there is water in the trench upon beginning work this plug shall remain in place until the trench has been pumped dry, unless otherwise approved by the Engineer. Standard plugs shall be inserted into all dead end pipes, tees or crosses; spigot ends shall be capped; flanged ends shall have blind flanges, or sheet metal or plywood caps. Plugs installed for pressure testing shall be fully secured and restrained to withstand the test pressure. Where plugging is required because of Contract division or phasing for later connection, the ends of such lines shall be equipped with a permanent type cast iron or ductile iron plug/cap or blind flange with or without a blowoff cock, as shown on the Drawings. Installation or removal of such plugging shall be considered incidental to the work and no payment shall be expected for this work by the Contractor.

1400-3.2 Handling All materials, unless otherwise directed, shall be unloaded as nearby as possible to the location of installation by the Contractor. Materials shall be handled with care to avoid damage. Materials shall be lifted by hoists or slid or rolled on skidways in such manner as to avoid shock. Under no circumstances shall materials be dropped. Pipe handled on skidways must not be allowed to roll against pipe already on the ground. The Contractor shall be responsible for the safe handling of all materials. Damaged materials shall not be installed. All materials found during the progress of work to have flaws, cracks, or other defects will be rejected by the Engineer regardless of whether or not it has been installed and shall be replaced by and at the expense of the Contractor. All PVC pressure pipe, upon delivery to the site and until such time as it is placed in the trench, shall be shielded from the weather and direct sunlight to prevent pipe deterioration. Materials shall not be stacked or placed under materials in such a manner that damage could result. Slings, hooks, or tongs used for lifting shall be padded in such a manner as to prevent damage to exterior surfaces, interior linings and components. If any part of the coating, lining or components is damaged, the repairs or replacement shall be made by the Contractor at his expense and in a manner satisfactory to the Engineer prior to attempting installation. The Contractor shall ensure that the equipment that will come into contact with the potable water is clean and sterilized by means of dipping or washing it in a highly concentrated solution of water and chlorine or as required by the Engineer.

1400-3.3 Valves Valves shall be set and joined to the pipe and each type of joint as specified for pipe.

1400-3.4 Tapping of mains The Contractor, after installing the sleeve and prior to making the tap, shall insure that the sleeve is providing a watertight joint by means of pressure testing with pressures in accordance with the City Pipeline Testing Requirements. If leaks are present, the Contractor will be required to repair them to the satisfaction of the Engineer.

1400-3.5 Potable water and wastewater mains Testing The Contractor shall test and disinfect in accordance with the City of Venice and AWWA requirements and specifications.

1400-3.6 Electric Valve Actuator including stem. Refer to the Ball Valve Type 21 Users Manual and Quarter Master Chief Series 92 Installation, Operation and Maintenance Manual for installation of the Electric Valve Actuator including stem.

METHOD OF MEASUREMENT

1400-4.1 This item shall be measured for the furnishing, hauling, constructing, directional drilling, testing and disinfection of the potable water or wastemain main including pipe bedding and back fill material.

1400-4.2 This item shall be measured for the furnishing, hauling, and constructing the ASAHI/American Valve Series 92 Actuator or approved equal and actuator stem or approved equal.

BASIS OF PAYMENT

1400-5.1 This item will be paid for on the basis of the contract unit price per linear foot for potable water and wastewater main, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

1400-5.2 This item will be paid for on the basis of the contract unit price per each for a ASAHI/American Electrical Valve Series 92 Actuator or approved equal and actuator stem or approved equal, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item W-1400-1	8 inch by 2 inch Tapping Saddle and 2 inch Valve - per each
Item W-1400-2	¾ inch hose bib - per each
Item W-1400-3	2 inch by ¾ inch reducer - per each
Item W-1400-4	¾ inch HDPE SDR 11 water line - per linear foot
Item W-1400-5	2 inch HDPE SDR 11 water line - per linear foot
Item W-1400-6	2 inch Backflow Assembly - per each
Item W-1400-7	2 inch ASAHI/American Electrical Valve Series 92 Actuator and actuator stem or approved equal. - per each
Item W-1400-8	4 inch ASAHI/American Electrical Valve Series 92 Actuator and actuator stem or approved equal. - per each
Item W-1400-9	1 ¼ inch HDPE SDR 11 force main - per linear foot
Item W-1400-10	3 inch SDR 11 forcemain sleeve by directional - per linear foot

END OF ITEM W-1400

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Section 4. Testing Requirements

The Engineer of Record shall provide testing specifications which are consistent with the following:

4.2 Gravity Sewer:

a) Compaction testing
   - Shall be performed on the upstream and downstream side of each manhole/structure.
   - Shall be performed at the mid-point of each run of pipe installed.
   - Shall be performed at 12" lifts, beginning at the springline of the pipe and alternate sides of the pipeline with each lift.
   - Shall be minimum of 98% of maximum compaction under pavement, 95% of maximum compaction under other surfaces as determined by AASHTO Method T-180.

b) Deflection Testing (Mandrel)
   - Shall be performed in accordance with ASTM D3034, latest revision.
   - Minimum mandrel diameter shall be 95% of the pipeline interior diameter.
   - Provide 48 hour advance notification to the City of Venice Engineering Department.

c) Air Test gravity lines and services
   - The maximum pressure drop allowable shall be one (1) pound per square inch (PSIG): Refer to Air Test Table below. The minimum initial test pressure shall be three and one half (3 1/2) pounds per square inch (PSIG) except when testing in areas with high water tables. For every foot of groundwater above the springline of the pipe, increase the test pressure by (0.43 PSIG). Maximum test pressure shall be nine (9) PSIG, or not exceeding manufacturer's recommendations. Provide 48-Hour advance notification to the City of Venice Engineering Department.

FROM THE UNI-BELL HANDBOOK OF PVC PIPE
SPECIFICATION TIME REQUIRED FOR A 1.0 PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED.
SEE DETAIL 4, NOTE 2c ON SHEET G-1 FOR TEST PRESSURE CALCULATION.
THE EOR SHALL PROVIDE TESTING SPECIFICATIONS CONSISTENT WITH THE FOLLOWING TABLE FOR PVC AND DIP:

1	2	3	4	SPECIFICATION TIME FOR LENGTH (L) SHOWN (MIN., SEC)								
PIPE DIAMETER (INCHES)	MINIMUM TIME (MIN:SEC)	LENGTH FOR MINIMUM (FEET)	TIME FOR LONGER (SECONDS)		100 FT.	150 FT.	200 FT.	250 FT.	300 FT.	350 FT.	400 FT.	450 FT.
4	3.46	597	0.380	L	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46
6	5.40	398	0.854	L	5.40	5.40	5.40	5.40	5.40	5.40	5.42	6.24
8	7.34	298	1.520	L	7.34	7.34	7.34	7.34	7.36	8.52	10.08	11.24
10	9.26	239	2.374	L	9.26	9.26	9.26	9.53	11.52	13.51	15.49	17.48
12	11.20	199	3.418	L	11.20	11.20	11.24	14.15	17.05	19.56	22.47	25.38
15	14.10	159	5.342	L	14.10	14.10	17.48	22.15	26.42	31.09	35.36	40.04
18	17.00	133	7.692	L	17.00	19.13	25.38	32.03	38.27	44.52	51.16	57.41
21	19.50	114	10.470	L	19.50	26.10	34.54	43.37	52.21	61.00	69.48	78.31
24	22.40	99	13.674	L	22.47	34.11	45.34	56.58	68.22	79.46	91.10	102.33
27	25.30	88	17.306	L	28.51	43.16	57.41	72.07	86.32	100.57	115.22	129.48
30	28.20	80	21.366	L	35.37	53.25	71.13	89.02	106.50	124.38	142.26	160.15
33	31.10	72	25.852	L	43.05	64.38	86.10	107.43	129.16	150.43	172.21	193.53
36	34.00	66	30.768	L	51.17	76.55	102.34	128.12	153.50	179.29	205.07	230.46

a.) FOR PIPE LENGTHS GREATER THAN FOUR HUNDRED FIFTY (450) FEET BUT LESS THAN LENGTH IN COLUMN 3, USE MINIMUM TIME IN COLUMN 2.	EXAMPLE: DETERMINE TEST TIME FOR 425 FEET OF TWELVE (12) INCH PVC.
b.) FOR PIPE LENGTHS GREATER THAN FOUR HUNDRED FIFTY FEET AND GREATER THAN LENGTH IN COLUMN 3, SUBTRACT LENGTH OF COLUMN 3 FROM ACTUAL PIPE LENGTH, THEN MULTIPLY DIFFERENCE BY TIME IN COLUMN 4 AND ADD TO TIME IN COLUMN 2.	CONVERT min:sec TO SECONDS (min. X 60) + sec: t400 = 360 s; 450=480s INTERPOLATE t425 = 363s + (408 - 363) X (425 - 400) T425 386s (450 - 400)
NOTE: INTERPOLATE BETWEEN VALUES ON TABLE AS SHOWN IN EXAMPLE FOR AIR TEST.	CONVERT SECONDS TO min:sec (386 sec/60) = 6.43 min. 6.43 min. = 6 min. + (60 X 0.43) t425 = 6 min. 26 sec. NOTE: FOR LENGTHS GREATER THAN FIVE HUNDRED (500) FEET CONTACT THE EOR.

d) Television Inspection

- Upon construction completion, any deflection causing a depth of water greater than 1/2" is unacceptable and must be repaired or replaced. The Owner shall provide an .mpg file of the television inspection for all gravity sewer piping being turned over to the City prior to acceptance of improvements.
- At time of one-year warranty inspection, any deflection causing a depth of water greater than 1" is unacceptable and must be repaired or replaced. The Owner shall provide an .mpg file of the television inspection for all gravity sewer piping turned over to the City prior to City release of the maintenance bond.

4.4 Pressure Mains (Potable, Reclaimed, Force Mains):

a) Compaction testing shall be performed every 250 feet.
b) Pressure Test (Main)
   - Prior to testing, all air must be expelled from the pressure main.
   - Test pressure shall be: Water (Potable & Reclaimed) Mains: 150 PSI
     Force (Wastewater) Mains: 100 PSI
   - Test pressure shall be held for a minimum of 2 hours
   - Allowable leakage shall be calculated with the following:

     $L = S D \sqrt{P} / 148{,}000$

     L= Allowable leakage, GPH
     S= Length of pipe tested, FT
     D= Diameter of pipe, IN
     P= Average test pressure, PSI
c) Contact the Building Department for Fire Service testing requirements and scheduling.
d) Pressure Test (Tapping sleeve & valve) shall be in conformance with these Standards.
e) Bacteriologic testing of Potable Mains shall be coordinated through COV Utilities Dept. and in conformance with State of Florida Department of Health. Bacterial sample shall be taken by a certified laboratory or FDOH Personnel only.
f) For all water needed for flushing, pressure testing or bacteriological sampling, please provide 48 hours advance notice to the City of Venice Utilities Department (941) 480-3333. The City will operate all valves.
g) Disinfecting of water mains must follow ANSI/AWWA 651-99 and must be witnessed by City Utilities. 48-Hr. (480-3333). Disinfection plan to be submitted to COV Utilities Dept. for review & approval prior to scheduling disinfection.
h) Force Mains shall be a minimum of 4" in diameter.
i) There shall be no lead products used in any Potable Water infrastructure including pipes, fittings or joints.

4.5 Backflow Assemblies:

a) Backflow Assemblies shall be tested upon installation In accordance with the City's Cross Connection Control Program Manual. Results shall be submitted to the Utilities Department within 72 hours.

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Serial No.	H-V027-E-15

Ball Valve Type 21･21α

Nominal size 15 - 100mm (1/2 - 4")

User's Manual

Contents

ASAHI YUKIZAI CORPORATION

This user's guide contains very important information for the proper installation, maintenance and safe use of an ASAHI AV Product. Please store this manual in an easily accessible location.

<Warning & Caution Signs>

 Warning	This symbol reminds the user to take caution due to the potential for serious injury or death.
 Caution	This symbol reminds the user to take caution due to the potential for damage to the valve if used in such a manner.

<Prohibited & Mandatory Action Signs>

	Prohibited: When operating the valve, this symbol indicates an action that should not be taken.
	Mandatory action: When operating the valve, this symbol indicates mandatory actions that must be adhered to.

(1) Be sure to read the following warranty clauses of our product

- Always observe the specifications of and the precautions and instructions on using our product.
- We always strive to improve product quality and reliability, but cannot guarantee perfection. Therefore, should you intend to use this product with any equipment or machinery that may pose the risk of serious or even fatal injury, or property damage, ensure an appropriate safety design or take other measures with sufficient consideration given to possible problems. We shall assume no responsibility for any inconvenience stemming from any action on your part without our written consent in the form of specifications or other documented approval.
- The related technical documents, operation manuals, and other documentation prescribe precautions on selecting, constructing, installing, operating, maintaining, and servicing our products. For details, consult with our nearest distributor or agent.
- Our product warranty extends for one and a half years after the product is shipped from our factory or one year after the product is installed, whichever comes first. Any product abnormality that occurs during the warranty period or which is reported to us will be investigated immediately to identify its cause. Should our product be deemed defective, we shall assume the responsibility to repair or replace it free of charge.
- Any repair or replacement needed after the warranty period ends shall be charged to the customer.
- The warranty does not cover the following cases:
  (1) Using our product under any condition not covered by our defined scope of warranty.
  (2) Failure to observe our defined precautions or instructions regarding the construction, installation, handling, maintenance, or servicing of our product.
  (3) Any inconvenience caused by any product other than ours.
  (4) Remodeling or otherwise modifying our product by anyone other than us.
  (5) Using any part of our product for anything other than the intended use of the product.
  (6) Any abnormality that occurs due to a natural disaster, accident, or other incident not stemming from something inside our product.

(2) General operating instructions

Warning

- Using a positive-pressure gas with our plastic piping may pose a dangerous condition due to the repellent force particular to compressible fluids even when the gas is under similar pressures used for liquids. Therefore, be sure to take the necessary safety precautions such as covering the piping with protective material. For inquiries, please contact us. For conducting a leak test on newly installed piping, be sure to check for leaks under water pressure. If absolutely necessary to use a gas in testing, please consult your nearest service station beforehand.
- Certain liquid such as H_2O_2, NaClO, etc may be prone to vaporization (Off-Gassing) which may cause irregular pressure increases, which may destroy the valve.

Caution

- Do not step on or apply excessive weight on valve. (It can be damaged.)
- Do not use the valve to fluid containing slurry. (The valve will not operate properly.)
- Do not use the valve in conditions where the fluid may have crystallized. (The valve will not operate properly.)
- Keep the valve away from excessive heat or fire. (It can be damaged, or destroyed.)
- Always operate the valve within the pressure vs. temperature range. (The valve can be damaged or deformed by operating beyond the allowable range.)
- Allow sufficient space for maintenance and inspection.
- Select a valve material that is compatible with the media. For chemical resistance information, refer to "CHEMICAL RESISTANCE ON ASAHI AV VALVE". (Some chemicals may damage incompatible valve materials.)
- Keep the valve out of direct sunlight, water and dust. Use cover to shield the valve. (The valve will not operate properly.)
- Perform periodic maintenance. (Leakage may develop due to temperature changes or periods of prolonged storage, rest, or operation.)

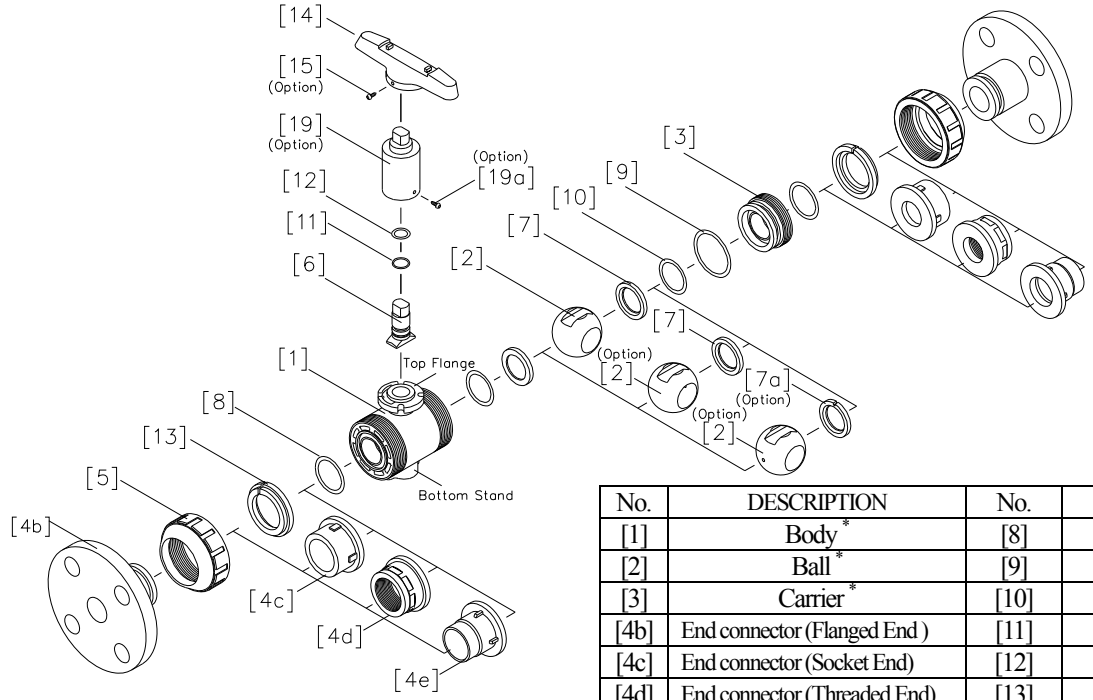
(3) General instructions for transportation, unpacking and storage

Warning - When suspending and supporting a valve, take care and do not stand under a suspended valve.

Caution - This valve is not designed to handle impacts of any kind. Avoid throwing or dropping the valve.
- Avoid scratching the valve with any sharp object.
- Do not over-stack cardboard shipping boxes. Excessively stacked packages may collapse.
- Avoid contact with any coal tar creosote, insecticides, vermicides or paint.
  (These chemicals may cause damage to the valve.)
- When transporting a valve, do not carry it by the handle.
- Store products in their corrugated cardboard boxes. Avoid exposing products to direct sunlight, and store them indoors (at room temperature). Also avoid storing products in areas with excessive temperatures. (Corrugated cardboard packages become weaker as they become wet with water or other liquid. Take care in storage and handling.)
- After unpacking the products, check that they are defect-free and meet the specifications.

(4) Name of parts

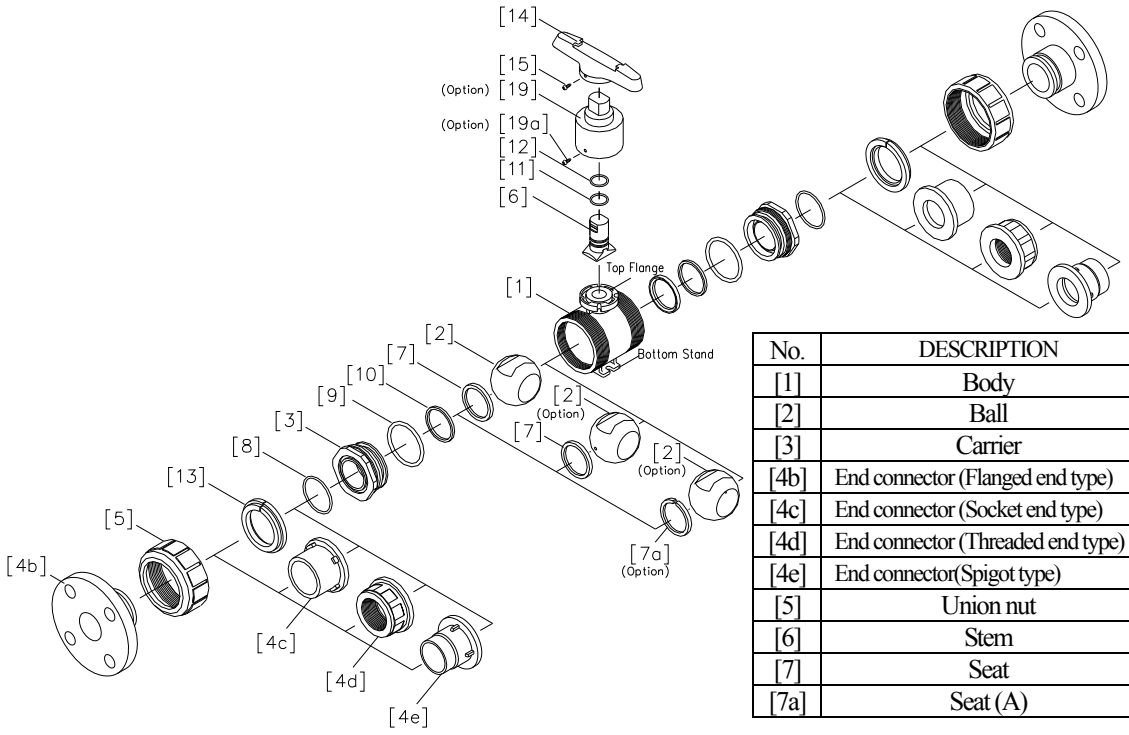
Nominal Size: 15-50mm (1/2”-2”)



No.	DESCRIPTION	No.	DESCRIPTION
[1]	Body *	[8]	O-ring (A)
[2]	Ball *	[9]	O-ring (B) *
[3]	Carrier *	[10]	O-ring (C) *
[4b]	End connector (Flanged End)	[11]	O-ring (D)
[4c]	End connector (Socket End)	[12]	O-ring (E)
[4d]	End connector (Threaded End)	[13]	Stop ring
[4e]	End connector (Spigot End) *	[14]	Handle
[5]	Union nut	[15]	Tapping screw (A)
[6]	Stem *	[19]	Extension stem
[7]	Seat *	[19a]	Tapping screw (B)
[7a]	Seat (A) *		

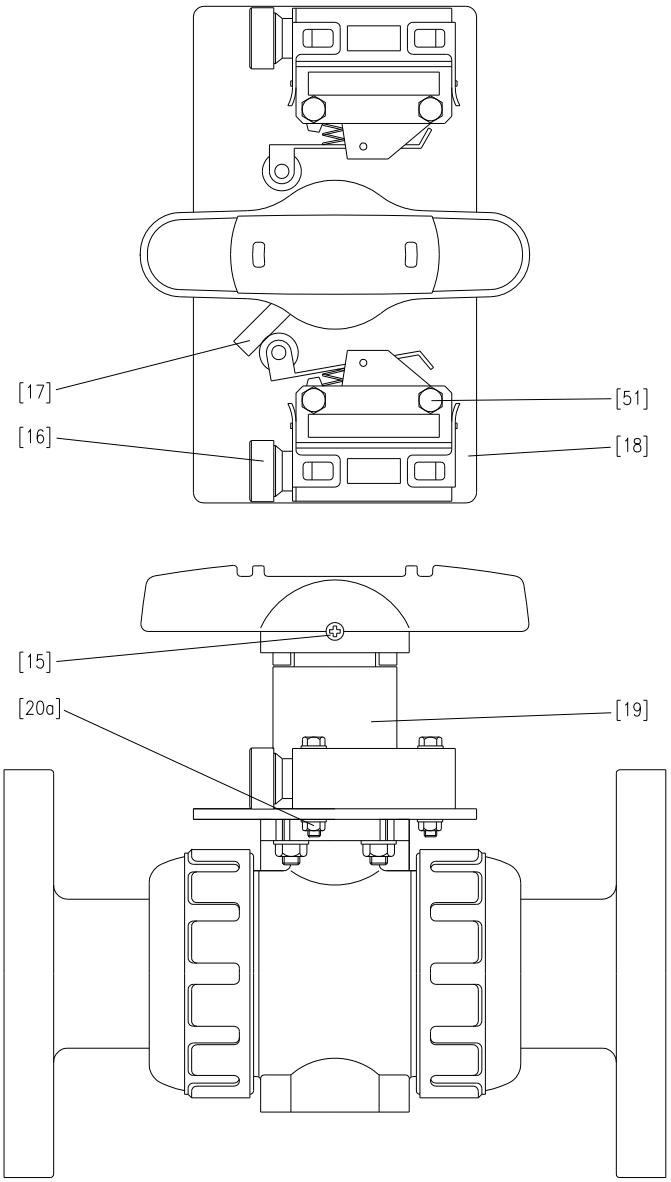
*Type21 and 21α have not all same parts to make one complete.
As for details, please consult your nearest service station beforehand.

Nominal Size: 65-100mm (2 1/2”-4”)



No.	DESCRIPTION	No.	DESCRIPTION
[1]	Body	[8]	O-ring (A)
[2]	Ball	[9]	O-ring (B)
[3]	Carrier	[10]	Cushion
[4b]	End connector (Flanged end type)	[11]	O-ring (C)
[4c]	End connector (Socket end type)	[12]	O-ring (D)
[4d]	End connector (Threaded end type)	[13]	Stop ring
[4e]	End connector(Spigot type)	[14]	Handle
[5]	Union nut	[15]	Tapping screw (A)
[6]	Stem	[19]	Extension stem
[7]	Seat	[19a]	Tapping screw (B)
[7a]	Seat (A)		

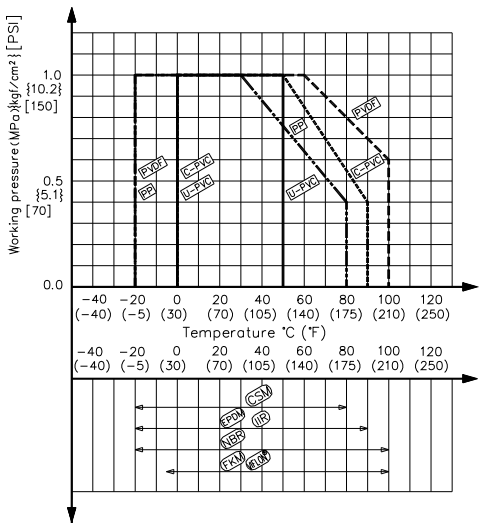
Nominal Size: 15-100mm (1/2”-4”) with Limit Switch (Option)



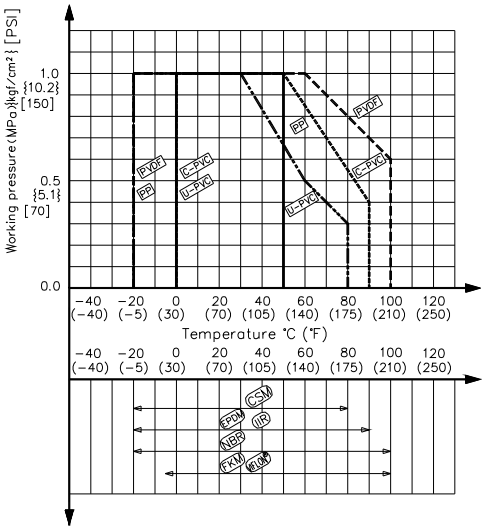
No.	DESCRIPTION	No.	DESCRIPTION
[15]	Tapping screw (A)	[19]	Extension stem
[16]	Limit switch	[20a]	Bolt･Nut(A)
[17]	Limit switch rod	[51]	Bolt･Nut (F)
[18]	Bracket (A)		

(5) Working pressure vs. temperature

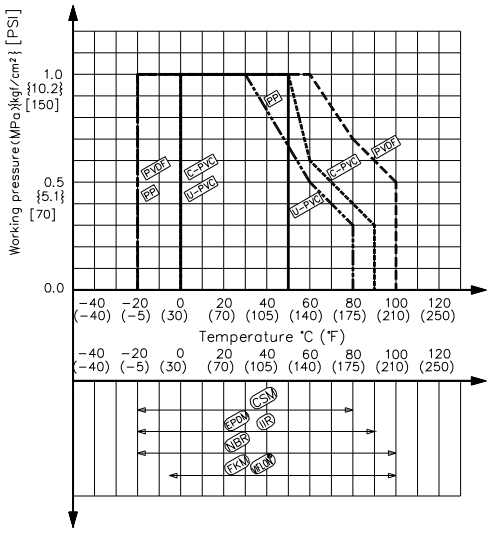
Nominal size: 15mm - 50mm (1/2" - 2")



Nominal size: 65mm (2 1/2")



Nominal size: 80mm, 100mm (3", 4")



(6) Specification of valve body

*Specification of Type 21 & Type 21α

Nominal size	Body material			
	PVC	C-PVC	PP	PVDF
15-50mm (1/2"-2")	Type21α		Type21	
65-100mm (2 1/2"-4")				

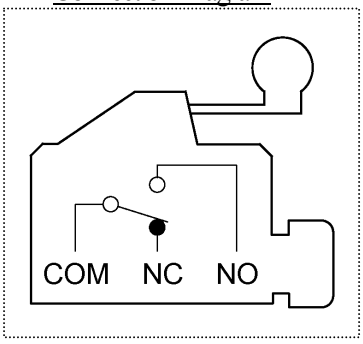
(7) Specification of limit switch (option)

Nominal Size	Type Code	Protection Grade
15 - 100mm (1/2 - 4")	SL1-P	IP67

Limit Switch Rating

Rate Voltage (V)	Resistive Load (A)	Inductive Load (A)
AC125	5	3
AC250	5	3
DC8	5	3
DC14	5	3
DC30	5	3
DC115	0.5	0.1
DC230	0.25	0.05

Connection Diagram



(8) Installation procedure

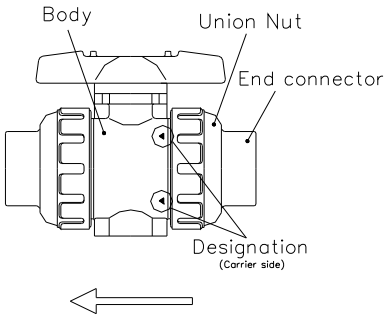
Warning

- When suspending and supporting a valve, take care and do not stand under a suspended valve.

- Be sure to conduct a safety check on all hand and power tools to be used before beginning work.
- Wear protective gloves and safety goggles as fluid remain in the valve even if the pipeline is empty. (You may be injured.)

Caution

- When installing a pipe support by means of a U-band or something similar, take care not to over-tighten. (Excessive force may damage the pipe.)
- When installing pipes and valves, ensure that they are not subjected to tension, compression, bending, impact, or other excessive stress.
- When installing a piece of equipment at the end of the piping line, be sure to keep the secondary (Downstream) End Connector and Union Nut installed on the valve.
- When installing Ball Valve, 15 to 50 mm (1/2" to 2") at the end, note the direction of flow. (Find the mark ◀ molded on the Carrier-side body. On the secondary (Downstream) side, the Carrier is integral with the valve body. This is the preferred method if installation when installing the equipment at the end of the line for safety purposes.)



- When installing, disassembling, or reassembling the piping, fix the End Connector.
- Before a water test, be sure that the Union Nut is tightly fastened.
- Fasten the Union Nut while avoiding the parallelism and axial misalignment of the flange surface.
- When connecting an ASAHI AV Valve to metal piping, take care not to let the pipe stress on the ASAHI AV Valve.
- When screwing in a Metal Insert (Ensat), install it vertically. Refer to the User's Manual for Metal Insert (Ensat) by the Maker.
- When loosening the union nut on the union side, fix the body cap (hold it with your hand) and do work. (If the body cap turns, the union will turn together, resulting in the union and ball separating from the body.) If the union is loosened, retighten the union.
- Take care not to over-tighten the Union Nut. (The valve can be damaged.)
- Do not use the pipe wrench. (The valve can be damaged.)

Flanged End (End connector materials: PVC, C-PVC, PP, PVDF,)

Caution
- Use flat faced flanges for connection to AV Valves.
- Ensure that the mating flanges are of the same standards.
- Be sure to use sealing gaskets (AV Gasket), bolts, nuts, and washers and tighten them to specified torques. (When a non-AV gasket is used, a different tightening torque specification should be followed.)

Necessary items

- Torque wrench
- AV gasket
- Spanner wrench
- Bolt, Nut, Washer (For many flanges specification)

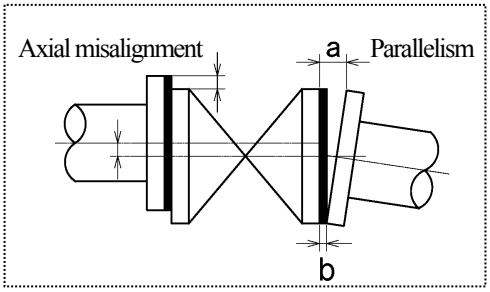
Procedure

1) When the union nut [5] flange assembly set was removed or loosen from body [1], O-ring (A) [8] should be installed into carrier and body groove. (In either horizontal or vertical installation, if necessary apply a small amount of lubricant to O-ring to hold in place.) Align union nut and end connector with the body. Insure end connector mates with body and O-ring. Make certain union nut threads onto body smoothly. Tighten union nuts on each side valve until hand tight. Then using a strap wrench tightens union nuts uniformly on each side approx 90° -180° turns, 1/4 to 1/2 turns.
2) Set the AV gasket between the flanges.
3) Insert washers and bolts from the pipe side, insert washers and nuts from the valve side, then temporarily tighten them by hand.

Caution
- The parallelism and axial misalignment of the flange surface should be under the values shown in the following table to prevent damage the valve.
(A failure to observe them can cause destruction due to stress application to the pipe)

Unit : mm (inch)

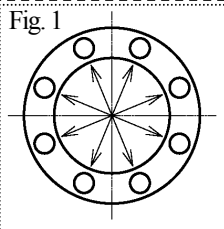
Nom. Size	Axial Misalignment	Parallelism (a-b)
15-32mm (1/2”-1 1/4”)	1.0mm (0.04”)	0.5mm (0.02”)
40-80mm (1 1/2”-3”)	1.0mm (0.04”)	0.8mm (0.03”)
100mm (4”)	1.0mm (0.04”)	1.0mm (0.04”)



4) Tighten the bolts and nuts gradually with a torque wrench to the specified torque level in a diagonal manner. (Refer to fig.1.)

Caution
- Tighten the bolts and nuts gradually with a torque wrench to the specified torque level in a diagonal manner.

Fig. 1



Recommended torque value　　Unit: N·m{kgf·cm}[lb·inch]

Nom. Size	15-20mm (1/2"-3/4")	25-40mm (1"-1 1/2")	50, 65 mm (2", 2 1/2")	80, 100 mm (3", 4")
PTFE·PVDF coated	17.5{179}[155]	20.0{204}[177]	22.5{230}[230]	30.0{306}[266]
Rubber	8.0 {82} [71]	20.0 {204} [177]	22.5 {230} [230]	30.0 {306} [266]

Threaded End (End connector materials: PVC, C-PVC, PP, PVDF)

Caution

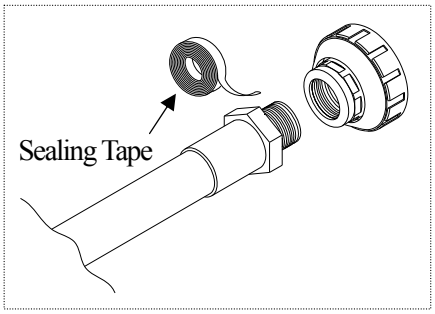
- Avoid excessive tightening. (The valve can be damaged.)
- Make sure that the threaded connections are plastic x plastic. (Metallic thread can cause damage.)
- Wrap the threaded joints on our plastic piping with sealing tape. Using a liquid sealing agent or liquid gasket may cause stress cracks (Environmental Stress Cracking). Our product warranty shall not apply in case of said use, even when said use is unavoidable.

Necessary items

- Sealing tape
- Strap wrench
- Spanner wrench

Procedure

1) Wind a sealing tape around the external thread of joint, leaving the end (about 3mm) free.
2) Loosen the union nut [5] with a strap wrench.
3) Remove the union nut [5] and the end connector [4d].
4) Tighten the external thread of the joint and the end connector [4d] hardly with hand.
5) Using a spanner wrench, screw in the end connector [4d] by turning 180° -360° carefully without damaging it.
6) Make sure that the O-ring (A) [8] is mounted.
7) Set the end connector [4d] and union nut [5] directly on the body without allowing the O-ring (A) [8] to come off.
8) Tighten union nuts [5] on each valve until hand tight.
9) Using a strap wrench tighten union nuts uniformly on each side approx 90° -180° turns, 1/4 to 1/2 turns.



Socket End (End connector materials: PVC, C-PVC)

Warning
- When using an adhesive, ventilate the space sufficiently, prohibit the use of a fire in the vicinity, and do not inhale adhesive vapors directly.
- If an adhesive gets into contact with your skin, wash it off immediately. If you feel sick or find any anomaly, receive a physician's diagnosis and take appropriate measures promptly.

Caution
- Take care in doing work at low temperatures. Solvent vapors are hard to evaporate and are likely to remain. (Solvent cracks may occur, damaging the equipment.) After assembling the piping system, open both ends of the piping and use a fan (of the Low-Voltage Type) or something similar to ventilate the space, thus removing the solvent vapors.
- Use the appropriate Asahi AV cement.
- Conduct a water test at least 24 hours after joining the pipes with an adhesive/cement.

Necessary items
- Adhesive for hard vinyl chloride pipes
- Strap wrench

Procedure

1) Loosen the union nut [5] with a strap wrench.
2) Remove the union nut [5] and end connector [4c].
3) Lead the union nut through the pipe.
4) Clean the hub part of the end connector [4c] by wiping the waste cloth.
5) Apply adhesive evenly to the hub part of the end connector [4c] and the pipe spigot.

Caution
- Do not apply more adhesive than necessary. (The valve can be damaged due to solvent cracking.)

Adhesive quantity (guideline)

Nom. Size	15mm (1/2")	20mm (3/4")	25mm (1")	32mm (1 1/4")	40mm (1 1/2")	50mm (2")	65mm (2 1/2")	80mm (3")	100mm (4")
Quantity(g)	1.0	1.3	2.0	2.4	3.5	4.8	6.9	9.0	13.0

6) After applying adhesive, insert the pipe quickly to the end connector [4c] and leave it alone for at least 60 seconds.

Caution
- Do not under any circumstances try to insert a pipe into another fitting or valve by striking it, which may break the piping.

7) Wipe away overflowing adhesive.
8) Make sure that O-ring(A) [8] is mounted
9) Set the end connector [4c] and union nut [5] directly on the body without allowing the O-ring (A) [8] to come off.
10) Tighten union nut [5] hardly with hand.
11) Using a strap wrench tighten union nuts uniformly on each side approx 90° -180° turns, 1/4 to 1/2 turns.

Socket End (End connector materials: PP, PVDF)

Necessary items

- Strap wrench
- Sleeve welder or automatic welding machine
- User's manual for sleeve welder or automatic welding machine

Procedure

1) Loosen the union nut with a strap wrench.
2) Remove the union nut [5] and the end connector.
3) Lead the union nut [5] through the pipe.
4) For the next step, refer to the user's manual for the sleeve welder or the automatic welding machine.
5) After welding, make sure that the O-ring (A) [8] is mounted.
6) Set the end connector [4c] and the union nut [5] directly without allowing the O-ring (A) [8] to come off.
7) Tighten union nut [5] hardly with hand.
8) Using a strap wrench tighten union nuts uniformly on each side approx 90° -180° turns, 1/4 to 1/2 turns.

Spigot End (End connector materials: PP, PVDF)

Necessary items

- Strap wrench
- Automatic welding machine
- User's manual for automatic welding machine

Procedure

1) Loosen the union nut with a strap wrench.
2) Remove the union nut [5] and the end connector.
3) Lead the union nut [5] through the pipe.
4) For the next step, refer to the user's manual for the sleeve welder or the automatic welding machine.
5) After welding, make sure that the O-ring (A) [8] is mounted.
6) Set the end connector [4e] and the union nut [5] directly without allowing the O-ring (A) [8] to come off.
7) Tighten union nut [5] hardly with hand.
8) Using a strap wrench tighten union nuts uniformly on each side approx 90° -180° turns, 1/4 to 1/2 turns.

(9) Connection of limit switch procedure (option)

Warning - Shut down the power on the equipment before connecting wires. There are risks of electrical shock depending on the level of operating voltage.

Caution - Connect the cables by using insulated sheathed crimping terminals in such a way as not to contact the cover or housing. (Contact of a crimping terminal with the cover may disable the cover from being closed or may cause a ground fault.)

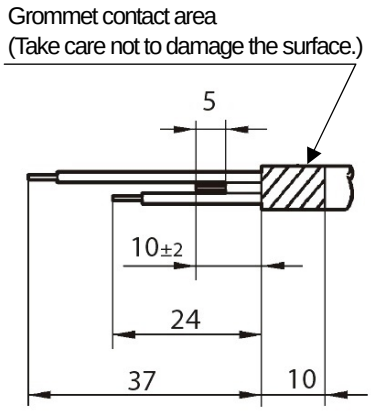
- Be sure that the terminal cover and body cover are put on during the operation.

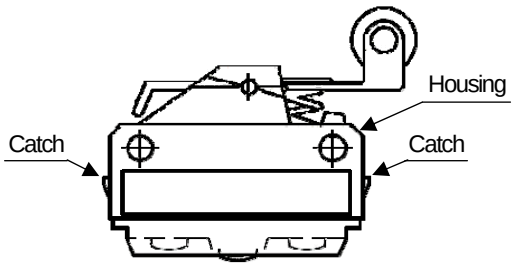
Necessary items

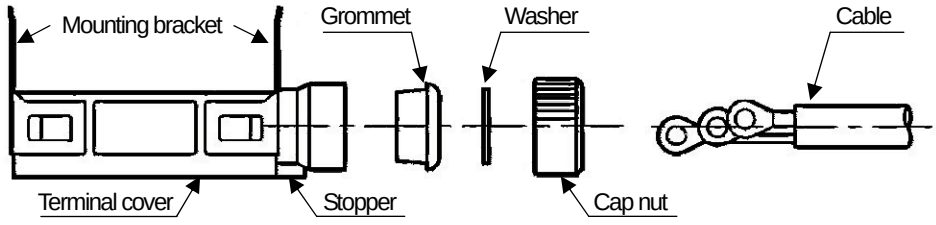
- Screw driver (+)
- Screw driver (-)
- Connector (G1/2)
- Wire stripper
- Terminal crimping tool

Procedure

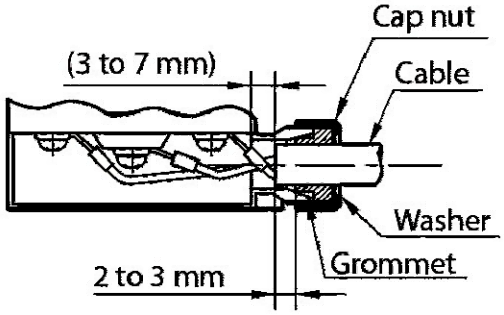
1) Cut and strip wires as shown figure right.
2) Attach M3 ring crimp terminals with insulating sleeves.
   (If bare crimp terminals are used, a short circuit may occur.)
3) Remove the terminal cover from the housing by using a screw driver (-).
4) Draw a cable through each part as shown in the figure below.







5) Connect the crimp style terminal to the terminal board with a screw driver.



6) Attach the terminal cover to the housing.
7) Set the seal and washer, and tighten the nut to the terminal cover.

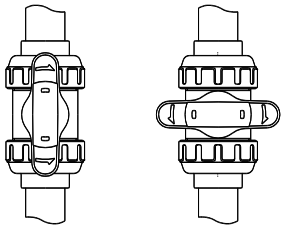
(10) Operating procedure

Caution
- Do not exert excessive force in closing the valve.
- Do not use the valve to fluid containing slurry. (The valve will not operate properly.)
- The installed valve must never be opened or closed when foreign matter such as sand is present in the pipeline.
- When operating the handle, be sure to do so with your hand. (Using a tool may damage the handle.)
- Before opening or closing a lubricant free product, be sure to apply water.

○ Turn the handle gently to open or close.
(Turn the handle clockwise to close and counter clockwise to open.)

Fully closed ····· The position of the handle should be perpendicular to the pipe.

Fully opened ····· The position of the handle should be parallel to the pipe.



Fully opened　　Fully closed

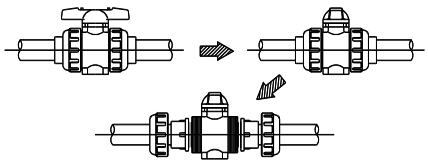
(11) Method of adjusting face pressure between ball and seat

Caution
- Take care not to over-tighten the Union Nut. (The valve can be damaged.)
- Do not use the pipe wrench. (The valve can be damaged.)

Necessary items
- Strap wrench
- Protective gloves
- Safety goggles
- Screwdriver (+)　(only with nominal size 65-100mm)

Procedure

1) Completely discharge fluid from pipes.
2) Turn the handle to full close.
3) Loosen the right union nut and the left one [5] with a strap wrench.
4) Remove the body part from piping system.



Caution
- If you do work with the piping installed, drain the piping of all its fluid. Some fluid will remain in the valve. Therefore wear protective goggles and protective gloves.
(You may otherwise get injured.)

5) Pull the handle off the body part.
As for nominal size 65-100mm (2 1/2"-4"), loosen the screw [15] properly with a screwdriver before pulling it off.

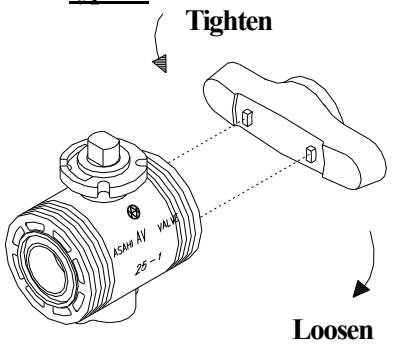
6) Engage the upper convex part of the handle with the concave part of the union [3].
As for nominal size 15-50mm Only the union [3] on the right side when viewed from the trademark (AV mark) can be adjusted.
As for nominal size 65-100mm adjust the unions on both sides.

7) Male an adjustment by turning the union [3] clockwise or counter clockwise.
- Tighten the union
  Ball Valve Type 21: Clockwise
  Ball Valve Type 21α: Counter clockwise
- Loosen the union
  Ball Valve Type 21: Counter clockwise
  Ball Valve Type 21α: Clockwise

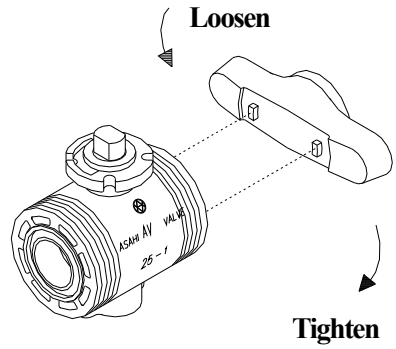
8) Make sure that the handle can be operated smoothly.

9) Assemble the valve by following the above procedure in the reverse order, starting at 6)

Ball valve **type 21**



Ball valve **type 21α**



(12) Disassembling method for replacing parts

Warning
- Be sure to conduct a safety check on all hand and power tools to be used before beginning work.
- Wear protective gloves and safety goggles as fluid remain in the valve even if the pipeline is empty. (You may be injured.)
- Do not change or replace valve parts under line pressure.

Caution
- Take care not to over-tighten the Union Nut. (The valve can be damaged.)
- Do not use the pipe wrench. (The valve can be damaged.)
- When installing, disassembling, or reassembling the piping, fix the End Connector.
- Before a water test, be sure that the Union Nut is tightly fastened.
- Fasten the Union Nut while avoiding the parallelism and axial misalignment of the flange surface.
- When connecting an ASAHI AV Valve to metal piping, take care not to let the pipe stress on the ASAHI AV Valve.
- Ball valve type 21・21α has the case of incompatible for a part of parts. (parts: Body[1], Ball[2], Carrier[3], Stem[6], Seat[7])

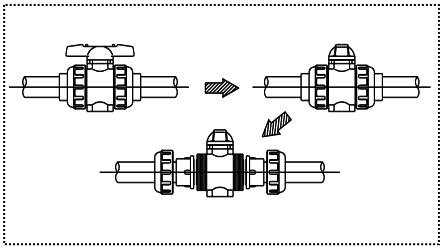
Necessary items
- Strap wrench
- Protective gloves
- Safety goggles

Caution
- If you do work with the piping installed, drain the piping of all its fluid. Some fluid will remain in the valve. Therefore wear protective goggles and protective gloves. (You may otherwise get injured.)

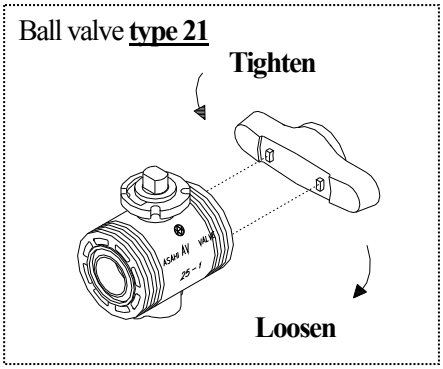
<Disassembly>

Procedure

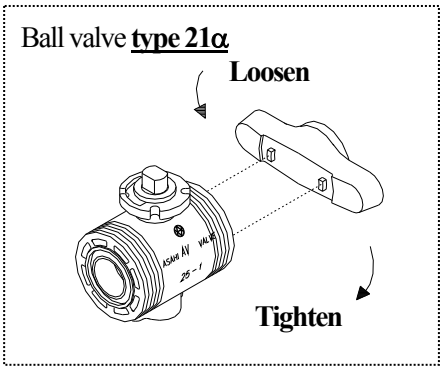
1) Completely discharge fluid from pipes.
2) Turn the handle to full close.
3) Loosen the right union nut and the left one [5] with a strap wrench.
4) Remove the body part from piping system.
5) Pull the handle off the body part.
   Engage the upper convex part of the handle with the concave part of the union.
6) In the engaged state, turn the handle [14] counter clockwise to loosen it and remove the union [3].
7) Remove the seat [7] carefully by hand without damaging it.
8) Push out the ball [2] by hand.
9) Push out the stem [6] from the top flange side to the body side.



Ball valve **type 21**



Ball valve **type 21α**



Caution

- As for nominal size 15-50mm. Only the carrier on the right side when viewed from the trademark (AV mark) can be adjusted.
  As for nominal size 65-100mm, adjust the carriers on both sides.

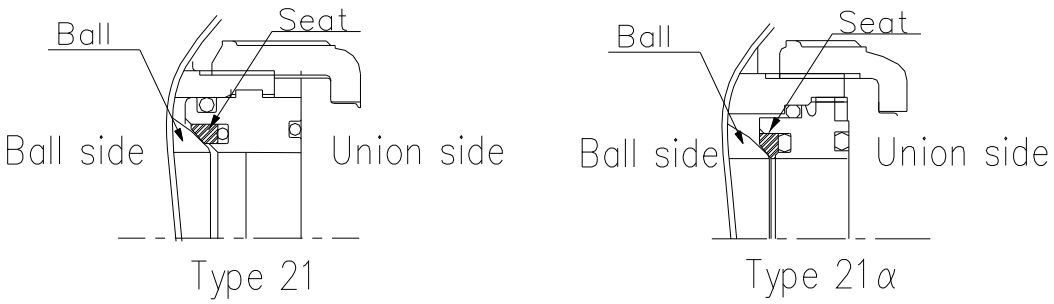
<Assembly>

Procedure

Carry out the assembly work in the reverse procedure from item 10)

Caution

- Before assembling PTFE seat in to the carrier, check the seat for seat face to touch the boll.



(13) Mounting actuator, metal ensat and base (Panel), install the locking device

○ Attach actuator to the top flange

Procedure

1) Remove the handle [14].
   As for nominal 65mm-100mm, tighten the screw [15] properly before removing it.

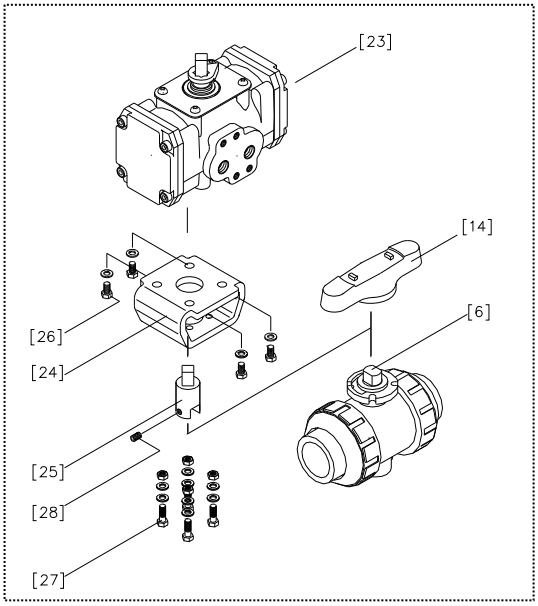
2) Fix the stand [24] to actuator [23] with bolt (A).

3) Fix the stem [6] to the joint [25] with screw (B) [28].

4) Engage the joint [25] with actuator [23].

5) Fix the stand [24] to the top flange with bolt-nut (B) [27].

6) Make sure that the valve works smoothly, by operating actuator [23] by hand.



○ Attach Inserted metal to the bottom stand.

Caution - When screwing in a Metal Insert (Ensat), install it vertically. Refer to the User's Manual for Metal Insert (Ensat) by the Maker.

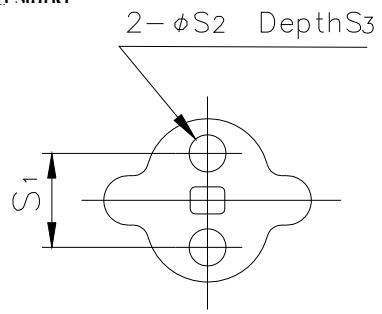
Procedure

Refer to the user's manual for the Inserted metal (Commercially available.)

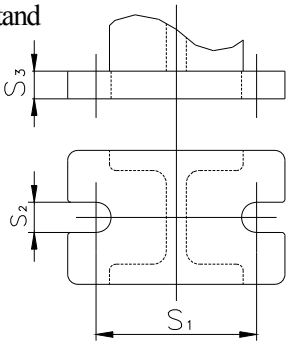
Bottom stand dimension Unit; mm

Nom. Size		S1	S2	S3
15mm	(1/2")	19	7.3	11
20mm	(3/4")	19	7.3	11
25mm	(1")	19	7.3	11
32mm	(1 1/4")	30	9	15
40mm	(1 1/2")	30	9	15
50mm	(2")	30	9	15
65mm	(2 1/2")	48	9	6
80mm	(3")	55	11	7
100mm	(4")	65	11	8

Nominal 15-50mm(1/2"-2")
Bottom stand



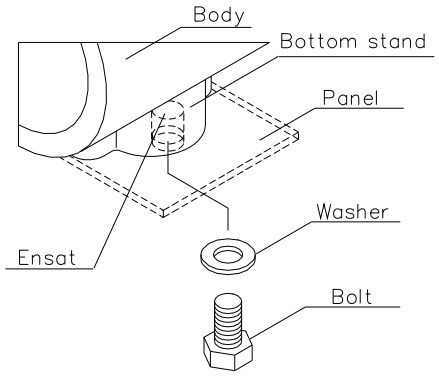
Nominal 65-100mm (2 1/2"- 4")
Bottom stand



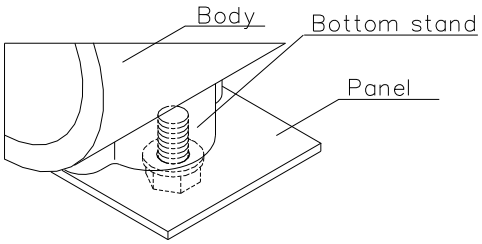
○ Fixation of bottom stand with panel

Nominal size: 15mm-50mm (1/2”-2”)

Before the fixation

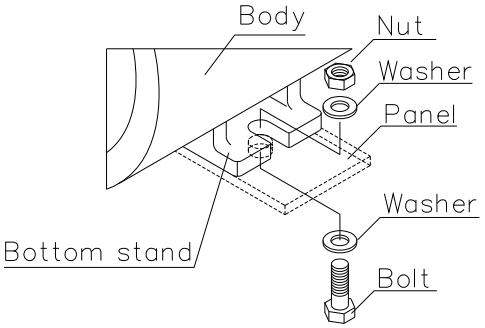


After the fixation

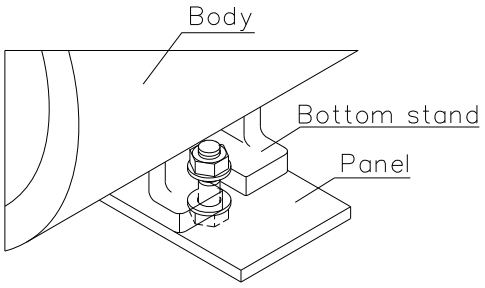


Nominal size: 65mm-100mm (2 1/2”-4”)

Before the fixation

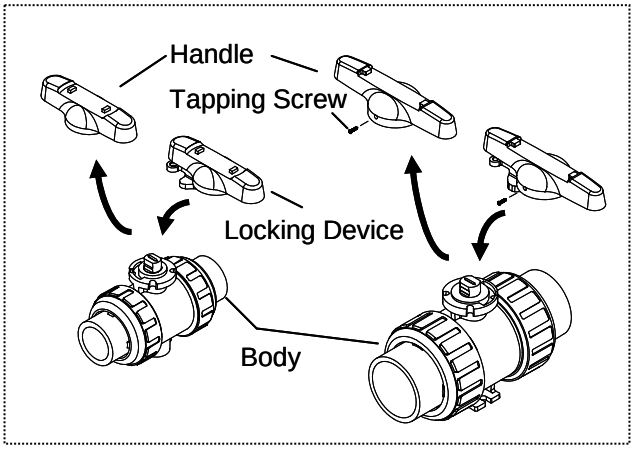


After the fixation



○ Installation Procedure of the Locking Device

The handle lock can be done by full-open (close). Refer to the User’s manual for Locking Device (Option).



The location hole for the lock is already installed in the handle. (Table 1)

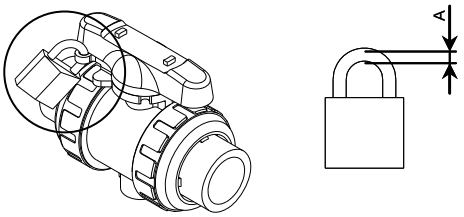


Table 1 <Size of Key>

Nominal Size mm (inch)	**A** mm (inch)
15-25 ($^1/_2$-1”)	5 (0.20”)
32-50 (1 $^1/_4$-2”)	6 (0.24”)
65-100 (2 $^1/_2$-4”)	7 (0.28”)

(14) Inspection items

Caution - Perform periodic maintenance. (Leakage may develop due to temperature changes or over periods of prolonged storage, rest or operation.)

○Inspect the following items.

(1)	Check for any flaw, cracks, or deformation on the outside.
(2)	Check whether fluid leaks to the outside.
(3)	Check whether the cap nut has been loosened.
(4)	Check whether the handle can be operated smoothly.

(15) Troubleshooting

Problem	Cause	Treatment
Fluid leaks from the valve even when the valve is closed fully.	The carrier is loosened.	Adjust the face pressure between the ball and the seat. (Refer to page 14)
	The seat is scratched or worn.	Replace the seat with a new one.
	Foreign matter is in the valve.	Clean up.
	The ball is scratched or worn.	Replace the scratched ball with a new one.
Fluid leaks from the valve.	The union nut is loosened.	Tighten up the union nut.
	The carrier is loosened.	Adjust the face pressure between the ball and the seat. (Refer to page 14)
	The O-ring is scratched or worn.	Replace the O-ring with a new one.
The handle can not be turned smoothly.	Foreign matter is in the valve.	Clean up.
	Deformation. (By heat etc.)	Replace the parts.
	The carrier is tightening too much.	Adjust the face pressure between the ball and the seat. (Refer to page 14)
The handle fails to engage.	The stem is broken.	Replace the stem with a new one.
	The engagement between the stem and the ball is broken.	Replace the stem and ball with new ones.

(16) Handling of residual and waste materials

Warning - Make sure to consult a waste treatment dealer for recommendations on the proper disposal of plastic valves. (Poisonous gas is generated when the valve is burned improperly.)

Ball Valve Type 21・21α

ASAHI YUKIZAI CORPORATION

Distributor

http://www.asahi-yukizai.co.jp/en/

Information in this manual is subject to change without notice. 2016.10

Quarter Master Chief Series 92 Actuator

Installation, Operation and Maintenance Manual

ASAHI/AMERICA®

Table of Contents

Series 92 Electric Actuator Introduction

Description

The Series 92 electric actuators feature a reversing,capacitor run motor, with a permanently lubricated gear train, and hardened steel spur gears. These actuators are equipped with integral thermal overload protection (AC models) with automatic reset, independently adjustable limit switches, declutchable manual override, beacon position indication, baked powder epoxy coating with stainless steel trim, ISO bolt circle, and 2 (two) ½" NPT conduit entries.

Units built prior to 8/1/2017 (*x*92W):

Standard models are offered in 120 VAC, feature a UL508 NEMA Type 4X enclosure, and provide up to 2000 in-lbs. of output torque (optional UL1203 enclosure for Hazardous Locations also available).

Various options are available such as operating voltages, additional limit switches, heater and thermostat, feedback potentiometers, etc.
Please see page 8 regarding these options.

Units built post 8/1/2017 (*x*92RHMW):

Standard models are offered in 120 VAC, feature an RHM package, a UL508 NEMA Type 4X enclosure, and provide up to 2000 in-lbs. of output torque (optional UL1203 enclosure for Hazardous Locations also available).
The RHM Package is a combination Heater and Thermostat, and 2-SPDT 8A auxiliary switches that are a dry contact. Please see page ?? for details.

Various options are available such as operating voltages, feedback potentiometers, etc.
Please see page 8 regarding these options.

Electrical Requirement

WARNING: Do not open actuator cover while circuits are energized.

CAUTION: Proper voltage must be supplied to actuator or damage will result.

CAUTION: In pulse power applications, the Series 92RHM will only power the Heater and Thermostat at the end of travel.

CAUTION: If 120vac & 220vac models are PLC driven, output contacts of PLC should be rated at a minimum of 1.5 times required input voltage of actuator

NOTE: To conform to various electrical codes, a **green grounding screw** has been provided (on the baseplate) inside of actuator.

Terminal Strip Wiring: 75° C Copper Supply Wires up to #14 AWG, wired as per the attached diagrams or the wiring diagram affixed inside of actuator cover. Control Wiring shall be insulated with conductors rated 105° C, 300 V minimum. Torque Terminal Strip Wiring to 5 in-lbs.

Model		120 Vac		220 Vac		12 Vdc		24 Vdc		12 Vac		24 Vac		Cycle Time per 90 Degrees (seconds)
	Torque (in/lbs)	Amp Draw	Duty Cycle	Amp Draw	Duty Cycle	Amp Draw	Duty Cycle	Amp Draw	Duty Cycle	Amp Draw	Duty Cycle	Amp Draw	Duty Cycle	
S92	400	0.5	100%	0.4	100%	2.0	75%	4.0	75%	2.0	75%	3.0	75%	15
A92	700	0.8	75%	0.6	75%	2.0	75%	4.0	75%	2.0	75%	3.0	75%	15
B92	1100	0.5	100%	0.4	100%	2.0	75%	4.0	75%	2.0	75%	3.0	75%	32
C92	2000	1.0	50%	0.6	50%	2.0	75%	4.0	75%	2.0	75%	3.0	75%	32

NOTE: Amp rating is considered locked rotor.
Duty cycles are for ambient temperature (73°F)

Installation

Electrical
Reference Drawing #289S92

Models S-92, A92, & B92

1A. To gain access to terminal strip (Part #24) it is necessary to remove manual override knob (Part #18) by loosening slotted setscrew (Part #39). Remove 8 cover screws and lift off cover (torque cover/base screws to 120 in-lbs when finished wiring up unit).
Note: Failure to properly tighten cover/base flange fasteners to 120 in/lbs may compromise the certified safety factors of the actuator.

Model C92

1B. To gain access to terminal strip it is necessary to remove manual override hand wheel (Part #18A) by loosening slotted setscrew (Part #39). Remove cam (Part #51) by loosening 2 set screws (Part #52). Remove 8 cover screws and lift off cover. (torque cover/base screws to 120 in-lbs when finished wiring up unit).

All Models

2. Make electrical connections to terminal strip as shown on wiring schematic located inside the cover (per various electrical codes there is a green screw on the actuator base plate for grounding purposes). Terminals are suitable for up to #14 AWG wire. All units are completely calibrated prior to shipment, and no internal adjustments should be required.

3. For United States units, Install 1/2" NPT conduit fitting(s) to actuator base. For ATEX Certified EU units, Install 1/2" NPT conduit fitting(s), to actuator base.

NOTE: Proper conduit fitting must be used to maintain enclosure rating and not compromise the certified safety factors of the actuator (weatherproof, explosion proof or combination weather proof/explosion proof).

NOTE: We recommend sealing conduit openings on units installed outdoors or exposed to large temperature swings (15ºF or more). We also recommend the Heater and Thermostat option in these applications.

4. Replace actuator cover, and install 8 cap screws supplied and tighten securely to 120 in/lbs. For outdoor or wet locations it is recommended prior to replacing the cover that the top shaft seal be cleaned and coated with silicone grease. Also clean shaft and lightly coat seal area of shaft with silicone grease. Unit is now ready for operation.

Type 21 Ball Valve

Position the valve and the actuator to corresponding positions (either OPEN or CLOSED). The flats on the actuator shaft extension indicate valve position

Type 21 Ball Valves (See Drawing #0107BV sizes ½" – 2")
Install mounting bracket #3 to actuator #2 using bolts #8 and washers #9. Insert coupling #4 on stem of valve #1 and then bolt valve #1 to mounting bracket #3 using bolts #5, nuts #7, and washers #6.

Note: All bolts should be snug and not excessively over tightened.

Type 21 Ball Valves (See Drawing #0113BV sizes 2-1/2" - 4")
Install mounting bracket #3 to actuator #2 using bolts #8 and washers #9. Insert coupling #4 on stem of valve #1 and then bolt valve #1 to mounting bracket #3 using bolts #5, nuts #7, and washers #6.

Note: All bolts should be snug and not excessively over tightened.

Type 23 Ball Valve (3-way)

Position the valve and the actuator to corresponding positions (either OPEN or CLOSED). The flats on the actuator shaft extension indicate valve position

Type 23 Ball Valves (3-way): (See Drawing #0130BV, sizes ½" - 4")
Install mounting bracket #3 to actuator #2 using bolts #8 and washers #9. Insert coupling #4 on stem of valve #1 and then bolt valve #1 to mounting bracket #3 using bolts #5, nuts #7, and washers #6.

Type 57 / 57L Butterfly Valves

CAUTION: If valve is in line, system must be shut down and have no line pressure before removing throttle plate and retaining washer.

Position the valve and the actuator to corresponding positions (either OPEN or CLOSED). The flats on the actuator shaft extension indicate valve position

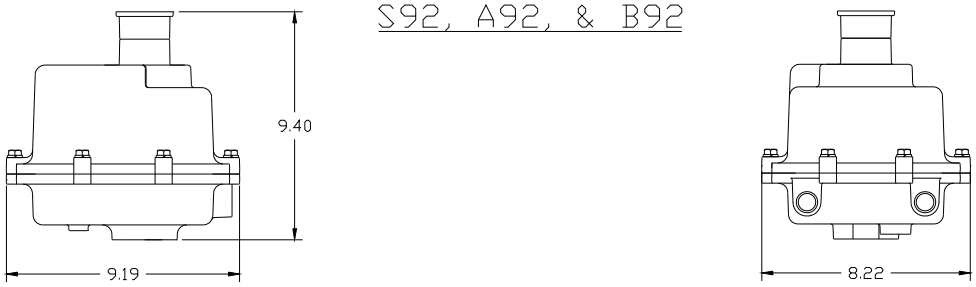
Butterfly Valves (See Drawing # 0200BF57 sizes 1-1/2" - 6")
No specially machined stem or valve body drilling required. Remove handle (remove handle cap and hex head bolt) to expose throttle plate screws. Remove throttle plate and retaining washer to expose existing bolt pattern.
Mount bracket #3 to actuator #2 with bolts #8 and washers #9 and tighten evenly. Insert coupling #4 into actuator #2.Install valve #1 onto mounting bracket #3 and align stem of valve to engage with coupling. (Line scribed on top of stem indicates disc orientation). Install bolts #5, washers #6 and nuts #7 and tighten evenly. Flats on actuator shaft indicate valve position. (Disc Orientation)

Butterfly Valves (See Drawing #0168BF57 8" size)
No specially machined stem or valve body drilling required. Remove gear operator by removing 4 thru bolts in body of valve to gear operator and lift off. Mount bracket #2 to actuator #10 using bolts #7 and washers #8. Insert actuator shaft adapter #9 into actuator #10. Install valve #1 to mounting bracket #2 and align stem of valve to engage with coupling. (Line scribed on top of stem indicates disc orientation). Install bolts #3, washers #4 & #5 and nuts #6 and tighten evenly. Flats on actuator shaft indicate valve position. (Disc Orientation)

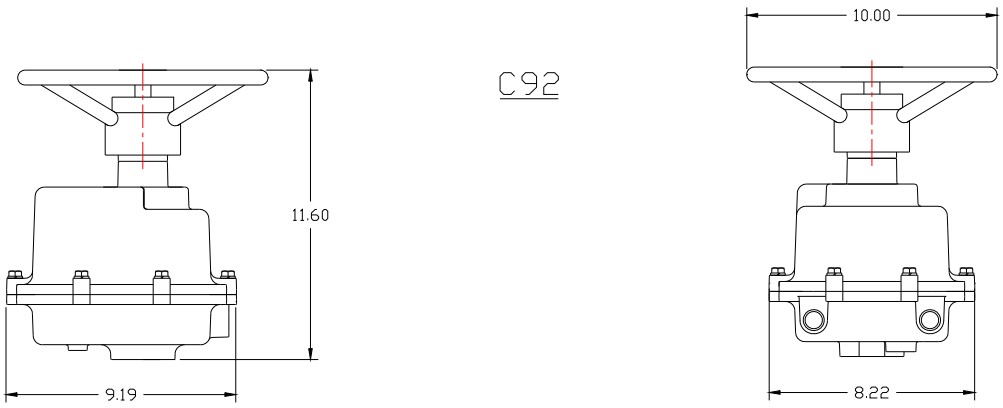
CAUTION: If mounted unit is installed other than straight up, the actuator should be supported independently to prevent side loading and loosening up of fasteners.

Actuator Mounting Dimensions

S92, A92, & B92



C92



Operation

Manual Override Operation
Reference Drawing #289S92

Models S-92, A92, & B92

Pull up the declutching knob (Part #18) and apply a 5/8" open end wrench to exposed flats and rotate within labeled limits as indicated by arrows.
To re-engage simply rotate actuator shaft in the opposite direction until declutching knob drops back down into position.

Model C92

Push down on hand wheel (Part #18A) and rotate within labeled limits.
To re-engage simply rotate actuator hand wheel until it moves up and re-engages.

CAUTION: The manual override should only be used when there is no power applied to actuator. When power is restored the actuator will automatically resume normal operation.

Setting Limit Switches
Reference Drawing #289S92

Disconnect power!

Open Travel Limit Switch (Top Switch Part #25):
Using declutchable manual override, move the valve into a full open position. Then loosen set screws on top cam (Part #40) and rotate cam (CCW) into limit switch arm until a click is heard, this designates the switch circuit has opened and defines a full open position. Tighten 2 set screws (Part #40) on cam.

Close Travel Limit Switch (Bottom Switch Part #25):
Using declutchable manual override, move the valve to a full closed position, loosen set screws on bottom cam (Part #40) and rotate cam (CW) into limit switch arm until a click is heard, this designates the switch circuit has opened and defines a full closed position. Tighten 2 set screws (Part #40) on cam.

Manually position valve to midstroke. Reapply power to actuator and drive to open or closed position. Actuator motor will run. The shaft will not turn until drive pins (Part #7) reseat in drive gear. This could take up to 32 seconds.

Options

Models S92, A92, B92, C92

Single Limit Switch

This procedure is for units built before 8/1/2017

Reference Drawing Number 0042EL

Install additional limit switch on posts on opposite side of standard limit switches using screws provided.

Wiring for switch is as follows:

Pink = Common to Terminal #6
Purple = NC to Terminal #7
Blue = NO to Terminal #8

Cam must be set so that this switch is tripped just ahead of Closed limit switch.

Double Limit Switch

This procedure is for units built before 8/1/2017

Reference Drawing Number 0042EL

Installation and wiring is the same as for the single limit switch, with the addition of wiring of the second switch as follows:

Brown = Common to Terminal #9
Green = NC to Ternimal #10
Orange = NO to Terminal #11

Cam must be set so that this switch is tripped just ahead of Open limit switch.

Wire tie loose wiring and check operation before installing cover.

Heater and Thermostat

This procedure is for units built before 8/1/2017

Reference Drawing Number 0042EL

Models S92 & A92

Install Heater into threaded hole located between actuator base gasket and motor module.

Wiring is as follows:
Heater lead = Terminal #12
Wire tie loose wiring and check operation before installing cover.

Models B92 & C92

Install Heater into threaded hole located between actuator shaft and motor module.

Wiring is as follows:
Heater lead = Terminal #12
Thermostat lead = Terminal #13
Wire tie loose wiring and check operation before installing cover.

RHM
For units built post 8/1/2017
Reference Appropriate Drawing Number:
M00EL9900 - x92RHM 12vac & 24vac
M00EL9901 - x92RHM 12vdc & 24vdc
M00EL9902 - x92RHM 120vac & 220vac

The RHM is a combination heater and thermostat, and 2-SPDT dry contacts for the open and closed positions.Its best feature is to provide a means of powering the heater and thermostat without the need of additional wiring. When the actuator reaches end of travel, the NO contact on the travel switch is tripped, and provides power for optional light indication. At the same time, the appropriate relay is triggered providing dry contact position indication as well as powering the heater and thermostat. The heater and thermostat are not powered during travel, only at the end of travel. This is a standard feature on Series 92 Automated Valves produced from 7/1/2017. Units provided prior to 7/1/2017 do not have this RHM feature.

Mechanical Brake

Loosen two (2) motor screws diagonally from each other and install bracket with tabs facing upward. Tighten screws

Install hexagonal adapter over armature shaft and tighten set screws.
NOTE: The adapter should be resting on the step of the armature shaft.

Install brake assembly onto hexagonal adapter making sure that the brake assembly is sitting flush on the bracket. Tighten with supplied screws.

Remove motor leads “A” & “B” from capacitor and install “piggy back connectors to capacitor, the re-install motor leads to their original locations.

Connect brake leads to piggy back connectors on capacitor (orientation does not matter)

Wire tie loose wiring and check operation before installing cover.

Feedback Potentiometer

Using 4-40 x 3/8 hardware, install potentiometer and bracket on standoffs by limit switches, with potentiometer gear facing output shaft.

Install drive gear face down over output shaft.

Wiring for potentiometer as follows:
#1 on potentiometer (black) #14 on terminal strip.

#2 on potentiometer (white) #15 on terminal strip.
#3 on potentiometer (red) #16 on terminal strip.

Using multimeter set at 2k ohms, calibrate potentiometer with leads from meter connected to terminals #15 and #16. With actuator in closed position multimeter should read between 95 and 100 ohms.

Rotate actuator 90 degrees (open position).

Connect leads from multimeter to terminal #14 and #15; multimeter should read 95 to 100 ohms.

If necessary adjust open limit switch cam so that multimeter will read 95-100 ohms.

Series 92 Options Codes for Serial # Tags

M1	1 extra limit switch
M2	2 extra limit switches
HT	Heater & thermostat
RHM	RHM Module
P	Feedback potentiometer
C1	4-20 mA Positioner
C3	4-20mA Output Transmitter
BR	Mechanical brake
CO	Center off
CL	Cycle length control
2W	2-wire control
FS	Failsafe Battery Pak

Units built prior to 8/1/2017 utilize M1, M2, and HT
Units built post 8/1/2017 utilize RHM

Example 1: S92**HTP**W

NEMA Type 4X enclosure, heater & thermostat and feedback potentiometer installed (prior to 8/1/2017)..

Example 2: A92**RHMBR**XW

RHM Module, Hazardous Location enclosure, and mechanical brake installed (post 8/1/2017).

Troubleshooting

WARNING: Do not open actuator cover while circuits are energized.

Q: *What if there is no output, but the motor runs?*
A: Manual override possibly engaged.
When the manual override is engaged, the motor will run, but no output will be observed until the manual override re-engages with the output shaft.
A: Valve stem broken. When the valve stem is broken, there will not be a change in fluid movement, making it seem as if the actuator has no output..

Q: *What if valve does not cycle?*
A: No power source to actuator. Check for power.
A: Power source disconnected. Check for broken wire, loose connection or no connection as per appropriate wiring diagram.
A: Low or wrong power source. Check for proper voltage.
A: Mechanical Brake jammed or misaligned. Check alignment of brake assembly.
This could occur during installation when someone would rest their hand on the Mechanical Brake to steady themselves.

Q: *What if there is water and/or moisture inside of the unit?*
A: Conduit fitting installed improperly. Re-install correctly.
A: Cover and/or base seal damaged. Replace damaged seal(s).
A: Base gasket damaged or installed improperly. Check gasket and replace if necessary.
A: Temperature swings of more than 15 degrees F. Install heater and thermostat to eliminate condensation.
When these temperature swings occur, the unit will “sweat” on the inside causing internal corrosion unless the actuator is equipped with a heater and thermostat to keep a constant temperature inside of the housing.
A: Unit has been submerged. Raise unit above liquid level.
An actuator that is to be submerged MUST meet NEMA Type 6 for the proper protection of the actuator and the elimination of a potential hazard. We do not recommend submerging the Series 92 Actuator as the electrical rating does not meet NEMA 6.

Q: *What if unit is oscillating?*
A: Valve torque exceeds output torque of actuator. Check for chemical compatibility of valve, and flange torque.

Q: *What if thermal overload frequently cuts out motor?*
A: Frequency of operation exceeds duty cycle rating. Check cycling period.
A: Unit is oscillating. Refer to above.

Q: *What if motor hums and no output is observed?*
A: Foreign material caught in valve. Remove material and inspect valve for damaged and/or worn parts. Replace parts as necessary.

A: Unit wired incorrectly (simultaneously powering open and closed). Check wiring as per appropriate wiring diagram.
A: Capacitor worn. Replace.

***Q:** What if actuator "over-shoots" limit switches without stopping?*
A: Actuator wired in parallel to each other. Please note that each actuator requires it's own set of switch contacts.

Maintenance

Disconnect power!

WARNING: Do not open actuator cover while circuits are energized.

CAUTION: It is imperative for reducing the chance of electrical shock, and to prevent ignition of hazardous atmospheres that you

Disconnect power

before any maintenance or repairs are performed.

Series 92 actuators are virtually maintenance free. We do however, recommend that periodic checks are made to ensure that all fasteners are tight and properly torqued to extend the life of the actuator and valve.

Series 92 Actuators are manufactured with factory lubricated grease in the gear case and gearbox. In most cases, this lubricant should never have to be replenished, however if deemed necessary, we recommend using Aeroshell Grease #33 MS, mfg. by Shell Oil Co.
Consult our technical department before replenishing lubricant.

For outdoor or wet locations keep top and bottom seals coated with a silicone based grease.

ATEX Requirements

II 2 G
Ex d IIB T4

Service/Maintenance/Inspection Requirements
Translation Requirements

Above directive for hazardous location service electric actuators, for use throughout the European Union.
All electric actuators are to be used for remote operation of a valve to open or closed positions. Any other uses are not approved by Asahi/America, Inc.

Every 250,000 cycles or 10 years whichever comes first, the actuator must be removed from service and sent back to Asahi/America, Inc. for inspection of wear of bearings as they relate to joints and gaps in accordance with above directive. Any units not within normal tolerances, will need to be re-built or replaced at the users expense.

Translations are in effect for the Atex product. It the ATEX actuator is to be used in any 1 of the 26 EU countries where English is not the primary language, it is the responsibility of the furnishing distributor to provide translated copies of this O & M manual.

Spare Parts
Reference Drawing #289S92

We recommend that the following be kept on hand as spare parts.

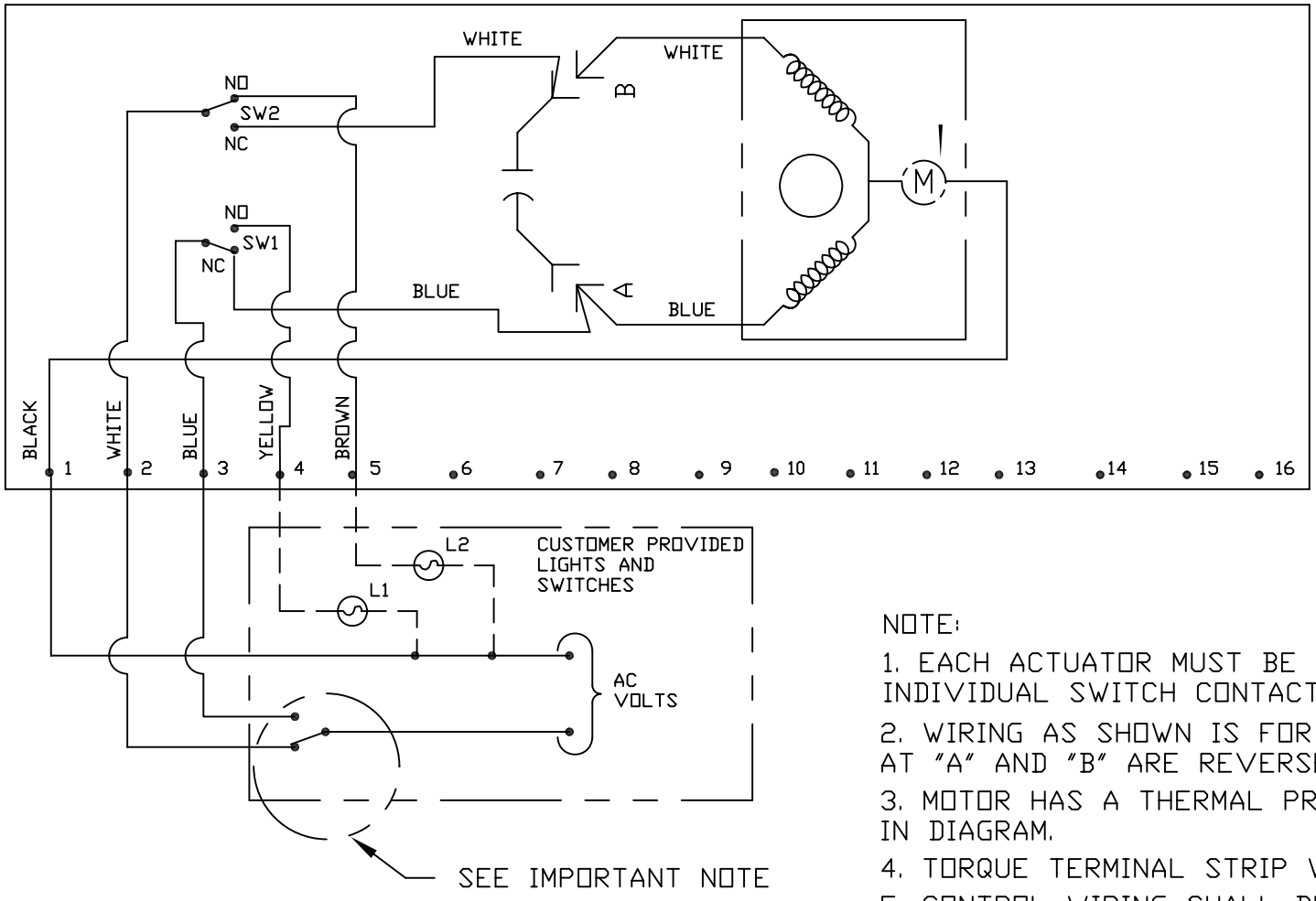
1 --- Limit Switch (Part #25)
1 --- Capacitor (Part #27 or #28)

NOTE: When ordering replacement motor parts and/or options specify model #, Serial #, and voltage.

Attachments:

13 drawings: 0043EL, 0044EL, 0042EL, M00EL9900, M00EL9901, M00EL9902, 0107BV, 0113BV, 0130BV, 0168BF57, 0200BF57, 289S92, M00EL610

WIRING DIAGRAM FOR 115 VAC AND 220 VAC ONLY
ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR "OPEN" POSITION



NOTE:

1. EACH ACTUATOR MUST BE POWERED THRU ITS OWN INDIVIDUAL SWITCH CONTACTS TO AVOID CROSS FEED.
2. WIRING AS SHOWN IS FOR S92 & A92 MOTOR LEADS AT "A" AND "B" ARE REVERSED FOR B92 AND C92.
3. MOTOR HAS A THERMAL PROTECTOR AS SHOWN BY (M) IN DIAGRAM.
4. TORQUE TERMINAL STRIP WIRING TO 5 IN-LBS.
5. CONTROL WIRING SHALL BE INSULATED WITH CONDUCTORS RATED 105°C, 300V MINIMUM.
6. 75°C COPPER SUPPLY WIRES ONLY.

	NAME	DATE
DR	JOHN GLASSFORD	6/18/07
APPD	DAVE HURLEY	6/18/07
PROD	LEO LESTER	6/18/07
WO#/CO#		
FILE		

ASAHI/AMERICA
ISO 9001 CERTIFIED
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

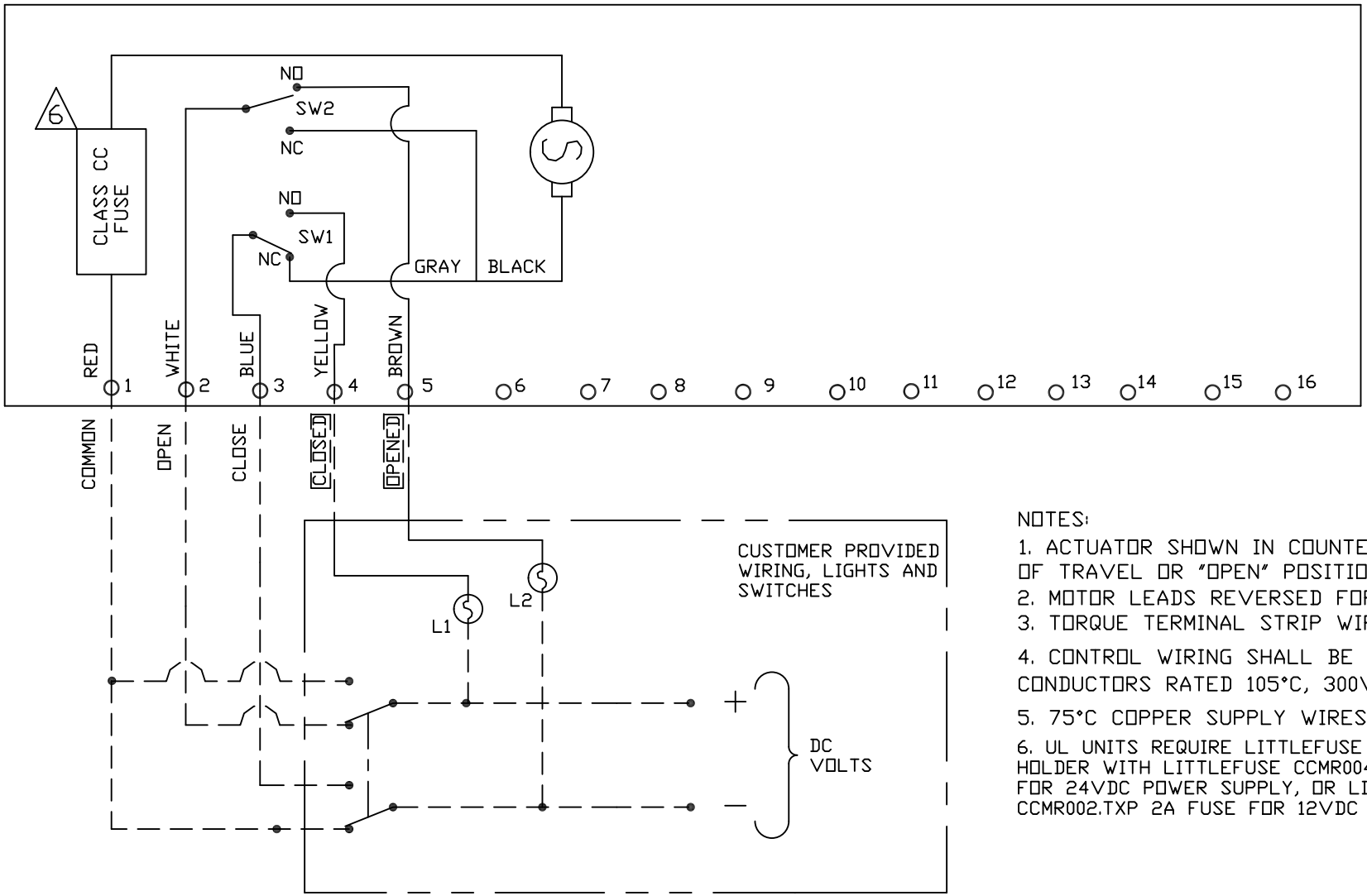
SERIES 92 WIRING DIAGRAM 120/220 VAC

SIZE	DWG. NO.	REV
A	0043EL	B

SCALE NTS

SHEET 1 OF 1

DC WIRING DIAGRAM



NOTES:

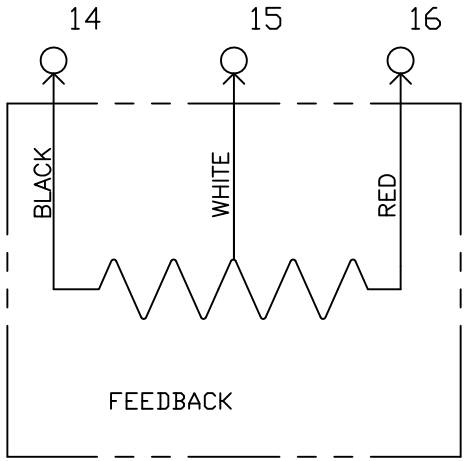
1. ACTUATOR SHOWN IN COUNTER CLOCKWISE EXTREME OF TRAVEL OR "OPEN" POSITION.
2. MOTOR LEADS REVERSED FOR 1100 & 2200 IN*LBS
3. TORQUE TERMINAL STRIP WIRING TO 5 IN-LBS.
4. CONTROL WIRING SHALL BE INSULATED WITH CONDUCTORS RATED 105°C, 300V MINIMUM.
5. 75°C COPPER SUPPLY WIRES ONLY.
6. UL UNITS REQUIRE LITTLEFUSE L60030C1C FUSE HOLDER WITH LITTLEFUSE CCMR004.TXP 4A FUSE FOR 24VDC POWER SUPPLY, OR LITTLEFUSE CCMR002.TXP 2A FUSE FOR 12VDC POWER SUPPLY

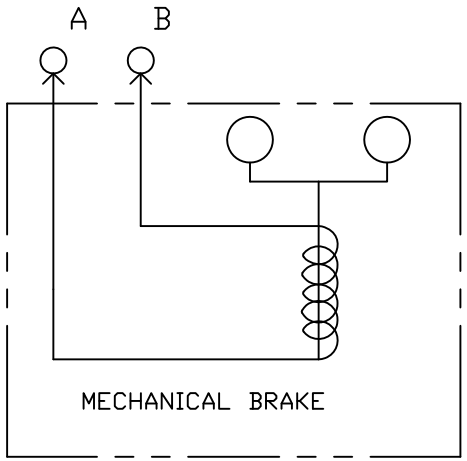
	NAME	DATE
DR	JOHN GLASSFORD	1/8/08
APPD	KEN BLYSTONE	1/8/08
PROD		
WO#/CO#		
FILE		

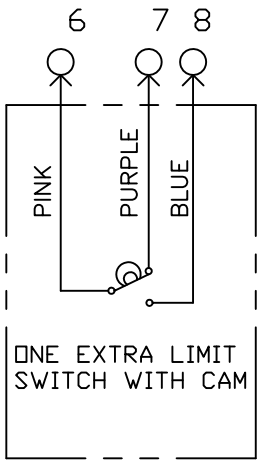
ASAHI/AMERICA
ISO 9001 CERTIFIED
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

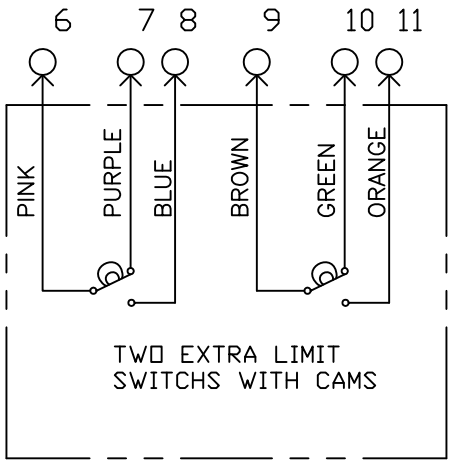
SERIES 92 WIRING DIAGRAM 12/24 VDC

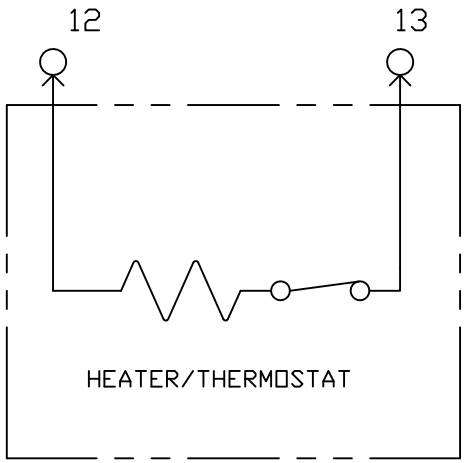
SIZE	DWG. NO.	REV
A	0044EL	E
SCALE NTS		SHEET 1 OF 1











NOTES:

1. TORQUE TERMINAL STRIP WIRING TO 5 IN-LBS.
2. CONTROL WIRING SHALL BE INSULATED WITH CONDUCTORS RATED 105°C, 300V MINIMUM.
3. 75°C COPPER SUPPLY WIRES ONLY.

	NAME	DATE
DR	JOHN GLASSFORD	6/18/07
APPD	DAVE HURLEY	6/18/07
PROD	LEO LESTER	6/18/07
WO#/CO#		
FILE		

ASAHI/AMERICA
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35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

SERIES 92 WIRING DIAGRAM OPTIONS

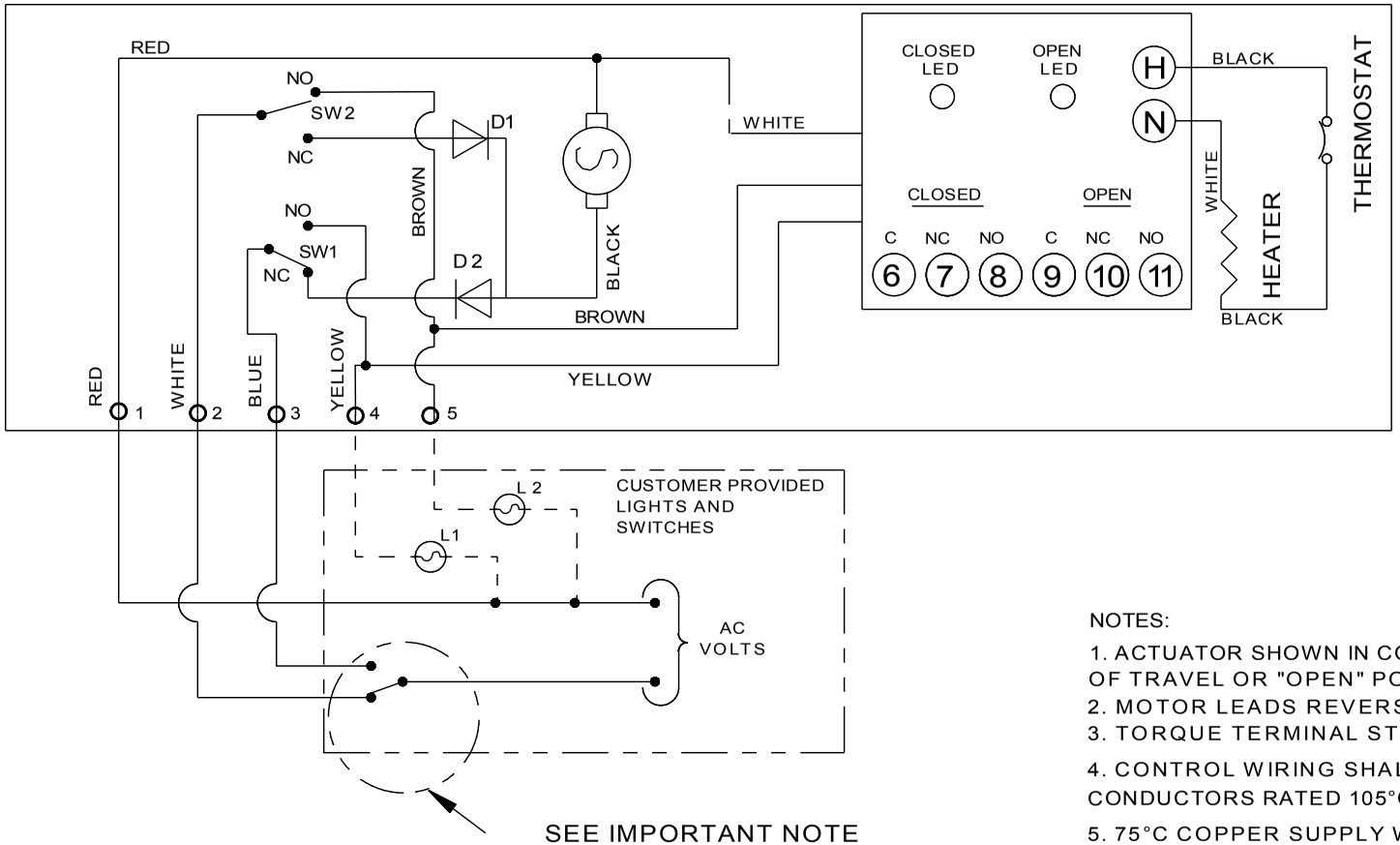
SIZE	DWG. NO.	REV
A	0042EL	C

SCALE NTS

SHEET 1 OF 1

REV	DATE	DESCRIPTION	BY	FROM
A	6/22/17	FIRST ISSUE	JH	KB

AC WIRING DIAGRAM



NOTES:

1. ACTUATOR SHOWN IN COUNTER CLOCKWISE EXTREME OF TRAVEL OR "OPEN" POSITION.
2. MOTOR LEADS REVERSED FOR 1100 & 2200 IN*LBS
3. TORQUE TERMINAL STRIP WIRING TO 5 IN-LBS.
4. CONTROL WIRING SHALL BE INSULATED WITH CONDUCTORS RATED 105°C, 300V MINIMUM.
5. 75°C COPPER SUPPLY WIRES ONLY.

UNLESS OTHERWISE SPECIFIED		
DIMENSIONS ARE IN INCHES		
MACHINING TOLERANCES:	2 PL DECIMALS	± .01
	3 PL DECIMALS	± .005
	ANGULAR	± 1/2°
	FRACTIONAL	± 1/64
FABRICATION TOLERANCES:	1/2" - 8"	± 1/4
	10" AND UP	± 1/2
	ANGULAR	± 1.0°
WELD TYPE:	N/A	
MATERIAL:	AS NOTED	
FINISH:	125µ"	

	NAME	DATE
DR	J. Hughes	06/22/17
REV		
APPR	K. Blystone	06/22/17
PRODUCT:	VALVE & ACT	
WO#/SO#		

ASAHI/AMERICA
ISO 9001 CERTIFIED
655 ANDOVER STREET, LAWRENCE, MA

SERIES 92 WITH RHM WIRING DIAGRAM 12/24 VAC

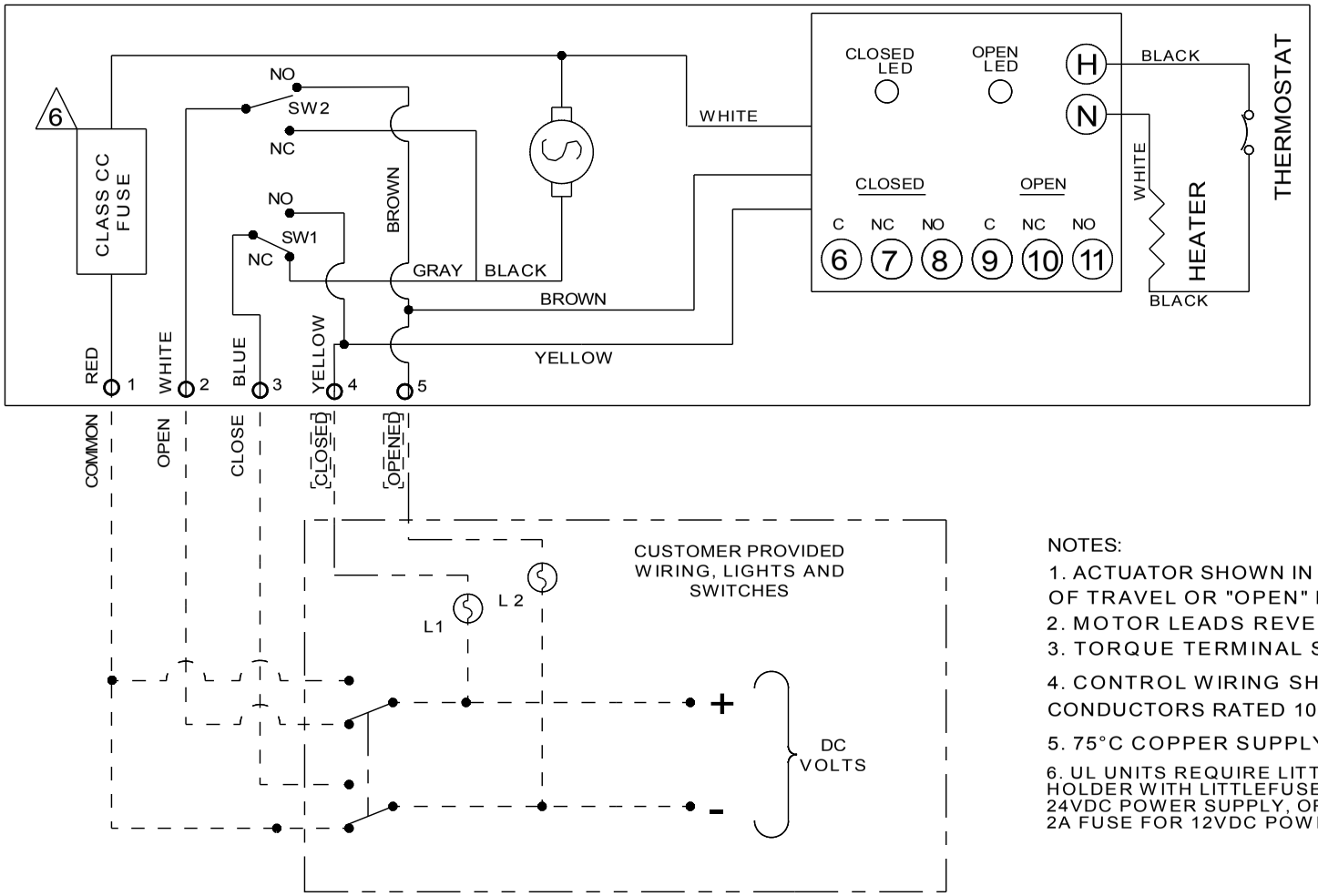
JDE PART # M00EL9900

SIZE A | DWG # **M00EL9900** | REVISION A

SCALE N/A | SHEET 1 OF 1

REV	DATE	DESCRIPTION	BY	FROM
A	6/22/17	FIRST ISSUE	JH	KB

DC WIRING DIAGRAM



NOTES:

1. ACTUATOR SHOWN IN COUNTER CLOCKWISE EXTREME OF TRAVEL OR "OPEN" POSITION.
2. MOTOR LEADS REVERSED FOR 1100 & 2200 IN*LBS
3. TORQUE TERMINAL STRIP WIRING TO 5 IN-LBS.
4. CONTROL WIRING SHALL BE INSULATED WITH CONDUCTORS RATED 105°C, 300V MINIMUM.
5. 75°C COPPER SUPPLY WIRES ONLY.
6. UL UNITS REQUIRE LITTLEFUSE L60030C1C FUSE HOLDER WITH LITTLEFUSE CCMR004.TXP 4A FUSE FOR 24VDC POWER SUPPLY, OR LITTLEFUSE CCMR002.TXP 2A FUSE FOR 12VDC POWER SUPPLY

UNLESS OTHERWISE SPECIFIED		
DIMENSIONS ARE IN INCHES		
MACHINING TOLERANCES:	2 PL DECIMALS	± .01
	3 PL DECIMALS	± .005
	ANGULAR	± 1/2°
	FRACTIONAL	± 1/64
FABRICATION TOLERANCES:	1/2" - 8"	± 1/4
	10" AND UP	± 1/2
	ANGULAR	± 1.0°
WELD TYPE:	N/A	
MATERIAL:	AS NOTED	
FINISH:	125µ"	

	NAME	DATE
DR	J. Hughes	06/22/17
REV		
APPR	K. Blystone	06/22/17

PRODUCT: VALVE & ACT

WO#/SO#

ASAHI/AMERICA
ISO 9001 CERTIFIED
655 ANDOVER STREET, LAWRENCE, MA

SERIES 92 WITH RHM WIRING DIAGRAM 12/24 VDC

JDE PART # M00EL9901

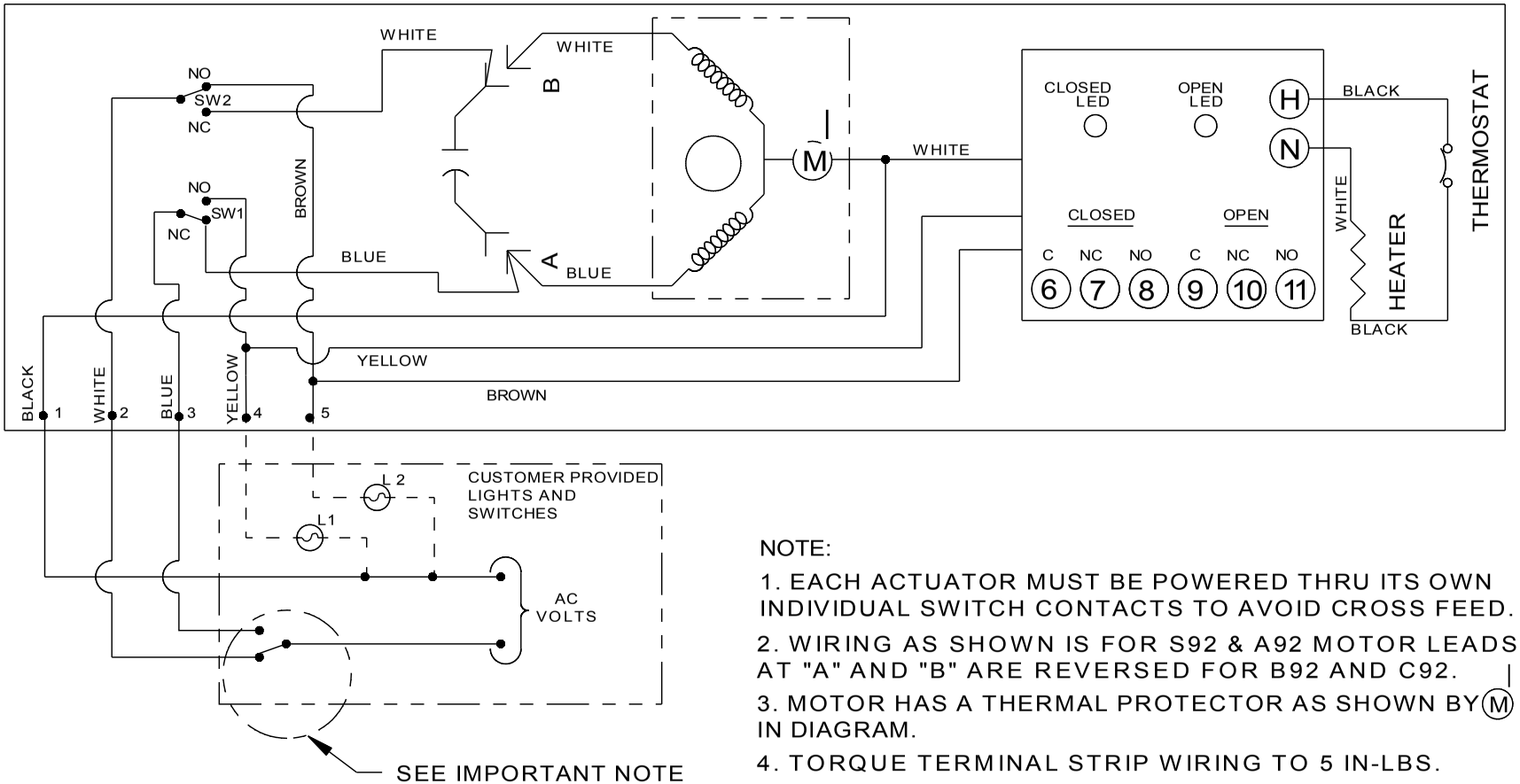
SIZE A | DWG # **M00EL9901** | REVISION A

SCALE N/A | SHEET 1 OF 1

REV	DATE	DESCRIPTION	BY	FROM
A	6/22/17	FIRST ISSUE	JH	KB

WIRING DIAGRAM FOR 120 VAC AND 220 VAC ONLY

ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR "OPEN" POSITION



NOTE:

1. EACH ACTUATOR MUST BE POWERED THRU ITS OWN INDIVIDUAL SWITCH CONTACTS TO AVOID CROSS FEED.
2. WIRING AS SHOWN IS FOR S92 & A92 MOTOR LEADS AT "A" AND "B" ARE REVERSED FOR B92 AND C92.
3. MOTOR HAS A THERMAL PROTECTOR AS SHOWN BY (M) IN DIAGRAM.
4. TORQUE TERMINAL STRIP WIRING TO 5 IN-LBS.
5. CONTROL WIRING SHALL BE INSULATED WITH CONDUCTORS RATED 105°C, 300V MINIMUM.
6. 75°C COPPER SUPPLY WIRES ONLY.

UNLESS OTHERWISE SPECIFIED		
DIMENSIONS ARE IN INCHES		
MACHINING TOLERANCES:	2 PL DECIMALS	± .01
	3 PL DECIMALS	± .005
	ANGULAR	± 1/2°
	FRACTIONAL	± 1/64
FABRICATION TOLERANCES:	1/2" - 8"	± 1/4
	10" AND UP	± 1/2
	ANGULAR	± 1.0°
WELD TYPE:	N/A	
MATERIAL:	AS NOTED	
FINISH:	125µ"	

	NAME	DATE
DR	J. Hughes	06/22/17
REV		
APPR	K. Blystone	06/22/17

PRODUCT: VALVE & ACT

WO#/SO#

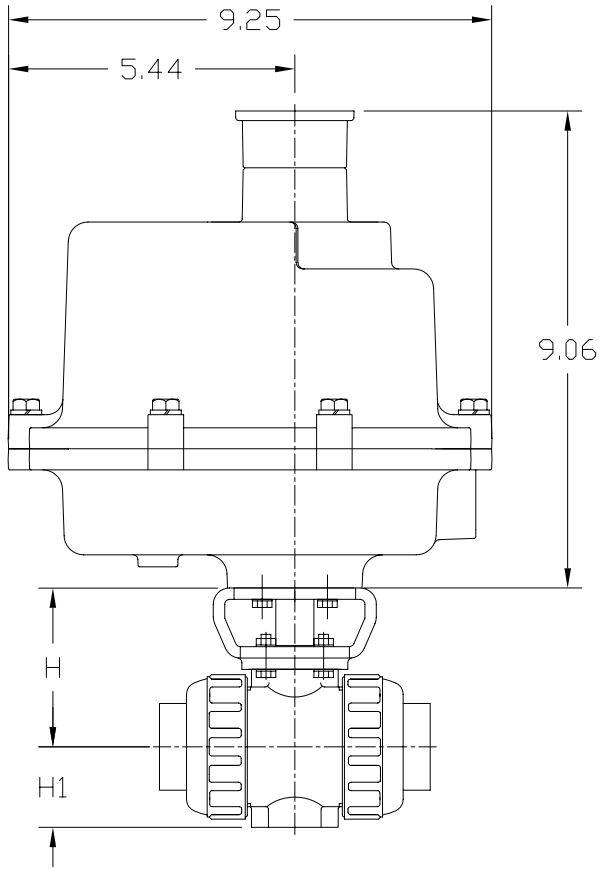
ASAHI/AMERICA
ISO 9001 CERTIFIED
655 ANDOVER STREET, LAWRENCE, MA

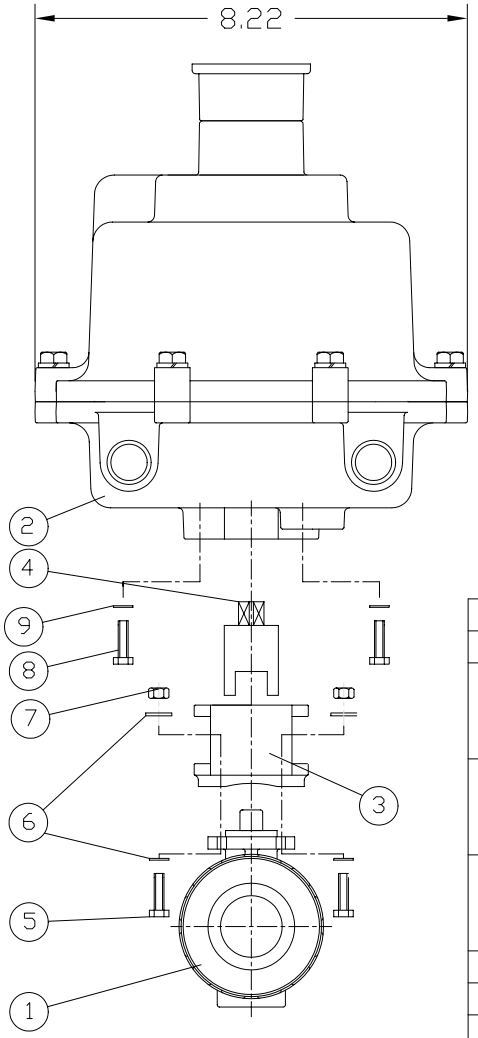
SERIES 92 WITH RHM WIRING DIAGRAM 120/220 VAC

JDE PART # M00EL9902

SIZE A | DWG # **M00EL9902** | REVISION A

SCALE N/A | SHEET 1 OF 1





UNIT: INCH

VALVE SIZE	1/2″	3/4″	1″	1-1/4″	1-1/2″	2″
H	2.76	3.01	3.29	3.64	3.98	4.43
H1	1.14	1.38	1.54	1.85	2.17	2.60

NOTE. The shape and appearance of assembly differ a little with nominal size compared to this drawing.

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M8.0)	STAINLESS STEEL	4
8	BOLT (M8.0x1.25-16LG)	STAINLESS STEEL	4
7	NUT (FOR 1/2″ THRU 1-1/4″ : M5.0x.8) (FOR 1-1/2″ THRU 2″ : M6.0x1)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 1/2″ THRU 1-1/4″ : M5.0) (FOR 1-1/2″ THRU 2″ : M6.0)	STAINLESS STEEL	8
5	BOLT (FOR 1/2″ THRU 1-1/4″ : M5.0x.8-16LG) (FOR 1-1/2″ THRU 2″ : M6.0x1-20LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 92	EPOXY COATED ALUMINUM	1
1	BALL VALVE TYPE 21	PVC,CPVC,PP,PVDF	1

FOR REFERENCE ONLY
ASAHI/AMERICA

	NAME	DATE
DR	DAN CAMERON	8/02/01
APPD	DAVE HURLEY	8/2/01
PROD	LEO LESTER	8/2/01
WO#/CO#		
FILE		

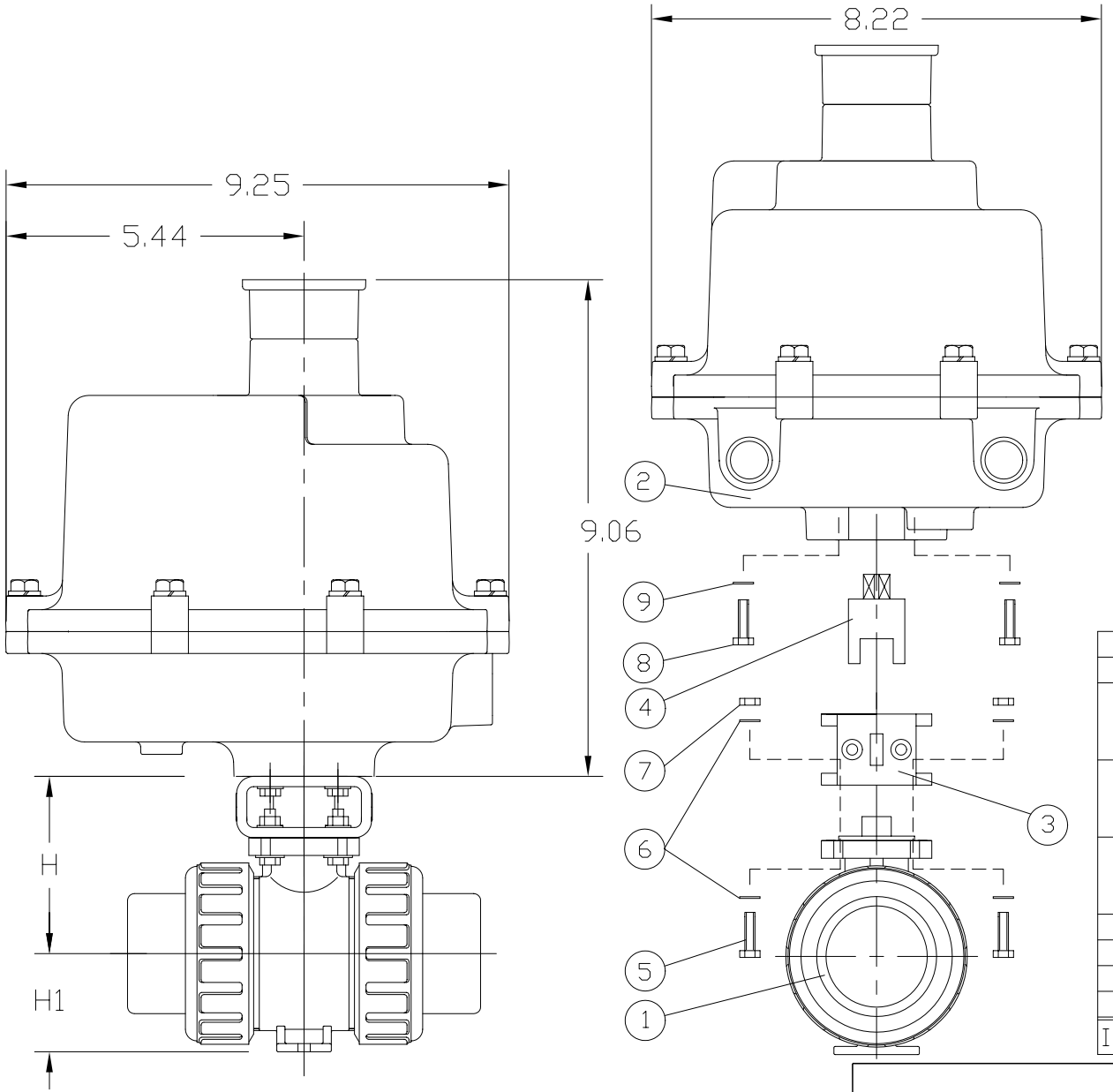
ASAHI/AMERICA
ISO 9001 CERTIFIED
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

BALL VALVE TYPE21 SERIES92 ELECTRIC ACTUATOR 1/2″ THRU 2″

SIZE	DWG. NO.	REV
A	0107BV	A

SCALE NTS

SHEET 1 OF 1



UNIT: INCH

VALVE SIZE	2-1/2″	3″	4″
H	5.12	5.47	6.97
H1	2.83	3.35	4.33

NOTE. The shape and appearance of assembly differ a little with nominal size compared to this drawing.

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M8.0)	STAINLESS STEEL	4
8	BOLT (M8.0x1.25-16LG)	STAINLESS STEEL	4
7	NUT (FOR 2-1/2″ AND 3″ : M8.0x1.25) (FOR 4″ : M10.0x1.50)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 2-1/2″ AND 3″ : M8.0) (FOR 4″ : M10.0)	STAINLESS STEEL	8
5	BOLT (FOR 2-1/2″ AND 3″ : M8.0x1.25-35LG) (FOR 4″ : M10.0x1.50-40LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 92	EPOXY COATED ALUMINUM	1
1	BALL VALVE TYPE 21	PVC,CPVC,PP,PVDF	1

	NAME	DATE
DR	KENICHI MIYAZAKI	8/14/01
APPD	DAVE HURLEY	8/14/01
PROD	LEO LESTER	8/14/01
WO#/CO#		
FILE		

FOR REFERENCE ONLY
ASAHI/AMERICA

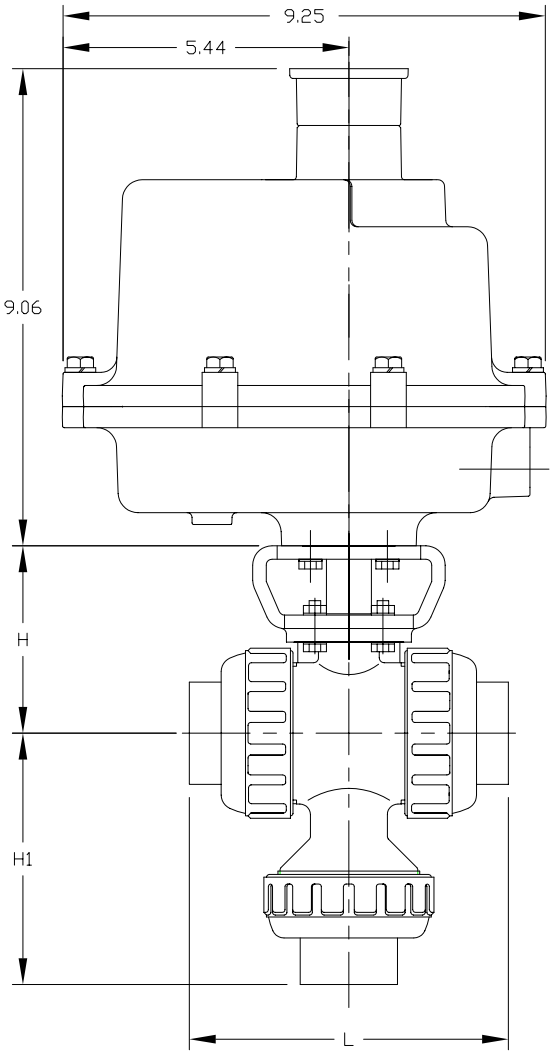
ASAHI/AMERICA
ISO 9001 CERTIFIED
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

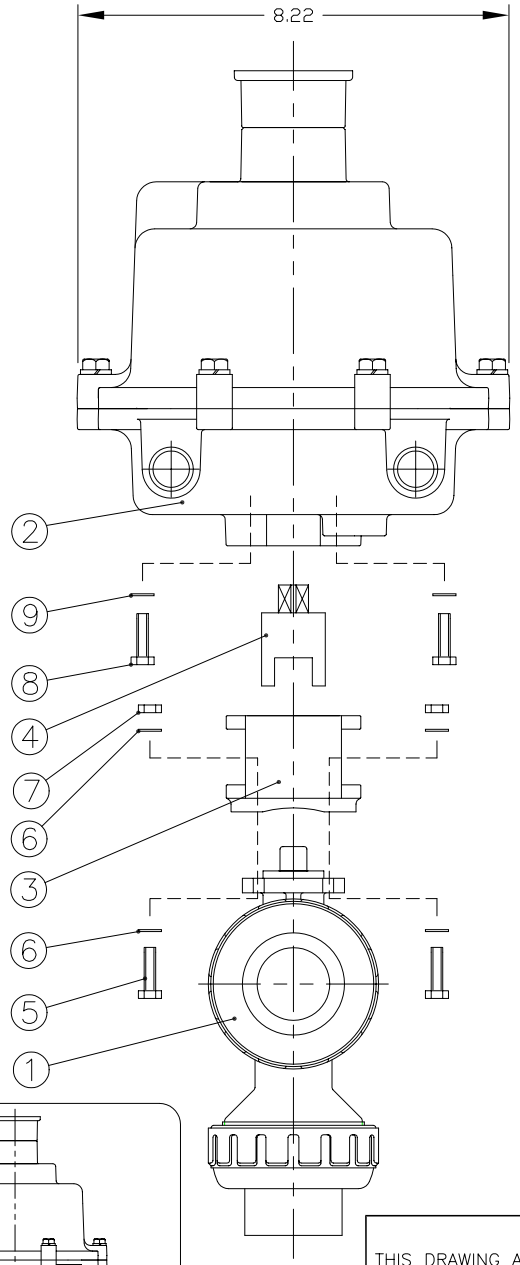
BALL VALVE TYPE21
SERIES92 ELECTRIC ACTUATOR
2-1/2″ THRU 4″

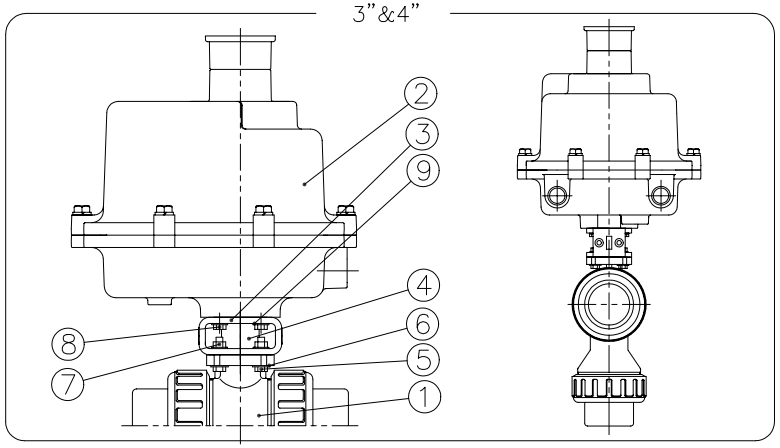
SIZE	DWG. NO.	REV
A	0113BV	A

SCALE NTS

SHEET 1 OF 1







DIMENSIONS TABLE — UNIT: inch

NOMINAL SIZE		H	FLANGED H1	FLANGED L	THREADED H1	THREADED L	SOCKET PVC,CPVC H1	SOCKET PVC,CPVC L	SOCKET PP,PVDF (DIN) H1	SOCKET PP,PVDF (DIN) L	SOCKET PP,PVDF (IPS) H1	SOCKET PP,PVDF (IPS) L	SPIGOT (BUTT END) H1	SPIGOT (BUTT END) L
½"	15mm	2.76	3.70	5.63	2.89	4.02	3.08	4.45	2.80	3.90	3.09	4.45	3.27	4.88
¾	20	3.01	4.50	6.77	3.48	4.72	3.56	5.08	3.27	4.49	3.61	5.08	3.90	5.67
1	25	3.29	5.24	7.36	4.13	5.16	4.32	5.75	3.94	4.84	4.37	5.75	4.53	6.06
1½	40	3.98	6.50	8.35	5.53	6.42	5.71	7.24	5.16	5.83	5.85	7.24	6.02	6.85
2	50	4.43	7.34	9.21	6.61	7.76	6.66	8.23	6.06	6.93	6.76	8.23	7.01	8.82
3	80	5.47	10.06	11.97	9.25	10.39	9.59	11.10	8.82	9.88	11.10	11.10	9.69	11.61
4	100	6.97	12.01	14.65	11.77	14.17	11.58	13.90	10.98	12.20	14.37	14.37	11.85	12.72

NOTE; 1) THE SHAPE AND APPEARANCE OF ASSEMBLY DIFFER A LITTLE WITH NOMINAL SIZE COMPARED TO THIS DRAWING.

2) FOR DETAILED VALVE DIMENSIONS, REFER TO DWG. NO. 0126BV, 0127BV, 0128BV.
L-PORT : DWG. NO. 0126BV
DOUBLE L-PORT : DWG. NO. 0127BV
CROSS PORT : DWG. NO. 0128BV

FOR REFERENCE ONLY
ASAHI/AMERICA

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M6.0)	STAINLESS STEEL	4
8	BOLT (M6.0x1-16LG)	STAINLESS STEEL	4
7	NUT (FOR 1/2" THRU 1-1/4" : M5.0x.8) (FOR 1-1/2" THRU 2" : M6.0x1) (FOR 3" : M8.0x1.25) (FOR 4" : M10.0x1.50)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 1/2" THRU 1-1/4" : M5.0) (FOR 1-1/2" THRU 2" : M6.0) (FOR 3" : M8.0) (FOR 4" : M10.0)	STAINLESS STEEL	8
5	BOLT (FOR 1/2" THRU 1" : M5.0x.8-16LG) (FOR 1-1/2" THRU 2" : M6.0x1-20LG) (FOR 3" : M8.0x1.25-35LG) (FOR 4" : M10.0x1.50-40LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 92	ZYTEL	1
1	MULTIPORT BALL VALVE TYPE23	PVC,CPVC,PP,PVDF	1

	NAME	DATE
DR	KENICHI MIYAZAKI	1/28/03
APPD	DAVE HURLEY	1/28/03
PROD	LEO LESTER	1/28/03
WO#/CO#		
FILE		

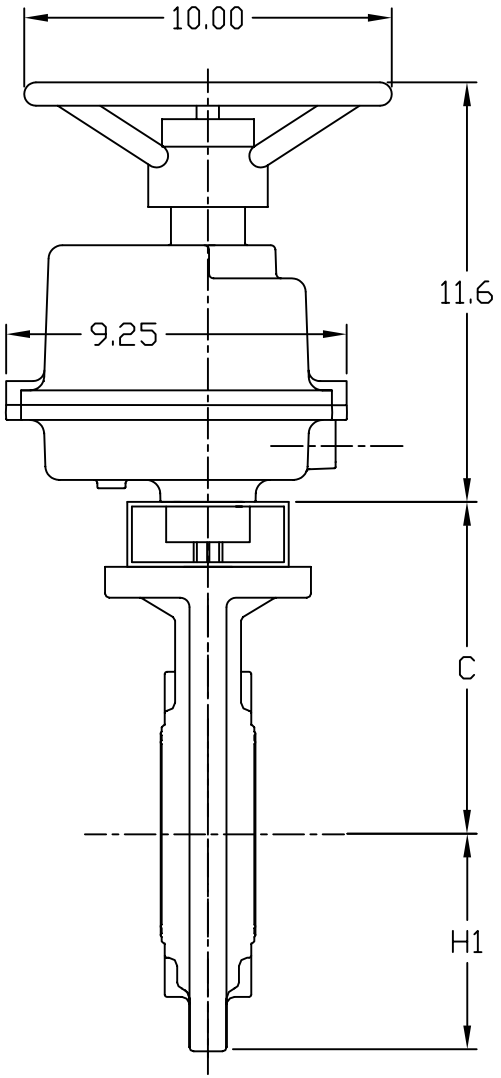
ASAHI/AMERICA
ISO 9001 CERTIFIED
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

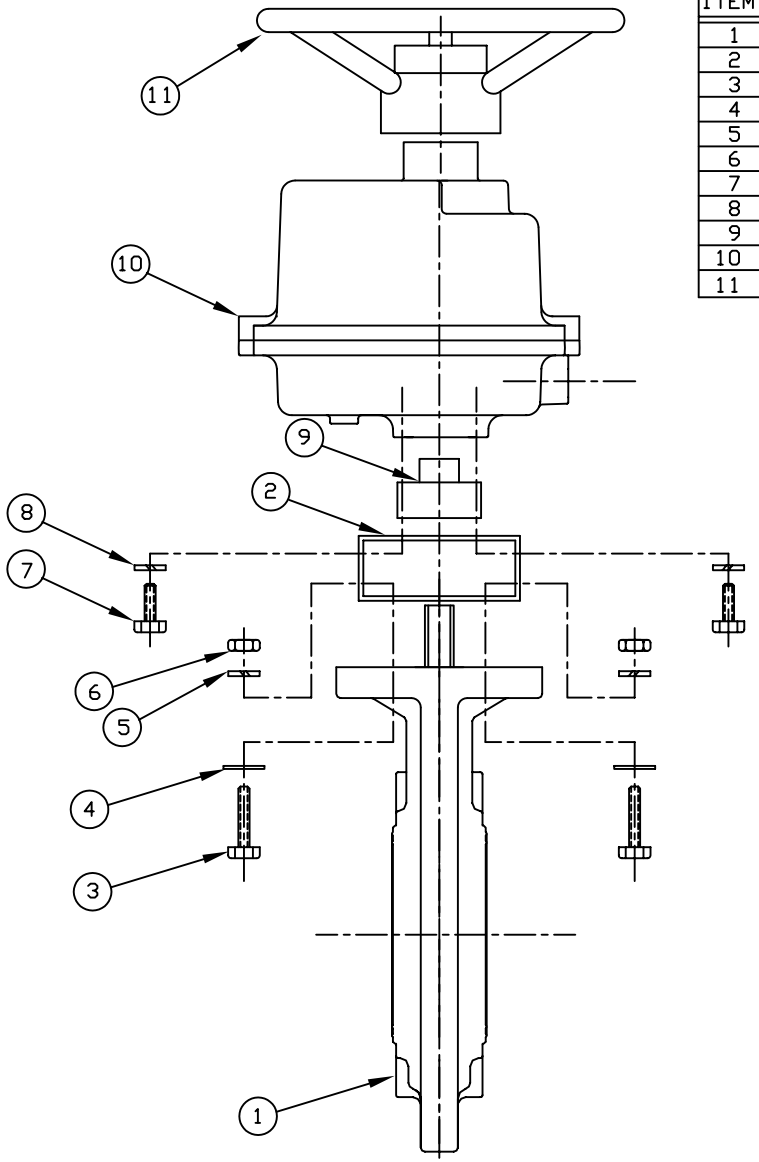
MULTI PORT BALL VALVE TYPE23 WITH SERIES92 ACT. 1/2" THRU 4"

SIZE	DWG. NO.	REV
A	0130BV	A

SCALE NTS SHEET 1 OF 1

VALVE SIZE	H1	C
1 1/2"	3.74	5.00
2"	3.86	5.00
2 1/2"	3.66	5.58
3"	3.94	5.78
4"	4.53	6.56
5"	5.00	8.05
6"	5.63	8.76
8"	6.70	11.25





ITEM	DESCRIPTION	MATERIAL	QTY
1	BUTTERFLY VALVE		1
2	BRACKET MOUNTING	300 SS	1
3	SCREW	300 SS	4
4	WASHER FLAT	300 SS	4
5	WASHER LOCK	300 SS	4
6	NUT HEX	300 SS	4
7	SCREW	300 SS	4
8	WASHER LOCK	300 SS	4
9	SHAFT ADAPTER	300 SS	1
10	ACTUATOR	ALUM. EPOXY COATED	1
11	HANDWHEEL	ALUM. EPOXY COATED	1

FOR REFERENCE ONLY
ASAHI/AMERICA

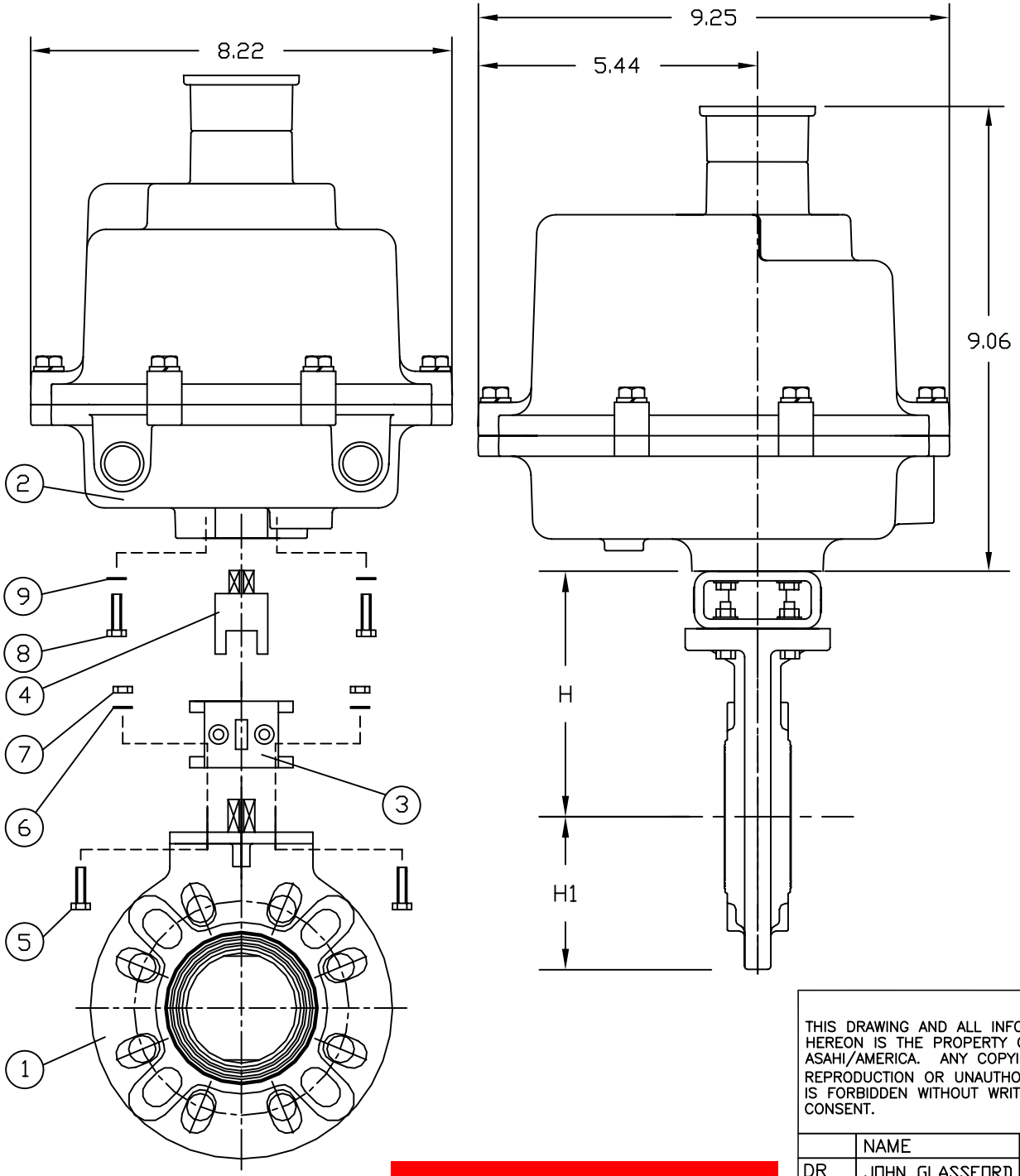
	NAME	DATE
DR	JOHN GLASSFORD	6/10/05
APPD	DAVE HURLEY	6/10/05
PROD	LEO LESTER	6/10/05
PATH		
WO#/CO#		

ASAHI/AMERICA
ISO 9001 CERTIFIED
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

TYPE57 BF VALVE SERIES
92 2000 IN/LB ELECTRIC ACT

SIZE	DWG. NO.	REV
A	0168BF57	A

SCALE NONE SHEET 1 OF 1



UNIT: INCH

VALVE SIZE	1-1/2″	2″	2-1/2″	3″	4″	5″	6″
H	5.51	5.75	6.18	6.46	7.16	8.46	8.97
H1	2.95	3.27	3.66	3.94	4.53	5.00	5.63

NOTE: 1. The shape and appearance of assembly differ a little with nominal size compared to this drawing.

2. For 1–1/2" thru. 4" Mounting Bracket : F7 x F05,F07

For 5" and 6" Mounting Bracket : F10 x F07,F10

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M8.0)	STAINLESS STEEL	4
8	BOLT (M8.0x1.25-16LG)	STAINLESS STEEL	4
7	NUT (FOR 1-1/2″ THRU. 4″ : M8.0x1.25) (FOR 5″ AND 6″ : M10.0x1.50)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 1-1/2″ THRU. 4″ : M8.0) (FOR 5″ AND 6″ : M10.0)	STAINLESS STEEL	8
5	BOLT (FOR 1-1/2″ THRU. 4″ : M8.0x1.25-35LG) (FOR 5″ AND 6″ : M10.0x1.50-40LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 92	EPOXY COATED ALUMINUM	1
1	BUTTERFLY VALVE TYPE 57	U-PVC,PP,PVDF	1

	NAME	DATE
DR	JOHN GLASSFORD	6/13/05
APPD	DAVE HURLEY	6/13/05
PROD	LEO LESTER	6/13/05
WO#/CO#		
FILE		

ASAHI/AMERICA
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35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

BUTTERFLY VALVE TYPE57 SERIES92 ELECTRIC ACTUATOR 1-1/2″ THRU 6″

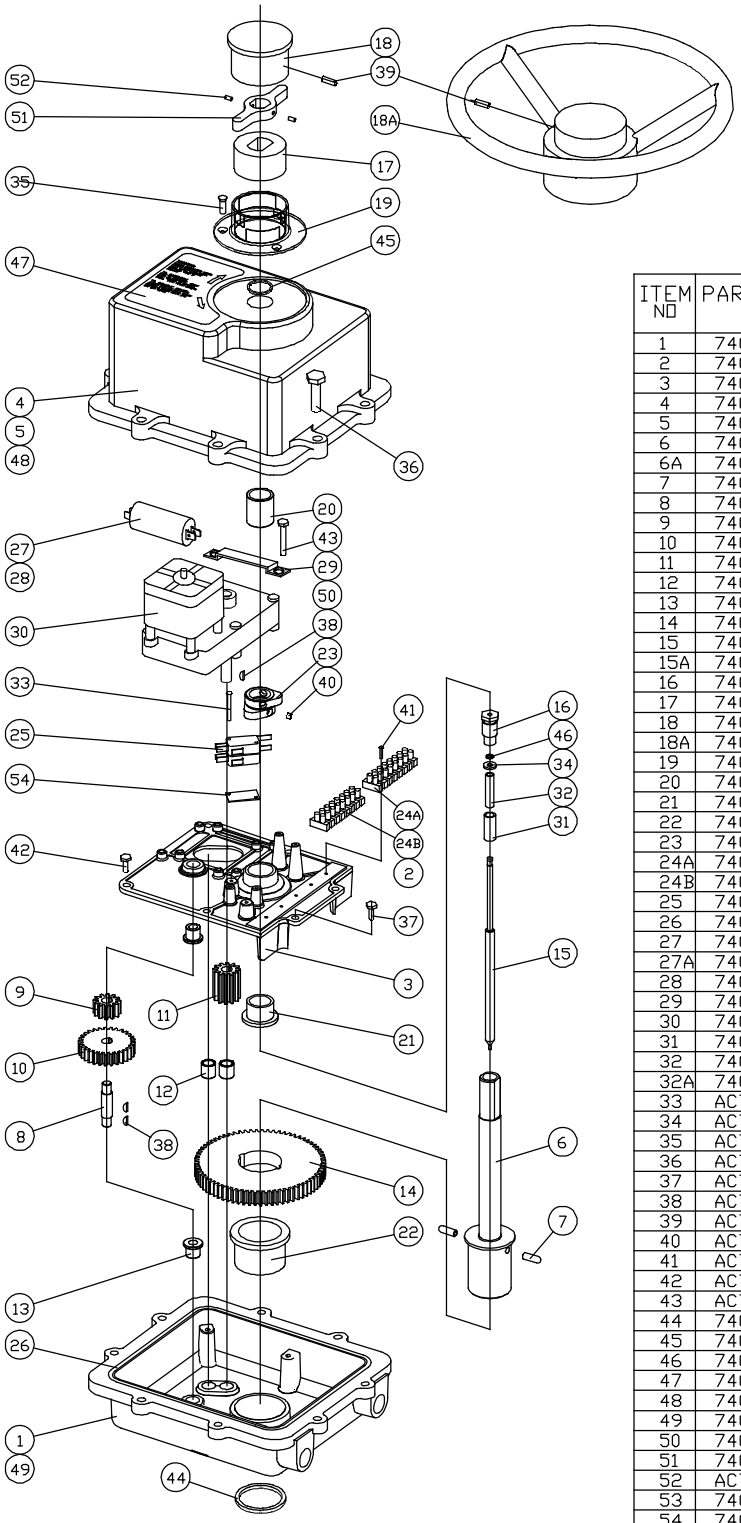
SIZE	DWG. NO.	REV
A	0200BF57	A

SCALE NTS

SHEET 1 OF 1

SERIES 92

PARTS LIST & MATERIALS OF CONSTRUCTION



CERTIFIED PRODUCT

NO MODIFICATIONS PERMITTED WITHOUT REFERENCE TO ATEX

SCHEDULE DRAWING

S92= 400 IN*LBS
A92= 700 IN*LBS
B92=1100 IN*LBS
C92=2000 IN*LBS

ITEM NO	PART NO	QUANTITY				DESCRIPTION
		S92	A92	B92	C92	
1	7401920	1	1	1	1	BASE
2	7401440	1	1	1	1	WIRING HARNESS - 4 PCS
3	7401060	1	1	1	1	BASE PLATE
4	7401940	1	1	1	1	COVER
5	7401925	1	1	1	1	WIRING DIAGRAM LABEL
6	7401900	1	1	1		SHAFT MAIN
6A	7401905				1	SHAFT MAIN
7	7401360	2	2	2	2	PIN
8	7401280			1	1	SHAFT STUB
9	7402003			1	1	SPUR GEAR 1B
10	7402002			1	1	SPUR GEAR 1A
11	7401400	1	1	1	1	GEAR PINION
12	7401540	1	1	1	1	BEARING PINION
13	7402006			2	2	BEARING FL - SPUR GEAR
14	7401380	1	1	1	1	GEAR MAIN
15	7401200	1	1	1		SHAFT INNER
15A	7401210				1	SHAFT INNER
16	7401180	1	1	1	1	SHAFT RETAINER
17	7401300	1	1	1	1	KNOB LOWER
18	7401320	1	1	1		KNOB UPPER
18A	7401995				1	HANDWHEEL
19	7401260	1	1	1	1	COLLAR
20	7401120	1	1	1	1	BEARING UPPER COVER
21	7401080	1	1	1	1	BASE PLATE BEARING
22	7401020	1	1	1	1	BASE BEARING
23	7401480	2	2	2	2	CAM
24A	7401420	2	2	2	2	TERMINAL BLOCK 1-8
24B	7401425	2	2	2	2	TERMINAL BLOCK 9-16
25	7401460	2	2	2	2	MICRO SWITCH (V7-6C13D8-132)
26	7401560	1	1	1	1	O-RING BASE/COVER
27	7401948	1		1		CAPACITOR 4.2 MFD
27A	7402004		1			CAPACITOR 6.7 MFD
28	7403008				1	CAPACITOR 7.6 MFD
29	7401520	1	1	1	1	CAPACITOR BRACKET
30	7401340	1	1	1	1	MOTOR
31	7401250	1	1	1	1	SHELL
32	7401220	1	1	1		SPRING
32A	7401230				1	SPRING
33	ACTMSC	2	2	2	2	SCREW ROUND HD. 4-40 x 1.00 LG
34	ACTMSC	1	1	1	1	WASHER, FLAT #10 Ø.450 x .06 THK
35	ACTMSC	3	3	3	3	SCREW FLAT HD. 8-32 x .25 LG. SS.
36	ACTMSC	8	8	8	8	SCREW HEX HD. 5/16-18 x 1.00 LG. SS.
37	ACTMSC	1	1	1	1	SCREW SELF TAP (GREEN) #10 x .50 LG.
38	ACTMSC	1	1	3	3	KEY, WOODRUF 3/32
39	ACTMSC	1	1	1	1	SCREW SLOT SET 8-32 x .50 LG. SS.
40	ACTMSC	4	4	4	4	SCREW SET 8-32 x .12 LG.
41	ACTMSC	4	4	4	4	SCREW SELF TAP #4 x .50 LG.
42	ACTMSC	5	5	5	5	SCREW SELF TAP SLOT/HEX #10 x .50 LG.
43	ACTMSC	4	4	4	4	SCREW SLOT/HEX 10-32 x 1.62 LG.
44	7401040	1	1	1	1	SEAL BASE
45	7401140	1	1	1	1	SEAL COVER
46	7401580	1	1	1	1	O-RING SHAFT
47	7401950	1	1	1	1	OVERRIDE LABEL
48	7401960	1	1	1	1	COVER NAMEPLATE
49	7401970	1	1	1	1	BASE NAMEPLATE
50	7401430	1	1	1	1	CAPACITOR HARNESS- 2 PCS
51	7401485				1	HANDWHEEL CAM
52	ACTMSC				2	CAM SCREW SET 1/4-20 x /250 LG.
53	7401971	1	1	1	1	OPTION WIRING DIAGRAM
54	7403240	1	1	1	1	NOMEX INSULATOR PLATE (220VAC ONLY)

	NAME	DATE
DR	J.GLASSFORD	6/18/07
CHK	D.HURLEY	6/18/07
APPD	L.LESTER	6/19/07

DO NOT SCALE DRAWING

ASAHI/AMERICA

ISO 9001 CERTIFIED

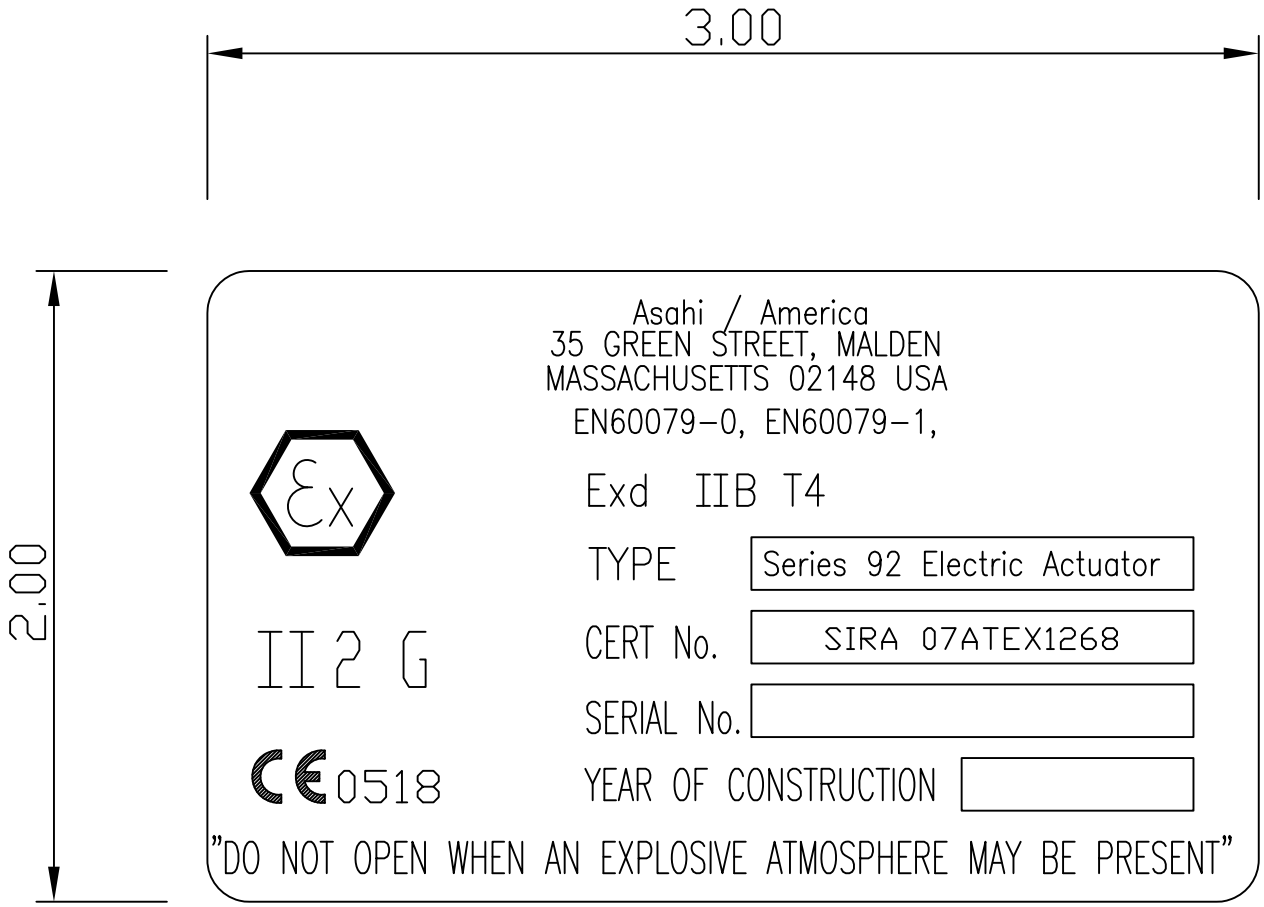
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

SERIES 92 EXPLODED VIEW

SIZE	DWG. NO.	REV
A	289S92	E

SCALE NTS

SHEET 1 OF 1



NOTE:
ALL THE SQUARES ARE TO BE FILLED IN WITH THE RELEVANT INFORMATION BY HARD STAMPING

	NAME	DATE
DR	JOHN GLASSFORD	7/8/08
APPD	DAVE HURLEY	7/8/08
PROD		
WO#/SO#		
FILE		

ASAHI/AMERICA
ISO 9001 CERTIFIED
35 GREEN STREET, P.O. BOX 653, MALDEN, MA.

SERIES 92 PRODUCT
ATEX - ID LABEL

SIZE	DWG. NO.	REV
A	M00EL610	B

SCALE NONE SHEET 1 OF 1

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SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American National Standards Institute (ANSI):
   a. C55,1, Standard for Shunt Power Capacitors.
   b. C62.11, Standard for Metal-Oxide Surge Arrestors for AC Circuits.
   c. Z55.1, Gray Finishes for Industrial Apparatus and Equipment.
2. American Society for Testing and Materials (ASTM):
   a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
   b. A240, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
   c. A570, Standard Specification for Steel, Sheet, and Strip, Carbon, Hot-Rolled, Structural Quality.
3. Federal Specifications (FS):
   a. W-C-596, Connector, Receptacle, Electrical.
   b. W-S-896E, Switches: Toggle, Flush Mounted.
4. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.
5. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   b. AB 1, Molded Case Circuit Breakers and Molded Case Switches.
   c. CP I, Shunt Capacitors.
   d. ICS 2, Industrial Control Devices, Controllers, and Assemblies.
   e. KS 1, Enclosed Switches.
   f. LA I, Surge Arrestors.
   g. PB 1, Panelboards
   h. ST 20, Dry-Type Transformers for General Applications.
   i. WD I, General Requirements for Wiring Devices.
6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
7. Underwriters Laboratories, Inc. (UL):
   a. 67, Standard for Panelboards.
   b. 98, Standard for Enclosed and Dead-Front Switches.
   c. 198C, Standard for Safety High-Interrupting-Capacity Fuses, Current-Limiting Types.
   d. 198E, Standard for Class Q Fuses.
   e. 486E, Standard for Equipment Wiring Terminals.
   f. 489, Standard for Molded Case Circuit Breakers and Circuit Breaker Enclosures.
   g. 508, Standard for Industrial Control Equipment.
   h. 810, Standard for Capacitors.
   i. 943, Standard for Ground-Fault Circuit Interrupters.
   j. 1059, Standard for Terminal Blocks.
   k. 1561, Standard for Dry-Type General-Purpose and Power Transformers.

1.2 SUBMITTALS

A. Shop Drawings:

1. Device boxes for use in hazardous areas.
2. Junction and pull boxes used above, at, or below, grade.
3. Hardware.
4. Receptacles.
5. Individual circuit breakers.
6. Fused and non-fused switches.
7. Pushbuttons, indicating lights, selector switches, and elapsed time meters.
8. Terminal blocks.
9. Terminal junction boxes.
10. Surge Protection Devices.
11. Panelboards and circuit breaker data.
12. Fuses.
13. Transformers.
14. All other miscellaneous material part of this project.
15. Support and framing channel.

B. Quality Control Submittals:

1. Test Report: Sound test certification for dry type power transformers (0 to 600-volt, primary).

1.3 QUALITY ASSURANCE

A. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.1 OUTLET AND DEVICE BOXES

A. Sheet Steel: One-piece drawn type, zinc- or cadmium-plated.

B. Cast Metal:
1. Box: Cast ferrous metal.
2. Cover: Gasketed, weatherproof, cast ferrous metal, with stainless steel screws.
3. Hubs: Threaded.
4. Lugs (Cast Mounting) Manufacturer:
   a. Crouse-Hinds; Type FS or FD.
   b. Appleton; Type FS or FD.

2.2 JUNCTION AND PULL BOXES

A. Outlet Boxes Used as Junction or Pull Box: As specified under Article OUTLET AND DEVICE BOXES.

B. Large Stainless Steel Box: NEMA 250, Type 4X.

1. Box: 14-gauge, ASTM A240, Type 316-stainless steel.
2. Cover: Hinged with screws.
3. Hardware and Machine Screws: ASTM A167, Type 316-stainless steel.
4. Manufacturers:
   a. Hoffman Engineering Co.
   b. Robroy Industries.

2.3 WIRING DEVICES

A. Switches:

1. NEMA WD 1 and FS W-S-896E.
2. Specification grade, totally enclosed, ac type, with quiet tumbler switches and screw terminals.
3. Capable of controlling 100 percent tungsten filament and fluorescent lamp loads.
4. Rating: 20 amps, 120/277 volts.
5. Color:
   a. Office Areas: Ivory.
   b. Other Areas: Brown.
6. Switches with Pilot Light: 125-volt, neon light with red jewel, or lighted toggle when switch is ON.
7. Manufacturers:
   a. Bryant.
   b. Leviton.
   c. Hubbell.
   d. Pass and Seymour.
   e. Arrow Hart.

B. Receptacle, Single and Duplex:

1. NEMA WD 1 and FS W-C-596.
2. Specification grade, two-pole, three-wire grounding type with screw type wire terminals suitable for No. 10 AWG.
3. High strength, thermoplastic base color.
4. Color:
   a. Office Areas: Ivory.
   b. Other Areas: Brown.
5. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.
6. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps.
7. Manufacturers:
   a. Bryant.
   b. Leviton.
   c. Hubbell.
   d. Pass and Seymour.

e. Sierra.
f. Arrow Hart.

C. Receptacle, Ground Fault Circuit Interrupter: Duplex, specification grade, tripping at 5 mA.

1. Color: Ivory.
2. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, capable of interrupting 5,000 amps without damage.
3. Size: For 2-inch by 4-inch outlet boxes.
4. Standard Model: NEMA WD 1 with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
5. Feed-Through Model: NEMA WD 1, with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
6. Manufacturers:
   a. Pass and Seymour.
   b. Bryant.
   c. Leviton.
   d. Hubbell.
   e. Arrow Hart.

2.4 DEVICE PLATES

A. General: Sectional type plates not permitted.

B. Plastic:

1. Material: Specification grade, 0.10-inch minimum thickness, noncombustible, thermosetting.
2. Color: To match associated wiring device.
3. Mounting Screw: Oval-head metal, color matched to plate.

C. Metal:

1. Material: Specification grade, one-piece, 0.040-inch nominal thickness stainless steel.
2. Finish: ASTM A167, Type 304/316, satin.
3. Mounting Screw: Oval-head, finish matched to plate.

D. Cast Metal:

1. Material: Malleable ferrous metal, with gaskets.
2. Screw: Oval-head stainless steel.

E. Engraved:

1. Character Height: 3/16 inch.
2. Filler: Black.

F. Weatherproof:

1. For Receptacles: Gasketed, cast metal or stainless steel, with individual cap over each receptacle opening.
2. Mounting Screw: Stainless steel.
   a. Cap Spring: Stainless steel.
   b. Manufacturers:
      1) General Electric.
      2) Bryant.
      3) Hubbell.
      4) Sierra.
      5) Pass and Seymour.
      6) Crouse-Hinds; Type WLRD or WLRS.
      7) Bell.
      8) Arrow Hart.
3. For Switches: Gasketed, cast metal incorporating external operator for internal switch.
   a. Mounting Screw: Stainless steel.
   b. Manufacturers:
      1) Crouse-Hinds; DS-181 or DS-185.
      2) Appleton; FSK-LVTS or FSK-IVS.

G. Raised Sheet Metal: 1/2-inch high zinc- or cadmium-plated steel designed for one-piece drawn type sheet steel boxes.

2.5 SUPPORT AND FRAMING CHANNELS

A. Material:

1. Dry indoors - galvanized.
2. All Other Areas: ASTM A167, Type 316 stainless steel or fiber-reinforced epoxy, as required.

B. Finish:

1. Dry indoors - galvanized.
2. All Other Areas: ASTM A167, Type 316 stainless steel or fiber-reinforced epoxy, as required.

C. Inserts: Continuous.

D. Beam Clamps: Gray cast iron.

E. Manufacturers:

1. B-Line.
2. Unistrut.

2.6 NAMEPLATES

A. Material: Laminated plastic.
B. Attachment Screws: Stainless steel.

C. Color: White, engraved to a black core.

D. Engraving:

1. Pushbuttons/Selector Switches: Name of motor controlled on one, two, or three lines, as required.
2. Panelboards: Panelboard designation, service voltage, and phases.

E. Letter Height:

1. Pushbuttons/Selector Switches: 1/8 inch.
2. Panelboards: 1/4 inch.

2.07 SURGE PROTECTION DEVICE (SPD)

A. This section describes the material and installation requirements for surge protection device (SPD) in switchboards, panelboards, control panels and motor control centers for the protection of all AC electrical circuits.

B. SPD shall be listed and component recognized in accordance with UL 1449 and UL 1283.

C. SPD shall be installed and warranted by and shipped from the electrical distribution equipment manufacturer's factory.

D. SPD shall provide surge current diversion paths for all modes of protection; L-L, L-N, L-G, N-G in WYE systems, and L-L, L-G in DELTA systems.

E. SPD shall be modular in design. Each module shall be fused with a surge rated fuse.

F. A UL approved disconnect switch shall be provided as a means of disconnect in the switchboard device only.

G. SPD shall meet or exceed the following criteria:

1. Maximum surge current capability (single pulse rated) shall be:

a. Service entrance switchboard 300kA

b. Branch panelboards 150kA

c. Control Panel 150kA

2. UL 1449 Listed and Recognized Component Suppression Voltage Ratings shall not exceed the following:

Voltage	L-N	L-G	N-G
208Y/120	400V	400V	400V
480Y/277	800V	800V	800V

H. SPD shall have a minimum EMI/RFI filtering of -44dB at 100kHz with an insertion ration of 50:1 using MIL STD. 220A methodology.

I. SPD shall be provided with 1 set of NO/NC dry contacts.

J. SPD shall have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period. Warranty will be the responsibility of the electrical distribution equipment manufacturer.

K. Approve manufactures are:

1. Square D Company XTE Series
2. Approved Equal

2.02 LOW VOLTAGE SURGE SUPPRESSION (SS/SPD) PROTECTION

A. GENERAL:

1. SS/SPD protection shall be provided to protect the system from induced surges propagating along the signal and power supply lines. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the device surge withstand level, and be maintenance free and self-restoring.

2. All discrete inputs and outputs shall be optically or transformer isolated for voltage surge protection and shall meet peak common mode and 3 kV surge to ground withstand capability (SWC) test as specified by ANSI C37.90A-197A (IEEE Standard 472-1974).

3. In the event a standard manufacturers product does not satisfy the above surge requirements, additional protective circuitry to suppress contact bounce and to protect transients from being recognized as data. Input/output modules shall be configured for ease of wiring and maintenance. The modules shall be connected to wiring arms which are movable to permit removal of a module without disturbing field wiring. Covers shall be provided to prevent operator personnel from inadvertently touching the terminals.

B. POWER SUPPLY:

1. Protection of all 120 VAC instrument power supply lines shall be provided. Control panels shall be protected by line noise suppressing isolation transformers and SS/SPD. Field instruments shall be protected by SS/SPD. For control panels, the line noise suppressing isolation transformer shall be Topaz Series 30 Ultra isolators or approved equal. The suppressor shall be Edco HSP-121.

PART 3 - EXECUTION

3.1 GENERAL

A. Install equipment in accordance with NECA 5055.

3.2 OUTLET AND DEVICE BOXES

A. Install suitable for conditions encountered at each outlet or device in the wiring or raceway system, sized to meet NFPA 70 requirements.

B. Size:
1. Depth: Minimum 2 inches, unless otherwise required by structural conditions. Box extensions not permitted.
   a. Hollow Masonry Construction: Install with sufficient depth such that conduit knockouts or hubs are in masonry void space.
2. Ceiling Outlet: Minimum 4-inch octagonal sheet steel device box, unless otherwise required for installed fixture.
3. Switch and Receptacle: Minimum 2-inch by 4-inch sheet steel device box.

C. Locations:

1. Drawing locations are approximate.
2. To avoid interference with mechanical equipment or structural features, relocate outlets as directed by ENGINEER.
3. Light Switch: Install on lock side of doors.
4. Light Fixture: Install in symmetrical pattern according to room layout unless otherwise shown.

D. Mounting Height:

1. General:
   a. Measured to centerline of box.
   b. Where specified heights do not suit building construction or finish, mount as directed by ENGINEER.
2. Light Switch: 48 inches above floor.
3. Thermostat: 54 inches above floor.
4. Telephone Outlet: 6 inches above counter tops or 15 inches above floor.
5. Wall Mounted Telephone Outlet: 52 inches above floor.
6. Convenience Receptacle:
   a. General Interior Areas: 15 inches above floor.
   b. General Interior Areas (Counter Tops): Install device plate bottom or side flush with top of splash back, or 6 inches above countertops without splash back.
   c. Industrial Areas, Workshops: 48 inches above floor.
   d. Outdoor, All Areas: 24 inches above finished grade.
7. Special-Purpose Receptacle: 54 inches above floor or as shown.

E. Install plumb and level.

F. Flush Mounted:

1. Install with concealed conduit.
2. Install proper type extension rings or plaster covers to make edges of boxes flush with finished surface.
3. Holes in surrounding surface shall be no larger than required to receive box.

G. Support boxes independently of conduit by attachment to building structure or structural member.

H. Install bar hangers in frame construction, or fasten boxes directly with wood screws on wood, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units, and machine screws threaded into steelwork.

I. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.

J. Provide plaster rings where necessary.

K. Boxes embedded in concrete or masonry need not be additionally supported.

L. Install stainless steel mounting hardware in industrial areas.

M. Boxes Supporting Fixtures: Provide means of attachment with adequate strength to support fixture.

N. Open no more knockouts in sheet steel device boxes than are required; seal unused openings.

O. Box Type (Steel Raceway System):

1. Exterior Locations:
   a. Exposed Raceways: Cast metal.
   b. Concealed Raceways: Cast metal.
   c. Concrete Encased Raceways: Cast metal.
   d. Class I, II, or III Hazardous Areas: Cast metal.
2. Interior Dry Locations:
   a. Exposed Rigid Conduit: Cast metal.
   b. Exposed EMT: Sheet steel.
   c. Concealed Raceways: Sheet steel.
   d. Concrete Encased Raceways: Cast metal.
   e. Lighting Circuits, Ceiling: Sheet steel.
   f. Class I, II, or III Hazardous Areas: Cast metal.
3. Interior Wet Locations:
   a. Exposed Raceways: Cast metal.
   b. Concealed Raceways: Cast metal.
   c. Concrete Encased Raceways: Cast metal.
   d. Lighting Circuits, Ceiling: Sheet steel.
   e. Class I, II, or III Hazardous Areas: Cast metal.
      6. Cast-In-Place Concrete Slabs: Sheet steel.

3.3 JUNCTION AND PULL BOXES

A. Install where shown and where necessary to terminate, tap-off, or redirect multiple conduit runs.

B. Install pull boxes where necessary in raceway system to facilitate conductor installation.

C. Install in conduit runs at least every 150 feet or after the equivalent of three right angle bends.

D. Use outlet boxes as junction and pull boxes wherever possible and allowed by applicable codes.

E. Installed boxes shall be accessible.

F. Do not install on finished surfaces.

G. Install plumb and level.

H. Support boxes independently of conduit by attachment to building structure or structural member.

I. Install bar hangers in frame construction, or fasten boxes directly with wood screws on wood, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units, and machine screws or welded threaded studs on steelwork.

J. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.

K. Boxes embedded in concrete or masonry need not be additionally supported.

L. At or Below Grade:

1. Install boxes for below grade conduits flush with finished grade in locations outside of paved areas, roadways, or walkways.
2. If adjacent structure is available, box may be mounted on structure surface just above finished grade in accessible but unobtrusive location.
3. Obtain ENGINEER'S written acceptance prior to installation in paved areas, roadways, or walkways.
4. Use boxes and covers suitable to support anticipated weights.

M. Flush Mounted:

1. Install with concealed conduit.
2. Holes in surrounding surface shall be no larger than required to receive box.
3. Make edges of boxes flush with final surface.

N. Mounting Hardware:

1. Non-corrosive Interior Areas: Galvanized.
2. All Other Areas: 316 Stainless steel.

O. Location/Type:

1. Finished, Indoor, Dry: NEMA 250, Type 1.
2. Unfinished, Indoor, Dry: NEMA 250, Type 12.
3. Unfinished, Indoor and Outdoor, Wet and Corrosive: NEMA 250, Type 4X.

4. Unfinished, Indoor and Outdoor, Wet, Dust, or Oil: NEMA 250, Type 13.
5. Unfinished, Indoor and Outdoor, Hazardous: NEMA 250, Type 7 and Type 9, where indicated.
6. Underground Conduit: Concrete Encased.
7. Corrosive Locations: Nonmetallic.

3.4 WIRING DEVICES

A. Switches:

1. Mounting Height: See Paragraph OUTLET AND DEVICE BOXES.
2. Install with switch operation in vertical position.
3. Install single-pole, two-way switches such that toggle is in up position when switch is on.

B. Receptacles:

1. Install with grounding slot down except where horizontal mounting is shown, in which case install with neutral slot up.
2. Ground receptacles to boxes with grounding wire only.
3. Weatherproof Receptacles:
   a. Install in cast metal box.
   b. Install such that hinge for protective cover is above receptacle opening.
4. Ground Fault Interrupter: Install feed-through model at locations where ground fault protection is specified for "downstream" conventional receptacles.

3.5 DEVICE PLATES

A. Securely fasten to wiring device; ensure a tight fit to the box.

B. Flush Mounted: Install with all four edges in continuous contact with finished wall surfaces without use of mats or similar materials. Plaster fillings will not be acceptable.

C. Surface Mounted: Plate shall not extend beyond sides of box unless plates have no sharp corners or edges.

D. Install with alignment tolerance to box of 1/16 inch.

E. Engrave with designated titles.

F. Types (Unless Otherwise Shown):

1. Office: Stainless Steel.
2. Exterior: Weatherproof.
3. Interior:
   a. Flush Mounted Boxes: Stainless Steel.
   b. Surface Mounted, Cast Metal Boxes: Cast metal.
   c. Surface Mounted, Sheet Steel Boxes: Stainless Steel.
   d. Surface Mounted, Nonmetallic Boxes: Plastic.

3.6 SUPPORT AND FRAMING CHANNEL

A. Furnish zinc-rich primer; paint cut ends prior to installation, where applicable.

B. Install where required for mounting and supporting electrical equipment and raceway systems.

PART 4 METHODS OF MEASUREMENT

4.01 GENERAL

The quantity of units to be paid for under this item shall be the number of each type installed, adjusted, removed or replaced, complete in place, ready for operation, and accepted by the Engineer.

PART 5 BASIS OF PAYMENT

Payment will be made at the contract unit price or lump sum price for each item completed by the contractor and accepted by the engineer. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, taxes, equipment, tolls, and incidentals necessary to complete this item. See plans for the summary of quantities and pay item descriptions.

Item No. 16050-5.1 #12, 600V, XHHW, installed in new conduit, complete in place. Includes all labor, conductors, testing, cleaning and dewatering, pull string, pulling compound, identification, splice kits, and etc., complete in place. - Price per linear foot.

Item No. 16050-5.2 #10, 600V, XHHW, installed in new conduit, complete in place. Includes all labor, conductors, testing, cleaning and dewatering, pull string, pulling compound, identification, splice kits, and etc., complete in place. - Price per linear foot.

Item No. 16050-5.3 One 3/4" schedule 40 PVC conduit direct buried in earth complete in place. Includes conduits, connectors, warning tape, excavation, labor, backfill, sod restoration, and etc., complete in place. – Price per linear foot.

Item No. 16050-5.4 One 1" schedule 40 PVC conduit direct buried in earth complete in place. Includes conduits, connectors, warning tape, excavation, labor, backfill, sod restoration, and etc., complete in place. – Price per linear foot.

Item No. 16050-5.5 One 3/4" hot dipped rigid galvanized steel conduit surfaced mounted, complete in place. Includes conduits, connectors, junction boxes, man lifts, channel, hardware, labor, and etc., complete in place. – Price per linear foot.

Item No. 16050-5.6 New Washrack Control Pedestal, complete in place. Includes control panel, receptacle, junction boxes, pedestal, conduits, conductors, concrete, hardware, excavation, backfill, splice kits, grounding, ground rods, labor, testing, and etc., complete in place. – Price per each

Item No. 16050-5.7 New Pump Station Control Panel Pedestal, complete in place. Includes coordination with pump station supplier/manufacturer, mounting of pump station control/alarm panel, pedestal, conduits, conductors, concrete, hardware, excavation, backfill, splice kits, grounding, ground rods, labor, testing, and etc., complete in place. – Price per each

Item No. 16050-5.8 Modify existing Hangar Panel, complete in place. Includes circuit breakers, conduit penetrations, hubs, panel schedules, labor, testing, and etc., complete in place. – Price per each

END OF SECTION 16050

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SECTION 16110

RACEWAYS

PART 1 - GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO): Division I, Standard Specifications for Highway Bridges, Fourteenth Edition.
2. American National Standards Institute (ANSI):
   a. C80.1, Rigid Steel Conduit-Zinc Coated.
   b. C80.3, Electrical Metallic Tubing-Zinc Coated.
   c. CS0.5, Rigid Aluminum Conduit.
   d. C80.6, Intermediate Metal Conduit (IMC)-Zinc Coated.
3. American Society for Testing and Materials (ASTM):
   a. A123 El, Standard Specification for Zinc-Coated (Galvanized) Coatings on Iron and Steel Products.
   b. C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
4. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.
5. National Electrical Manufacturers Association (NEMA):
   a. RN 1, Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
   b. TC 2, Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
   c. TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.
   d. TC 6, PVC and ABS Plastic Utilities Duct for Underground Installation.
   e. VE 1, Metallic Cable Tray Systems.
6. National Fire Protection Association (NFPA): 70, National Electrical Code. (NEC)
7. Underwriters Laboratories, Inc. (UL):
   a. 1, Standard for Safety Flexible Metal Conduit.
   b. 6, Standard for Safety Rigid Metal Conduit.
   c. 360, Standard for Safety Liquid-Tight Flexible Steel Conduit.
   d. 514B, Standard for Safety Fittings for Conduit and Outlet Boxes.
   e. 514C, Standard for Safety Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
   f. 651, Standard for Safety Schedule 40 and 80 PVC Conduit.
   g. 651A, Standard for Safety Type EB and Rigid PVC Conduit and HDPF Conduit.
   h. 797, Standard for Safety Electrical Metallic Tubing.
   i. 870, Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings.
   j. 1242, Standard for Safety Intermediate Metal Conduit.
   k. 1660, Standard for Safety Liquid-Tight Flexible Nonmetallic Conduit.

1.02 SUBMITTALS

A. Shop Drawings:

1. Manufacturer's Literature:
   a. Rigid galvanized steel conduit.
   b. Electric metallic tubing.
   c. Rigid aluminum conduit.
   d. PVC Schedule 40 conduit.
   e. PVC-coated rigid galvanized steel conduit.
   f. Flexible metal, liquid-tight conduit.
   g. Flexible, nonmetallic, liquid-tight conduit.
   h. Conduit fittings.
   i. Wireways.
2. Precast Manholes and Handholes:
   a. Dimensional drawings and descriptive literature.
   b. Traffic loading calculations.
   c. Accessory information.
3. Cable Tray Systems:
   a. Dimensional drawings, calculations, and descriptive information.
   b. NEMA load/span designation and how it was selected.
   c. Support span length and pounds-per-foot actual and future cable loading at locations, with safety factor used.
   d. Location and magnitude of maximum simple beam deflection of tray for loading specified.
   e. Layout drawings and list of accessories being provided.
4. Conduit Layout:
   a. Plan and section type, showing arrangement and location of conduit and duct bank required for:
      1) Low and medium voltage feeder and branch circuits.
      2) Instrumentation and control systems.
      3) Communications systems.
      4) Empty conduit for future use.

1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.01 CONDUIT AND TUBING

A. Rigid Galvanized Steel Conduit (RGS):

1. Meet requirements of ANSI C80.1 and UL6.
2. Material: Hot-dip galvanized, with chromated protective layer.

B. PVC Schedule 40 Conduit:

1. Meet requirements of NEMA TC 2 and UL 651.
2. UL listed for concrete encasement, underground direct burial, concealed or direct sunlight exposure, and 90 degrees C insulated conductors.

C. Flexible Metal, Liquid-Tight Conduit:

1. UL 360 listed for 105 degrees C insulated conductors.
2. Material: Galvanized steel, with an extruded PVC jacket.

D. Flexible, Nonmetallic, Liquid-Tight Conduit:

1. Material: PVC core with fused flexible PVC jacket.
2. UL 1660 listed for:
   a. Dry Conditions: 80 degrees C insulated conductors.
   b. Wet Conditions: 60 degrees C insulated conductors.
3. Manufacturers:
   a. Carlon; Carflex or X-Flex.
   b. T & B; Xtraflex LTC or EFC.

2.02 FITTINGS

A. Rigid Galvanized Steel and Intermediate Metal Conduit:

1. General:
   a. Meet requirements of UL 514B.
   b. Type: Threaded, galvanized. Set screw fittings not permitted.
2. Bushing:
   a. Material: Malleable iron with integral insulated throat, rated for 150 degrees C.
   b. Manufacturers:
      1) Thomas & Betts; Type BIM.
      2) O.Z./Gedney; Type HB.
3. Grounding Bushing:
   a. Material: Malleable iron with integral insulated throat rated for 150 degrees C, with solderless lugs.
   b. Manufacturers:
      1) Appleton; Series GIB.
      2) O.Z. Gedney; Type HBLG.
4. Conduit Hub:
   a. Material: Malleable iron with insulated throat.
   b. Manufacturers:
      1) O.Z. Gedney; Series CH.
      2) T & B; Series 370.
5. Conduit Bodies:
   a. Material: Malleable iron, sized as required by NFPA 70.
   b. Manufacturers (For Normal Conditions):
      1) Appleton; Form 35 threaded Unilets.
      2) Crouse-Hinds; Form 7 or 8 threaded condulets.
      3) Killark; Series O Electrolets.
   c. Manufacturers (For Hazardous Locations):
      1) Appleton.
      2) Crouse-Hinds.

3) Killark.

6. Couplings: As supplied by conduit manufacturer.
7. Conduit Sealing Fitting Manufacturers:
   a. Appleton; Type EYF, EYM, or ESU.
   b. Crouse-Hinds; Type EYS or EZS.
   c. Killark; Type EY or EYS.
8. Drain Seal Manufacturers:
   a. Appleton; Type SF.
   b. Crouse-Hinds; Type EYD or EZD.
9. Drain/Breather Fitting Manufacturers:
   a. Appleton; Type ECDB.
   b. Crouse-Hinds; ECD.
10. Expansion Fitting Manufacturers:
   a. Deflection/Expansion Movement:
      1) Appleton; Type DF.
      2) Crouse-Hinds; Type XD.
   b. Expansion Movement Only:
      1) Appleton; Type XJ.
      2) Crouse-Hinds; Type XJ.
11. Cable Sealing Fittings:
   a. To form watertight nonslip cord or cable connection to conduit.
   b. For Conductors With OD of 1/2 Inch or Less: Neoprene bushing at connector entry.
   c. Manufacturers:
      1) Crouse-Hinds; CGBS.
      2) Appleton; CG-S.

B. PVC Conduit and Tubing:

1. Meet requirements of NEMA TC-3.
2. Type: PVC, slip-on.

C. Flexible Metal, Liquid-Tight Conduit:

1. Metal insulated throat connectors with integral nylon or plastic bushing rated for 105 degrees C.
2. Insulated throat and sealing O-rings.
3. Long design type extending outside of box or other device at least 2 inches.
4. Manufacturer: T & B; Series 5300.

D. Flexible, Nonmetallic, Liquid-Tight Conduit: Meet requirements of UL 514B.

1. Type: One-piece fitting body, complete with lock nut, O-ring, threaded ferrule, sealing ring, and compression nut.
2. Manufacturers:
   a. Carlon; Type LT.
   b. Kellems; Polytuff.
   c. T & B; LT Series.

E. Watertight Entrance Seal Device:

1. New Construction:
   a. Material: Oversized sleeve, malleable iron body with sealing ring, pressure ring, grommet seal, and pressure clamp.
   b. Manufacturer: O.Z./Gedney; Type FSK or WSK, as required.
2. Gored-Hole Application:
   a. Material: Assembled dual pressure disks, neoprene sealing ring, and membrane clamp.
   b. Manufacturer: O.Z./Gedney; Series CSM.

2.03 WIREWAYS

A. Meet requirements of UL 870.

B. Type: Steel-enclosed, with removable, hinged cover.

C. Rating: Outdoor raintight if outdoor, and indoor if indoor.

D. Finish: Gray, baked enamel.

E. Manufacturers:

1. Square D.
2. B-Line Systems, Inc.

2.04 ACCESSORIES

A. Duct Bank Spacers:

1. Type: Nonmetallic, interlocking, for multiple conduit sizes.
2. Suitable for all types of conduit.
3. Manufacturer: Underground Device, Inc.; Type WUNPEECE.

B. Identification Devices:

1. Raceway Tags:
   a. Material: Permanent, nylon.
   b. Shape: Round.
   c. Raceway Designation: Pressure stamped, embossed, or engraved.
   d. Tags relying on adhesives or taped-on markers not permitted.
2. Electric Detectable Warning Tape:
   a. Material: Polyethylene, 4-mil gauge with solid aluminum foil core.
   b. Color: Red, unless otherwise noted.
   c. Width: Minimum 6-inch.
   d. Designation: Warning on tape that electric circuit is located below tape.
   e. Manufacturers:
      1) Blackburn.
      2) Griffolyn Co.
      3) Or approved equal.
3. Buried Raceway Marker:

a. Material: 6”x6”x12” concrete monument, consisting of double-ended arrows, straight for straight runs and bent at locations where runs change direction.
b. Designation: Incise to depth of 3/32 inch, ELECTRIC CABLES. in letters 1/4-inch high.
c. Minimum Dimension: 1/4-inch thick, 10 inches long, and 3/4-inch wide.

C. Raceway Coating:

1. Material: Bitumastic or plastic tape coating.
2. Manufacturers:
   a. Koppers bitumastic; No. 505.
   b. Scotchwrap; No. 51, plastic tape.

D. Wraparound Duct Band:

1. Material: Heat-shrinkable, cross-linked polyolefin, precoated with hot-melt adhesive.
2. Manufacturer: Raychem; Type TWDB.

PART 3 - EXECUTION

3.01 GENERAL

A. Conduit and Tubing sizes shown are based on the use of copper conductors. Reference Section 16120, CONDUCTORS, concerning conduit sizing for aluminum conductors.

B. All installed Work shall comply with NECA 5055.

C. Crushed or deformed raceways not permitted.

D. Maintain raceway entirely free of obstructions and moisture.

E. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.

F. Aluminum Conduit: Do not install in direct contact with concrete.

G. Sealing Fittings: Provide drain seal in vertical raceways where condensate may collect above sealing fitting.

H. Avoid moisture traps where possible. When unavoidable in exposed conduit runs, provide junction box and drain fitting at conduit low point.

I. Group raceways installed in same area.

J. Proximity to Heated Piping: Install raceways minimum 12 inches from parallel runs.

K. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.

L. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes.

M. Block Walls: Do not install raceways in same horizontal course with reinforcing steel.

N. Install watertight fittings in outdoor, underground, or wet locations.

O. Paint threads, before assembly of fittings, of galvanized conduit or IMC installed in exposed or damp locations with zinc-rich paint or liquid galvanizing compound.

P. All metal conduit to be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.

Q. Do not install raceways in concrete equipment pads, foundations, or beams.

R. Horizontal raceways installed under floor slabs shall lie completely under slab, with no part embedded within slab.

S. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.

3.02 CONDUIT APPLICATION

A. Diameter: Minimum 3/4 inch.

B. Exterior, Exposed:

1. Rigid galvanized steel.

C. Interior:

1. Rigid galvanized steel.
2. Electric metallic tubing for ceiling portion of lighting circuits in a conditioned environment.

D. Aboveground, Embedded in Concrete Walls, Ceilings, or Floors: PVC Schedule 40.

E. Direct Earth Burial: PVC Schedule 40.

F. Concrete-Encased Raceways: PVC Schedule 40.

3.03 CONNECTIONS

A. For motors, wall or ceiling mounted fans and unit heaters, dry type transformers, electrically operated valves, instrumentation, and other equipment where flexible connection is required to minimize vibration:

1. Conduit Size 4 Inches or Less: Flexible metal, liquid-tight conduit.
2. Conduit Size Over 4 Inches: Nonflexible.
3. Corrosive Areas: Flexible, nonmetallic, liquid or PVC-coated metallic, liquid-tight.

4. Length: 18-inch minimum, 60-inch maximum, of sufficient length to allow movement or adjustment of equipment.

B. Lighting Fixtures in Dry Areas: Flexible steel, nonliquid-tight conduit.

C. Outdoor Areas, Process Areas Exposed to Moisture, and Areas Required to be Oiltight and Dust-Tight: Flexible metal, liquid-tight conduit.

D. Transition From Underground or Concrete Embedded to Exposed: Rigid galvanized steel conduit.

E. Under Equipment Mounting Pads: Rigid galvanized steel conduit.

F. Exterior Light Pole Foundations: Rigid galvanized steel conduit.

3.04 PENETRATIONS

A. Make at right angles, unless otherwise shown.

B. Notching or penetration of structural members, including footings and beams, not permitted.

C. Fire-Rated Walls, Floors, or Ceilings: Fire-stop openings around penetrations to maintain fire-resistance rating.

D. Apply single layer of wraparound duct band to all metallic conduit in contact with concrete floor slabs to a point 2 inches above concrete surface.

E. Concrete Walls, Floors, or Ceilings (Aboveground): Provide nonshrink grout dry-pack, or use watertight seal device.

F. Entering Structures:

1. General: Seal raceway at the first box or outlet with minimum 2 inches thick expandable plastic compound to prevent the entrance of gases or liquids from one area to another.
2. Concrete Roof or Membrane Waterproofed Wall or Floor:
   a. Provide a watertight seal.
   b. Without Concrete Encasement: Install watertight entrance seal device on each side.
   c. With Concrete Encasement: Install watertight entrance seal device on the accessible side.
   d. Securely anchor malleable iron body of watertight entrance seal device into construction with one or more integral flanges.
   e. Secure membrane waterproofing to watertight entrance seal device in a permanent, watertight manner.
3. Heating, Ventilating, and Air Conditioning Equipment:
   a. Penetrate equipment in area established by manufacturer.
   b. Terminate conduit with flexible metal conduit at junction box or condulet attached to exterior surface of equipment prior to penetrating equipment.
   c. Seal penetration with silicone type sealant.
4. Corrosive-Sensitive Areas:
   a. Seal all conduit passing through chlorine and ammonia room walls.

b. Seal all conduit entering equipment panel boards and field panels containing electronic equipment.
c. Seal penetration with silicone type sealant.

5. Existing or Precast Wall (Underground): Core drill wall and install a watertight entrance seal device.
6. Nonwaterproofed Wall or Floor (Underground, without Concrete Encasement):
   a. Provide Schedule 40 galvanized pipe sleeve, or watertight entrance seal device.
   b. Fill space between raceway and sleeve with an expandable plastic compound on each side.

7. Manholes and Handholes:
   a. Metallic Raceways: Provide insulated grounding bushings.
   b. Nonmetallic Raceways: Provide bell ends flush with wall.
   c. Install such that raceways enter as near as possible to one end of wall, unless otherwise shown.

3.05 SUPPORT

A. Support from structural members only, at intervals not exceeding NFPA 70 requirements, and in any case not exceeding 10 feet. Do not support from piping, pipe supports, or other raceways.

B. Multiple Adjacent Raceways: Provide ceiling trapeze. For trapeze-supported conduit, allow 40 percent extra space for future conduit.

C. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:

1. Wood: Wood screws.
2. Hollow Masonry Units: Toggle bolts.
3. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.
4. Steelwork: Machine screws.

D. Nails or wooden plugs inserted in concrete or masonry for attaching raceway not permitted. Do not weld raceways or pipe straps to steel structures. Do not use wire in lieu of straps or hangers.

3.06 BENDS

A. Install concealed raceways with a minimum of bends in the shortest practical distance.

B. Make bends and offsets of longest practical radius.

C. Install with symmetrical bends or cast metal fittings.

D. Avoid field-made bends and offsets, but where necessary, make with acceptable hickey or bending machine. Do not heat metal raceways to facilitate bending.

E. Make bends in parallel or banked runs from same center or centerline with same radius so that bends are parallel.

F. Factory elbows may be installed in parallel or banked raceways if there is change in plane of run, and raceways are same size.

G. PVC Conduit:

1. Bends 30-Degree and Larger: Provide factory-made elbows.
2. 90-Degree Bends: Provide rigid steel elbows.
3. Use manufacturer's recommended method for forming smaller bends.

H. Flexible Conduit: Do not make bends that exceed allowable conductor bending radius of cable to be installed or that significantly restricts conduit flexibility.

3.07 EXPANSION/DEFLECTION FITTINGS

A. Provide on all raceways at all structural expansion joints, and in long tangential runs.

B. Provide expansion/deflection joints for 50 degrees F maximum temperature variation.

C. Install in accordance with manufacturer's instructions.

3.08 PVC CONDUIT

A. Solvent Welding:

1. Provide manufacturer recommended solvent; apply to all joints.
2. Install such that joint is watertight.

B. Adapters:

1. PVC to Metallic Fittings: PVC terminal type.
2. PVC to Rigid Metal Conduit or IMC: PVC female adapter.

C. Belied-End Conduit: Bevel the unbelled end of the joint prior to joining.

3.09 PVC-COATED RIGID STEEL CONDUIT

A. Install in accordance with manufacturer's instructions.

B. Provide PVC boot to cover all exposed threading.

3.10 WIREWAYS

A. Install in accordance with manufacturer's instructions.

B. Locate with cover on accessible vertical face of wireway, unless otherwise shown.

3.11 TERMINATION AT ENCLOSURES

A. Cast Metal Enclosure: Provide manufacturer's premolded insulating sleeve inside metallic conduit terminating in threaded hubs.

B. Sheet Metal Boxes, Cabinets, and Enclosures:

1. Rigid Galvanized Conduit:
   a. Provide one lock nut each on inside and outside of enclosure.
   b. Install grounding bushing.
   c. Provide bonding jumper from grounding bushing to equipment ground bus or ground pad; if neither ground bus nor pad exists, connect jumper to lag bolt attached to metal enclosure.
   d. Install insulated bushing on ends of conduit where grounding is not required.
   e. Provide insulated throat when conduit terminates in sheet metal boxes having threaded hubs.
2. Electric Metallic Tubing: Provide gland compression, insulated connectors.
3. Flexible Metal Conduit: Provide two screw type, insulated, malleable iron connectors.
4. Flexible, Nonmetallic Conduit: Provide nonmetallic, liquid-tight strain relief connectors.
5. PVC-Coated Rigid Galvanized Steel Conduit: Provide PVC-coated, liquid-tight, metallic connector.
6. PVC Schedule 40 Conduit: Provide PVC terminal adapter with lock nut.

C. Motor Control Center, Switchboard, Switchgear, and Free-Standing Enclosures: Terminate conduit entering bottom with grounding bushing; provide a grounding jumper extending to equipment ground bus or grounding pad.

3.12 UNDERGROUND RACEWAYS

A. Grade: Maintain minimum grade of 4 inches in 100 feet, either from one manhole, handhole, or pull box to the next, or from a high point between them, depending on surface contour.

B. Cover: Maintain minimum 2-foot cover above conduit and concrete encasement, unless otherwise shown.

C. Make routing changes as necessary to avoid obstructions or conflicts.

D. Couplings: In multiple conduit runs, stagger so that couplings in adjacent runs are not in same transverse line.

E. Union type fittings not permitted.

F. Spacers:

1. Provide preformed, nonmetallic spacers, designed for such purpose, to secure and separate parallel conduit runs in a trench or concrete encasement.
2. Install at intervals not greater than that specified in NFPA 70 for support of the type conduit used, but in no case greater than 10 feet.

G. Support conduit so as to prevent bending or displacement during backfilling or concrete placement.

H. Installation with Other Piping Systems:

1. Crossings: Maintain minimum 12-inch vertical separation.
2. Parallel Runs: Maintain minimum 12-inch separation.
3. Installation over valves or couplings not permitted.

I. Metallic Raceway Coating: At couplings and joints and along entire length, apply wraparound duct band with one-half tape width overlap to obtain two complete layers.

3.13 EMPTY RACEWAYS

A. Provide permanent, removable cap over each end.

B. Provide PVC plug with pull tab for underground raceways with end bells.

C. Provide nylon pull cord.

D. Identify, as specified in Paragraph IDENTIFICATION DEVICES, with waterproof tags attached to pull cord at each end, and at intermediate pull point.

3.14 IDENTIFICATION DEVICES

A. Raceway Tags:

1. Identify origin and destination.
2. Install at each terminus, near midpoint, and at minimum intervals of every 50 feet of exposed Raceway, whether in ceiling space or surface mounted.
3. Provide nylon strap for attachment.

B. Electric Detectable Warning Tape: Install approximately 12 inches above underground or concrete-encased raceways. Align parallel to, and within 12 inches of, centerline of runs.

C. Buried Raceway Markers:

1. Install at grade to indicate direction of underground raceways.
2. Install at all bends and at intervals not exceeding 100 feet in straight runs.

3.15 PROTECTION OF INSTALLED WORK

A. Protect products from effects of moisture, corrosion, and physical damage during construction.

B. Provide and maintain manufactured watertight and dust-tight seals over all conduit openings during construction.

C. Touch up painted conduit threads after assembly to cover nicks or scars.

D. Touch up damage to coating on PVC-coated conduit with patching compound approved by manufacturer.

PART 4 METHODS OF MEASUREMENT

4.01 GENERAL

The quantity of units to be paid for under this item shall be the number of each type installed, adjusted, removed or replaced, complete in place, ready for operation, and accepted by the Engineer.

PART 5 BASIS OF PAYMENT

No direct payment shall be made for the work described in this section. The work described in this section is incidental to bid items in section 16050 and shall be paid for in the respective bid item of which it is a component part.

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SECTION 16120

CONDUCTORS

PART 1 - GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American National Standards Institute (ANSI): 386, Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V.

2. American Society for Testing and Materials (ASTM):
   a. A167, Standard Specification for Stainless and Heat Resisting Chromium-Nickel-P1ated Steel Plate, Sheet, and Strip.

   b. B3, Standard Specification for Soft or Annealed Copper Wire.

   c. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

   d. B263, Standard Test Method for Determination of Cross- Sectional Area of Stranded Conductors.

2. Association of Edison Illuminating Companies (AEIC):

   a. CS 5, Crosslinked Polyethylene Insulated Shielded Power Cables Rated 5 Through 35 kV.

   b. CS 6, Ethylene- Propylene-Rubber-Insulated Shielded Power Cables Rated 5 Through 69 kV.

4. Insulated Cable Engineer's Association, Inc. (ICEA): T-29-250, Procedure for Conducting Vertical Cable Tray Flame Test With a Theoretical Heat Input of 210,000 Btu/hour.

5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

   a. 48, Standard Test Procedures and Requirements or High-Voltage Alternating Current Cable Terminations.

   b. 404, Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5,000V through 46,000V and Cable Joints for Use with Laminated Dielectric Cable Rated 2,500V through 500,000V.

6. National Electrical Contractors Association, Inc. (NECA): 5055, Standard of Installation.

7. National Electrical Manufacturers' Association (NEMA):

   a. CC 1, Electric Power Connectors for Substations.

b. WC 3, Rubber-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

c. WC 5, Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

d. WC 7, Crosslinked-Thermosetting-Polyethylene-lnsulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

e. WC 8, Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

f. WC 55, Instrumentation Cables and Thermocouple Wire.

8. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

9. Underwriters Laboratories, Inc. (UL):
   a. 13, Standard for Safety Power-Limited Circuit Cables.

   b. 44, Standard for Safety Rubber-Insulated Wires and Cables.

   c. 62, Standard for Safety Flexible Cord and Fixture Wire.

   d. 486A, Standard for Safety Wire Connector and Soldering Lugs for Use with Copper Conductors.

   e. 486B, Standard for Safety Wire Connectors and Soldering Lugs for Use with Aluminum Conductors.

   f. 510, Standard for Safety Insulating Tape.

   g. 854, Standard for Safety Service-Entrance Cables.

   h. 910, Standard for Safety Test Method for Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air Handling Spaces.

   i. 1072, Standard for Safety Medium-Voltage Power Cables.

   j. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

   k. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

1.02 SUBMITTALS

A. Shop Drawings:

1. Wire and cable descriptive product information.

2. Wire and cable accessories descriptive product information.

3. Cable fault detection system descriptive product information.

4. Manufactured wiring systems descriptive product information.

5. Manufactured wire systems rating information.

6. Manufactured wire systems dimensional drawings.

7. Manufactured wire systems special fittings.

B. Quality Control Submittals:

1. Certified Factory Test Report for conductors 600 volts and below.

2. Certified Factory Test Report per AEIC CS6, including AEIC qualification report for conductors above 600 volts.

1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.01 CONDUCTORS 600 VOLTS AND BELOW

A. Conform to applicable requirements of NEMA WC 3, WC 5, and WC 7.

B. Conductor Type:

1. 120- and 277-Volt Lighting, No. 10 AWG and Smaller: Stranded copper.

2. 120-Volt Receptacle Circuits, No. 10 AWG and Smaller: Stranded copper.

3. All Other Circuits: Stranded copper.

C. Insulation: Type XHHW-2 insulation for all power and control application.

D. Flexible Cords and Cables:

1. Type SOW-A50 with ethylene propylene rubber insulation in accordance with UL 62.

2. Conform to physical and minimum thickness requirements of NEMA WC 8.

2.02 600-VOLT RATED CABLE

A. General:

1. Type: TC, meeting requirements of UL 1277, including Vertical Tray Flame Test at 20,000 Btu/hr, and NFPA 70, Article 340, or UL 13 Listed Power Limited Circuit Cable meeting requirements of NFPA 70, Article 725.

2. Permanently and legibly marked with manufacturer's name, maximum working voltage for which cable was tested, type of cable, and UL listing mark.

3. Suitable for installation in open air, in cable trays, or conduit.

4. Minimum Temperature Rating: 90 degrees C dry locations, 75 degrees C wet locations.

5. Overall Outer Jacket: PVC, flame-retardant, sunlight- and oil-resistant.

B. Wire and Connectors:

1. Cable shall be rated for 600 volts and shall meet the requirements below:

2. Conductors shall be stranded

3. All wire shall be brought to the job in unbroken packages and shall bear the data of manufacturing; not older than 12 months.

4. Type of wire shall be XHHW-2, rated 75 degrees C suitable for wet locations.

5. No wire smaller than No. 12 gauge shall be used unless specifically indicated.

6. Conductor metal shall be copper.

7. All conductors shall be megger tested after installation and insulation must be in compliance with the Insulated Power Cable Engineers Association Minimum Values of Insulation Resistance.

2.03 GROUNDING CONDUCTORS

A. Equipment: Stranded copper with green, Type USE/RHH/RHW-XLPE or XHHW-2, insulation.

B. Direct Buried: Bare stranded copper.

2.04 ACCESSORIES FOR CONDUCTORS 600 VOLTS AND BELOW

A. Tape:

1. General Purpose, Flame Retardant: 7-mil, vinyl plastic, Scotch Brand 33, rated for 90 degrees C minimum, meeting requirements of UL 510.

2. Flame Retardant, Cold and Weather Resistant: 8.5-mil, vinyl plastic, Scotch Brand 88.

3. Arcs and Fireproofing:

a. 30-mil, elastomer

b. Manufacturers and Products:
1) Scotch; Brand 77, with Scotch Brand 69 glass cloth tape binder.
2) Plytnount; Plyarc 30, with Plymount Plyglas glass cloth tape binder.

B. Identification Devices:

1. Sleeve: Permanent, PVC, yellow or white, with legible machine-printed black markings.

2. Marker Plate: Nylon, with legible designations permanently hot stamped on plate.

3. Grounding Conductor: Permanent green heat-shrink sleeve, 2-inch minimum.

C. Connectors and Terminations:

1. Nylon, Self-Insulated Crimp Connectors:

a. Manufacturers and Products:

1) Thomas & Betts; Sta-Kon.

2) Burndy; Insulink.

3) ILSCO.

2. Nylon, Self-Insulated, Crimp Locking-Fork, Torque-Type Terminator:

a. Manufacturers and Products:

1) Thomas & Betts; Sta-Kon.

2) Burndy; Insulink.

3) ILSCO.

D. Cable Lugs:

1. In accordance with NEMA CC I.

2. Rated 600 volts of same material as conductor metal.

3. Insulated, Locking-Fork, Compression Lugs:

a. Manufacturers and Products:

1) Thomas & Betts; Sta-Kon.

2) ILSCO; ILSCONS.

4. Un-insulated Crimp Connectors and Terminators:

    a. Manufacturers and Products:

        1) Square D; Versitide.

        2) Thomas & Betts; Color-Keyed.

        3) ILSCO.

5. Un-insulated, Bolted, Two-Way Connectors and Terminators:

    a. Manufacturers and Products:

        1) Thomas & Betts; Locktite.

        2) Burndy; Quiklug.

        3) ILSCO.

E. Cable Ties: Nylon, adjustable, self-locking, and reusable.

1. Manufacturers and Product: Thomas & Betts; TY-RAP.

F. Heat Shrinkable Insulation: Thermally stabilized, crosslinked polyofin.

1. Manufacturers and Product: Thomas & Betts; SHRINK-KON.

2.05 PULLING COMPOUND

A. Nontoxic, non-corrosive, noncombustible, nonflammable, wax-based lubricant; UL listed.

B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.

C. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.

D. Manufacturers and Products:

1. Ideal Co.; Yellow 77.

2. Polywater, Inc.

3. Cable Grip Co.

2.06 WARNING TAPE

A. As specified in Section 16110, RACEWAYS.

2.07 SOURCE QUALITY CONTROL

A. Conductors 600-Volts and Below: Test in accordance with UL 44 and 854 Standards.

PART 3 - EXECUTION

3.01 GENERAL

A. Conductor installation to be in accordance with NECA 5055.

B. Conductor and cable sizing shown is based on copper conductors, unless noted otherwise.

C. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii.

D. Tighten screws and terminal bolts in accordance with UL 486A for copper conductors.

E. Cable Lugs: Provide with correct number of holes, bolt size, and center-to-center spacing as required by equipment terminals.

F. Bundling: Where single conductors and cables in manholes, hand holes, vaults, and other indicated locations are not wrapped together by some other means, bundle conductors from each conduit throughout their exposed length with cable ties placed at intervals not exceeding 18 inches on center.

G. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables.

H. Concrete-Encased Raceway Installation: Prior to installation of conductors, pull through each raceway a mandrel approximately 1/4-inch smaller than raceway inside diameter.

3.02 POWER CONDUCTOR COLOR CODING

A. Conductors 600 Volts and Below:

1. No. 6 AWG and Larger: Apply general purpose, flame retardant tape at each end, and at accessible locations wrapped at least six full overlapping turns, covering an area 1-1/2 to 2 inches wide.

2. No. 8 AWG and Smaller: Provide colored conductors.

3. Colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts Single-Phase, Three-Wire	Grounded Neutral One Hot Leg Other Hot Leg	White Black Red
208Y/120 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A	White Black

	Phase B Phase C	Red Blue
240/120 Volts Three-Phase, Four-Wire Delta, Center Tap Ground on Single-Phase	Grounded Neutral Phase A High (wild) Leg Phase C	White Black Orange Blue
480Y/277 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	Gray Brown Purple Yellow
NOTE: Phase A, B, C implies direction of positive phase rotation. Coordinate with local code for wire color and adjust acoordingly.		

4. Tracer: Outer covering of white with an identifiable colored strip other than green in accordance with NFPA 70.

3.03 CIRCUIT IDENTIFICATION

A. Circuits Appearing in Circuit Schedules: identify power, instrumentation, and control conductor circuits, using circuit schedule designations, at each termination and in accessible locations such as manholes, hand holes, panels, switchboards, motor control centers, pull boxes, and terminal boxes.

B. Circuits Not Appearing in Circuit Schedules:

1. Assign circuit name based on device or equipment at load end of circuit.

2. Where this would result in same name being assigned to more than one circuit, add number or letter to each otherwise identical circuit name to make it unique.

C. Method:

1. Conductors No. 3 AWG and Smaller: Identify with sleeves.

2. Cables, and Conductors No. 2 AWG and Larger:

a. Identify with marker plates.

b. Attach marker plates with nylon tie cord.

3. Taped-on markers or tags relying on adhesives not permitted.

3.04 CONDUCTORS 600 VOLTS AND BELOW

A. Install 10 AWG or 12 AWG conductors for branch circuit power wiring in lighting and receptacle circuits.

B. Do not splice incoming service conductors and branch power distribution conductors No. 6 AWG and larger unless specifically indicated or approved by ENGINEER.

C. Connections and Terminations:

1. Install wire nuts only on solid conductors.

2. Install nylon self-insulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 6 AWG and smaller.

3. Install un-insulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 4 AWG through No. 2/0 AWG.

4. Install un-insulated, bolted, two-way connectors and terminators for power circuit conductors No. 4/0 AWG and larger.

5. Install un-insulated bolted, two-way connectors for motor circuit conductors No. 12 and larger.

6. Tape insulates all un-insulated connections.

7. Place no more than one conductor in any single-barrel pressure connection.

8. Install crimp connectors with tools approved by connector manufacturer.

9. Install terminals and connectors acceptable for type of material used.

10. Compression Lugs

a. Attach with a tool specifically designed for purpose.

b. Tool shall provide complete controlled crimp and shall not release until crimp is complete.

c. Do not use plier type crimpers.

D. Do not use soldered mechanical joints.

E. Splices and Terminations:

1. Indoors: Use general purpose, flame retardant tape.

2. Outdoors: Use flame retardant, cold- and weather-resistant tape.

F. Cap spare conductors and conductors with UL listed end caps.

G. Cabinets, Panels, and Motor Control Centers:

1. Remove surplus wire, bridle and secure.

2. Where conductors pass through openings or over edges in sheet metal, remove bums, chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.

H. Control and Instrumentation Wiring:

A. Where terminals provided will accept such lugs, terminate control and instrumentation wiring, except solid thermocouple leads, with insulated, locking-fork compression lugs.

B. Terminate with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions.

C. Locate splices in readily accessible cabinets or junction boxes using terminal strips.

D. Cable Protection:

a. Under Infinite Access Floors: May be installed without bundling.

b. All Other Areas: Install individual wires, pairs, or triads in flex conduit under the floor or grouped into bundles at least 1/2-inch in diameter.

c. Maintain integrity of shielding of instrumentation cables.

d. Ensure grounds do not occur because of damage to jacket over the shield.

I. Extra Conductor Length: For conductors to be connected by others, install minimum 6 feet of extra conductor in freestanding panels and minimum 2 feet in other assemblies.

PART 4 - METHODS OF MEASUREMENT

4.01 GENERAL

The quantity of units to be paid for under this item shall be the number of each type installed, adjusted, removed or replaced, complete in place, ready for operation, and accepted by the Engineer.

PART 5 - BASIS OF PAYMENT

No direct payment shall be made for the work described in this section. The work described in this section is incidental to bid items in section 16050 and shall be paid for in the respective bid item of which it is a component part.

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SECTION 16450

GROUNDING

PART 1 - GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American National Standards Institute (ANSI): C2, National Electrical Safety Code (NESC).

2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

1.02 SUBMITTALS

A. Shop Drawings:

1. Product Data:
   a. Exothermic weld connectors.
   b. Mechanical connectors.

1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.01 GROUND ROD

A. Material: Copper clad.

B. Diameter: 3/4 inch.

C. Length: 20 feet.

2.02 GROUND CONDUCTORS

A. As specified in Section 16120, CONDUCTORS.

2.03 CONNECTORS

A. Exothermic Weld Type:

1. Outdoor Weld: Suitable for exposure to elements or direct burial.

2. Indoor Weld: Utilize low-smoke, low-emission process.

3. Manufacturers:
   a. Erico Products, Inc.; Cadweld amd Cadweld Exolon.
   b. Thermoweld.

B. Mechanical Type: Split-bolt, saddle, or cone screw type; copper alloy material.

1. Manufacturers:
   a. Burndy Corp.
   b. Thomas and Betts Co.

2.04 GROUNDING WELLS

A. Ground rod box complete with cast iron riser ring and traffic cover marked GROUND ROD.

B. Manufacturers:

1. Christy Co.; No. G5.

2. Lightning and Grounding Systems, Inc.; I-R Series.

PART 3 - EXECUTION

3.01 GENERAL

A. Grounding shall be in compliance with NFPA 70 and ANSI C2.

B. Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.

C. Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

D. Bond together system neutrals, service equipment enclosures, exposed non-current-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.

E. Shielded Power Cables: Ground shields at each splice or termination in accordance with recommendations of splice or termination manufacturer.

F. Shielded Control Cables:

1. Ground shield to ground bus at power supply for analog signal.

2. Expose shield minimum I inch at termination to field instrument and apply heat shrink tube.

3. Do not ground control cable shield at more than one point.

3.02 WIRE CONNECTIONS

A. Ground Conductors: Install in conduit containing power conductors and control circuits above 50 volts.

B. Nonmetallic Raceways and Flexible Tubing: Install an equipment grounding conductor connected at both ends to non current-carrying grounding bus.

C. Connect ground conductors to raceway grounding bushings.

D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.

E. Connect enclosure of equipment containing ground bus to that bus.

F. Bolt connections to equipment ground bus.

G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.

H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws.

3.03 MOTOR GROUNDING

A. Extend equipment ground bus via grounding conductor installed in motor feeder raceway; connect to motor frame.

B. Nonmetallic Raceways and Flexible Tubing: Install an equipment grounding conductor connected at both ends to non current-carrying grounding bus.

C. Motors Less Than 10 hp: Furnish mechanical-type terminal connected to conduit box mounting screw.

D. Motors 10 hp and Above: Tap motor frame or equipment housing; furnish mechanical-type terminal connected with minimum 5/16-inch brass threaded stud with bolt and washer.

E. Circuits 20 Amps or Above: Tap motor frame or equipment housing; install solderless terminal with minimum 5/16-inch diameter bolt.

3.04 GROUND RODS

A. Install full length with conductor connection at upper end.

B. Install with connection point below finished grade, unless otherwise shown.

3.05 GROUNDING WELLS

A. Install inside buildings, asphalt, and paved areas.

B. Install riser ring and cover flush with surface.

C. Place 9 inches crushed rock in bottom of each well.

3.06 CONNECTIONS

A. General:

1. Above grade Connections: Use either exothermic weld or mechanical-type connectors.

2. Below grade Connections: Install exothermic weld type connectors.

3. Remove paint, dirt, or other surface coverings at connection points to allow good metal-to-metal contact.

4. Notify ENGINEER prior to backfilling ground connections.

B. Exothermic Weld Type:

1. Wire brush or file contact point to bare metal surface.

2. Use welding cartridges and molds in accordance with manufacturer's recommendations.

3. Avoid using badly worn molds.

4. Mold to be completely filled with metal when making welds.

5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.

C. Mechanical Type:

1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.

2. Install in accordance with connector manufacturer's recommendations.

3. Do not conceal mechanical connections.

3.07 METAL STRUCTURE GROUNDING

A. Ground metal sheathing and exposed metal vertical structural elements to grounding system.

B. Bond electrical equipment supported by metal platforms to the platforms.

C. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.

3.08 MANHOLE AND HANDHOLE GROUNDING

A. Install one ground rod inside each.

B. Ground Rod Floor Protrusion: 4 to 6 inches above floor.

C. Make connections of grounding conductors fully visible and accessible.

D. Connect all non current-carrying metal parts, and any metallic raceway grounding bushings to ground rod with No. 6 AWG copper conductor.

3.09 TRANSFORMER GROUNDING

A. Bond neutrals of transformers within buildings to system ground network, and to any additional indicated grounding electrodes.

B. Bond neutrals of substation transformers to substation grounding grid and system grounding network.

C. Bond neutrals of pad-mounted transformers to four locally driven ground rods and buried ground wire encircling transformer and system ground network.

3.10 SURGE PROTECTION EQUIPMENT GROUNDING

A. Connect surge arrestor ground terminals to equipment ground bus.

3.11 INSTRUMENT GROUND - SURGE SUPPRESSION

A. Connect all instrument surge protection with #6 insulated copper ground wire (in conduit where above grade) to closest plant ground system.

3.12 BONDING

A. Bond to Main Conductor System:

1. All roof mounted ventilators, fans, air handlers, masts, flues, cooling towers, handrails, and other sizeable metal objects.

2. Roof flashing, gravel stops, insulation vents, ridge vents, roof drains, soil pipe vents, and other small metal objects if located within 6 feet of main conductors or another grounded object.

3. Provide air terminals as required.

B. Bond steel columns or major framing members to grounding system per National Electrical Code.

C. Bond each main down conductor to grounding system.

3.13 GROUNDING SYSTEM

A. Grounding Conductor:

1. Completely encircle building structure.

2. Bury minimum 30” below finished grade.

3. Minimum 2 feet distance from foundation walls.

B. Interconnect ground rods by direct-buried copper cables.

C. Connections:

1. Install ground cables continuous between connections.

2. Exothermic welded connections to ground rods, cable trays, structural steel, handrails, and buried and nonaccessible connections.

3. Provide bolted clamp type mechanical connectors for all exposed secondary connections.

4. Use bolded offset parapet bases or through-roof concealed base assemblies for air terminal connections.

5. Provide interconnections with electrical and telephone systems and all underground water and metal pipes.

6. Provide electric service arrestor ground wire to building water main.

3.14 FIELD QUALITY CONTROL

A. Visual and Mechanical Inspection:

1. Equipment and circuit grounds in motor control centers, panelboards, switchboards, and switchgear assemblies for proper connection and tightness.

2. Ground bus connections in motor control centers, panelboards, switchboards, and switchgear assemblies for proper termination and tightness,

3. Effective transformer core and equipment grounding.

4. Accessible connections to grounding electrodes for proper fit and tightness.

5. Accessible exothermic-weld grounding connections to verify that molds were fully filled and proper bonding was obtained.

B. Electrical Tests:

1. Fall-Of-Potential Test:

a. In accordance with IEEE 81, Section 8.2.1.5 for measurement of main ground system's resistance.
b. Main ground electrode system resistance to ground to be no greater than 5 ohms.

2. Two-Point Direct Method Test:

    a. In accordance with IEEE 81, Section 8.2. 1.1 for measurement of ground resistance between main ground system, equipment frames, and system neutral and derived neutral points.
    b. Equipment ground resistance shall not exceed main ground system resistance by 0.50 ohm.

PART 4 - METHODS OF MEASUREMENT

4.01 GENERAL

The quantity of units to be paid for under this item shall be the number of each type installed, adjusted, removed or replaced, complete in place, ready for operation, and accepted by the Engineer.

PART 5 - BASIS OF PAYMENT

No direct payment shall be made for the work described in this section. The work described in this section is incidental to bid items in section 16050 and shall be paid for in the respective bid item of which it is a component part.

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SECTION 16810

CONTROL PANELS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide, install, and test all control panels and appurtenances as shown on the Drawings and as hereinafter specified.

1.02 STANDARDS

A. Control panels shall be in accordance with the National Electric Code and NEMA as applicable.

1.03 QUALITY ASSURANCE

A. The control panel manufacturer shall have total system control responsibility. The manufacturer shall have local experience in providing control panels of the types and functions as specified herein.

B. All control panels shall be either UL 508 listed or constructed by an UL approved shop and labeled accordingly.

1.04 CONTROL PANEL FUNCTIONS

A. The panel builder shall provide functions as described using his own standard schematics and arrangements. All wires shall be numbered and brought to numbered terminals. Complete schematics and outline Drawings shall be provided for approval.

PART 2 - PRODUCTS

1.05 CONSTRUCTION

A. All panels furnished shall be of the arrangement and design as shown on the Drawings and specified herein.

B. Panel construction shall be NEMA 4X 316 stainless steel with drip shield kit, 316 stainless steel, with door gasket and three (3) point stainless steel latch, handle with nylon rollers and drip edge. Internal components shall be mounted on a back panel and selector switches, lights, etc., mounted on an front panel. Enclosure shall be painted white and have sun shields on top and sides.

C. Access doors or panels shall have continuous stainless steel hinges. Fabrication shall be of 11 gauge thick, sheet steel with stainless steel hardware, suitably braced internally for structural rigidity and strength. Front panels or sections containing instruments shall be not

less than 7 gauge thick stretcher leveled sheet steel or 1/4 inch thick anodized aluminum, reinforced to prevent warping or distortion. All sections shall be descaled, degreased, filled, ground and finished with two rust-resistant phosphate prime coats and two (2) air dry silicone alkyd finish coats of enamel which shall be applied by either the hot air spray or conventional cold spray methods. The final finish shall be smooth, free of runs, and uniform in tone and thickness. Unless otherwise noted, the colors to be used shall be selected by the owner from color chips supplied by the panel manufacturer. All cutouts shall be properly finished, including deburring and touch-up painting.

D. Nameplates shall be provided for all flush mounted equipment. The nameplates shall be constructed of black and white laminated, phenolic material having engraved letters approximately 1/4 inch high, extending through the black face into the white layer. Nameplates shall be attached to panels by self-tapping stainless steel screws.

E. Print storage pockets shall be provided on the inside of each panel. Its size shall be sufficient to hold all of the prints required to service the equipment. Reduced drawings shall be provided to be stored in these pockets.

F. All panel equipment shall be mounted and wired on or within the cabinet. All wiring within the panel shall be grouped together with harnesses or ducts and secured to the structure. All wiring shall be numbered in accordance with the numbering system used on the wiring/connection diagrams. Power and low voltage DC signal wiring shall be routed in separate wire ways. Crossing of the two system wires shall be at right angles. Parallel troughs of different systems shall be separated by a minimum of 12 inches. Wiring through for supporting internal wiring shall be plastic type with snap-on covers. The side walls shall be open-top type to permit wire changing without disconnecting. Wiring troughs shall not be filled to more than 60 percent visible fill. Wiring through covers shall be match marked to identify placement. If component identification is shown on covers for visibility, the ID shall also appear on the mounting sub-panel.

G. Power wire shall be minimum 12 AWG stranded, insulated for not less than 600 volts unless specified otherwise. Control wire shall be 14 AWG stranded, insulated and twisted shielded wire shall be 16 AWG. Use type XHHW-2 for outside to panel application and type MTW for wiring inside the panel. Wire color shall be, Line Power - Black; Neutral or common - White; AC Control - Red; DC Control - Blue; Equipment or Chassis Ground - Green; specified externally powered circuits - Orange.

H. All wiring shall terminate in a master terminal board, rigid type and numbered. The master terminal board shall have a minimum of 25 percent spares. Terminal blocks shall be arranged in horizontal rows and separated into groups. (Power, AC control, DC signal, and alarm). Terminal blocks shall be barrier type with the appropriate voltage rating (600 volts minimum) and shall be the raised channel mounted type. Wire connectors shall be the hook fork type with non insulated barrel for crimp type compression connection to the wire. Wire and tube markers shall be the sleeve type with heat impressed letters and members. Direct interlock wiring between equipment will not be allowed. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within six (6) inches of the side panel or adjacent terminal.

I. All components shall be mounted in a manner that shall permit servicing, adjustment, testing and removal without disconnecting, moving or removing any other component.

Components mounted on the inside panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required by the manufacturer to protect equipment from vibration. Component mounting shall be oriented in accordance with the component manufacturer's and industries' standard practices. All internal components shall be identified with suitable plastic or metal engraved tags attached with drive pins adjacent to (not on) each component identifying the component in accordance with the drawing, specifications, and supplier's data.

1.06 PUSH BUTTONS

A. Push buttons shall be heavy-duty, oil tight, with momentary contacts. Switches shall be supplied with the number of poles required for the application, an escutcheon plate, and contacts rated for 10 amperes at 120 volts AC. Push buttons shall be as manufactured by Square-D, Class 9001, Type K or approved equal.

1.07 ROTARY HAND SWITCHES

A. Rotary selector switches shall be heavy duty oil tight, with the number of poles and number of positions as required. Switches shall have a pistol grip handle and be of the maintained contact type rated for 10 amps at 120 volts AC. The switches required for "electronic duty" shall have low, stable, contact resistance and gold contacts. Provide make-before-break bridging contacts where required. Rotary hand switches shall be as manufactured by Square-D, Class 9001, Type K, standard knob, or approved equal.

1.08 LED PILOT LIGHTS

A. LED indicating lights shall be provided as shown on the Drawings. Units shall be approximately 1/2 inch diameter. Bulbs shall be of the push-to-test type shall be as manufactured by Square-D, unless otherwise noted on the drawings, or approved equal.

1.09 RELAYS

A. Relays shall be double pole, double throw, octal plug-in type with a transparent dust cover. The relay shall be equipped with an indicating light to indicate when its coil is energized. The relays shall have 10 amperes 120 volt AC contacts. Relays shall be as manufactured by Square D, Class 8501, Type KP, unless otherwise noted on the drawings, or approved equal.

1.10 TIME DELAY RELAYS

A. Time delay relays shall be of the pneumatic type with time delay and instantaneous contacts. Time delay relays shall be double pole, double throw with output contacts rated at 10 amperes, 120 volt AC minimum. The time delay relays shall be set for sixty seconds except where otherwise shown on the Drawings but shall be adjustable from 0 to 180 seconds. Time delay relays shall be as manufactured by Square-D, Class 9050, Type A, unless otherwise noted on the drawings, or approved equal.

1.11 TIMERS

A. Timers shall be plug-in type with a dust and moisture resistant case. The timers shall be of the multirange/analog or digital type with selectable ranges. The output contacts shall be

rated at 10 amperes 120 volt AC minimum. The timer shall have a "timing in progress" indication. Timers shall be manufactured by Square D, or approved equal.

1.12 CIRCUIT BREAKERS

A. Circuit breakers shall be thermal-magnetic, molded case, permanent trip. Voltage, current, interrupting ratings, and number of poles required shall be as shown on the Drawings. Circuit breakers used in 120/240 volt control panels shall be UL listed and have an interrupting capacity of not less than 18,000 amperes, RMS, symmetrical. Circuit breakers shall be manufactured by Square D, or approved equal.

B. Do not substitute single-pole circuit breakers with handle ties for multi-pole breakers.

1.13 SURGE PROTECTIVE DEVICE (SPD) POWER APPLICATIONS

A. Refer to specification 16050.

1.14 TERMINAL BLOCKS

A. Terminal blocks shall be as manufactured by Square D Class 9080, unless otherwise noted on the drawings, or approved equal.

PART 3 - EXECUTION

1.15 INSTALLATION

A. Seal all conduit entrances into control panels using sealing fittings as detailed on the drawings.

1.16 TESTS

A. The supplier shall test all equipment at the factory prior to shipment. Coordinate with supplier for testing and startup at the site.

1.17 ACCEPTANCE

A. Upon successful completion of operation test and subsequent review and approval of the complete system's final documentation, the system shall be considered as acceptable.

PART 4 - METHODS OF MEASUREMENT

4.01 GENERAL

The quantity of units to be paid for under this item shall be the number of each type installed, adjusted, removed or replaced, complete in place, ready for operation, and accepted by the Engineer.

PART 5 BASIS OF PAYMENT

No direct payment shall be made for the work described in this section. The work described in this section is incidental to bid items in section 16050 and shall be paid for in the respective bid item of which it is a component part.

- END OF SECTION -

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APPENDICES

CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY

AT

VENICE MUNICIPAL AIRPORT
VENICE, FLORIDA

Prepared By:

AMERICAN INFRASTRUCTURE DEVELOPMENT, INC.
TRANSPORTATION CONSULTING

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GEOTECHNICAL ENGINEERING REPORT

CONSTRUCTION OF AIRCRAFT WASH RACK FACILITY

AT

VENICE MUNICIPAL AIRPORT
VENICE, FLORIDA

Prepared By:

American Infrastructure Development, Inc.

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REPORT OF GEOTECHNICAL EXPLORATION

Venice Municipal Airport (VNC)
Aircraft Wash Rack
Venice, Sarasota County, Florida
AID, Inc. Project No. VNC17002
City of Venice Work Assignment No. 401-17-02

- Prepared For -
Venice Municipal Airport
150 Airport Avenue East
Venice, Florida 34285

- Prepared By -
American Infrastructure Development, Inc.
122 SW Midtown Place, Unit 101
Lake City, Florida 32025

February 12, 2018

AMERICAN INFRASTRUCTURE DEVELOPMENT, INC.

February 12, 2018

Venice Municipal Airport
150 Airport Avenue East
Venice, Florida 34285

Attention: Mr. Mark J. Cervasio, Project Director

Reference: Report of Geotechnical Exploration
Venice Municipal Airport (VNC) – Aircraft Wash Rack
Venice, Sarasota County, Florida
AID, Inc. Project No. VNC17002

Dear Mr. Cervasio:

American Infrastructure Development, Inc. (AID) has completed the geotechnical exploration and engineering evaluation at the referenced site. Our work described herein was performed in general accordance with the City of Venice Work Assignment No. 401-17-02 pursuant to June 13, 2017 Agreement. Acceptance to this work and authorization to proceed was provided on November 29, 2017.

This report briefly outlines our understanding of the planned construction, describes the field exploration, presents the collected data, and provides our geotechnical engineering evaluation of the subsurface conditions with respect to the planned construction.

We have enjoyed assisting you on this project and look forward to serving as your geotechnical and construction materials testing consultant for the remainder of this and future projects. Should you have any questions concerning this report, please contact me at 386-867-5563.

Sincerely,
American Infrastructure Development, Inc.

NABIL O. HMEIDI — LICENSED — 57842 — STATE OF FLORIDA — PROFESSIONAL ENGINEER

COPY

Nabil O. Hmeidi, P.E.
Senior Geotechnical Engineer
Licensed, Florida No. 57842

2/12/2018

Distribution: *File (1 copy)*
Addressee (1 e-mailed copy in PDF format)

TABLE OF CONTENTS

ATTACHMENTS

Attachments: Vicinity Map (1 page)
Boring Locations Map (1 page)
Record of Boring Logs (3 pages)

1.0 INTRODUCTION

This report presents the results of our geotechnical exploration performed for the proposed aircraft wash rack at the referenced site. The services rendered by AID during the course of this exploration can be summarized as follows:

- Reviewed available data such as results of similar exploration and published information;
- Planned and performed three (3) Standard Penetration Test (SPT) borings each extending 10 feet below the existing ground surface;
- Reviewed and analyzed gathered data, and
- Prepared this report.

2.0 PROJECT INFORMATION

We understand this project will mainly consist of the following:

1. Construct a 50' x 50' concrete pad to be utilized as an aircraft wash rack, and
2. Construct flexible pavement along the west and south ends of the wash rack pad to accommodate ingress/egress of aircrafts and to service adjacent taxilanes.

3.0 FIELD EXPLORATION

The subsurface condition within the proposed wash rack area and adjacent areas was explored by drilling three (3) SPT borings each extending 10 feet below the existing ground surface. The borings were performed at the approximate locations shown on the attached Boring Locations Map. These locations were determined in the field by tape measure and approximating right angles from existing features (existing shade hangar). Therefore, the boring locations should be considered only as accurate as the means and methods by which they were obtained. The following table summarizes the subsurface conditions encountered at each location:

SUMMARY OF FIELD EXPLORATION PROGRAM
Venice Municipal Airport (VNC) – Aircraft Wash Rack
Venice, Sarasota County, Florida
AID, Inc. Project No. VNC17002

Boring No.	Approximate GPS Coordinates	Total Depth (feet)	Date Drilled Drill Method	At-Completion Groundwater (feet)	Surface Material	Remark
B-1	27.077026° N, 82.442650° W	10	01/03/2018 SPT	5¼	Fine Sand (SP)	===
B-2	27.076937° N, 82.442505° W	10	01/03/2018 SPT	5	Fine Sand (SP)	===
B-3	27.076807° N, 82.442566° W	10	01/03/2018 SPT	5	Fine Sand (SP)	===

Sampling and penetration procedures of the SPT borings were accomplished in general accordance with ASTM D-1586, "*Penetration Test and Split-Barrel Sampling of Soils*", using a power rotary drill rig. The standard penetration tests were performed by driving a standard 1-3/8" I.D. and 2" O.D. split spoon sampler with a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler a total of 18 inches, in 6-inch increments, were recorded. The penetration resistance or "N" value is the summation of two 6-inch increments and is illustrated on the attached boring log adjacent to their corresponding sample depths. The "N" values are used as an index to derive soil parameters from various empirical correlations. Representative samples of the soils were brought to the ground surface by the auger process and

transported to our office for visual evaluation and classification. These borings were performed using a BR-2500 drill rig equipped with a manual hammer.

The attached record of boring logs graphically illustrates penetration resistances, groundwater levels, and soil descriptions. It should be noted that the stratification lines and depth designations indicated on the boring records represent approximate boundaries between soil types. In some instances, the transition between these soils may be gradual.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Conditions

The existing site conditions were observed by our representative at the time of drilling. Our site observation indicates the ground surface within the limits of construction is relatively level and grass covered. No ponded water noted at the time of drilling.

4.2 General Subsurface Conditions

In general, the soil profile as disclosed by the borings initially consisted of about 2 to 2½ feet of gray to light gray sand (SP). This stratum was underlain by light gray to grayish brown sand with silt (SP-SM) to the termination depth of 10 feet below the existing ground surface. As a safety precaution and due to the suspected presence of buried utilities, soil samples taken from the upper 4 feet of the existing ground surface were obtained using hand augering techniques. These sandy soils have a loose to medium stiff relative density with standard penetration resistance or "*N*" values ranging from 7 to 24 Blows Per Foot (BPF).

4.3 Groundwater

The depth to the groundwater table was measured as soon as each boring was completed. The "at-completion" groundwater level was encountered in all borings at depths ranging from 5 to 5¼ feet below the existing ground surface. We should note that due to the relatively short time frame of the field exploration, the "at-completion" groundwater levels may not have had sufficient time to stabilize. Fluctuation in groundwater levels should therefore be expected due to seasonal climatic changes, construction activity, rainfall variations, surface water runoff, and other site-specific factors (such as tidal activity of the nearby Gulf of Mexico).

5.0 SITE PREPARATION RECOMMENDATIONS

5.1 General

The recommendations presented in this report are based upon available project information and data obtained during our field program. If this information is incorrect or the location of the proposed construction changes, please contact this office so that our recommendations may be reviewed and/or revised. Discovery of any site or subsurface condition during construction, which deviates from the data collected during this exploration, must be reported to us for evaluation.

5.2 Exposed Subgrade - Structural Fill / Backfill

All vegetation, organics, and any other deleterious materials that fall within the construction limits should be removed. Beneath the thin cover of topsoil, the borings disclosed sand and sand with silt soils to the termination depth of 10 feet below the existing ground surface. These soils are considered suitable for reuse as structural fill, however, they are not considered acceptable for the support of the proposed pavement and wash rack slab in their current conditions. To improve the density of the upper loose in-situ soils, we recommend that the initial subgrade preparation includes the compaction of all exposed surfaces. The densification of the exposed surfaces may be achieved by means of overlapping passes of a vibratory drum roller having a total operating static weight (including fuel and water) of at least 10 tons and a drum diameter of 5 feet. This densification of the exposed surfaces should extend a minimum of 5 feet beyond the edges of pavement and wash rack perimeter.

All exposed surfaces or new structural fill (if any) within the wash rack pad and paved areas should be compacted and tested to a minimum of 100 percent of the standard Proctor maximum dry density (ASTM D-698) to a depth of at least 12 inches below the compacted surface. New structural fill should consist of an inorganic, non-plastic, granular soil containing less than 12 percent material passing the No. 200 mesh sieve (relatively clean sand with a Unified Soil Classification of SP or SP-SM).

5.3 Considerations for New Pavement Base Course

A limerock base (FAA Item P-211), crushed aggregate base (FAA Item P209), or recycled concrete aggregate (FAA Item P-219) base course may be used on this project. The base course material should be compacted to a minimum of 100 percent of its maximum dry density as determined by the standard Proctor test (ASTM D-698). The selected base should meet the gradation requirements and have the minimum CBR required by FAA guidelines when compacted to 98 percent of the standard Proctor maximum dry density. The use of base material other than what stated herein is not recommended without prior approval by the project geotechnical engineer.

Transition areas where concrete pavement abuts asphalt pavement should be thickened to avoid "impact" rutting resulting from sudden transfer of load from the rigid section to the flexible section. This may be accomplished by thickening the concrete and asphaltic layers along the length of any rigid/flexible pavement interface. A typical transition between PCC and HMA pavement section is presented in FAA Advisory Circular AC150-5320-6F, Figure 3-18.

5.4 Wash Rack Slab Recommendations (Rigid Pavement)

Subgrade:	Minimum 12 inches having LBR of 40 when compacted to 100 percent of the standard Proctor maximum dry density (ASTM D-698), (FAA Item P-152)
Rigid Pavement:	Minimum 6 inches of Portland Cement Concrete Pavement (FAA Item P-610) over minimum 4 inches of recycled concrete aggregate base (FAA Item P-219), (LBR = 100)

5.5 Wash Rack and Access Lane Recommendations (Flexible Pavement)

Subgrade:	Minimum 12 inches having LBR of 40 when compacted to 100 percent of the standard Proctor maximum dry density (ASTM D-698), (FAA Item P-152)
Flexible Pavement:	Minimum 3 inches of Asphaltic Concrete (FAA Item P-403) over minimum 6 inches of recycled concrete aggregate base (FAA Item P-219), (LBR = 100)

5.6 Drainage Considerations

Adequate drainage should be provided at the site to minimize increase in moisture content of the pavement subgrade and foundation soils. Excessive moisture can significantly reduce the soil's bearing capacity and contribute to foundation settlement and pavement failure. For the protection of the pavement subgrade and foundation soils, we recommend the ground surface be sloped away from all proposed structures/floor slabs and paved areas.

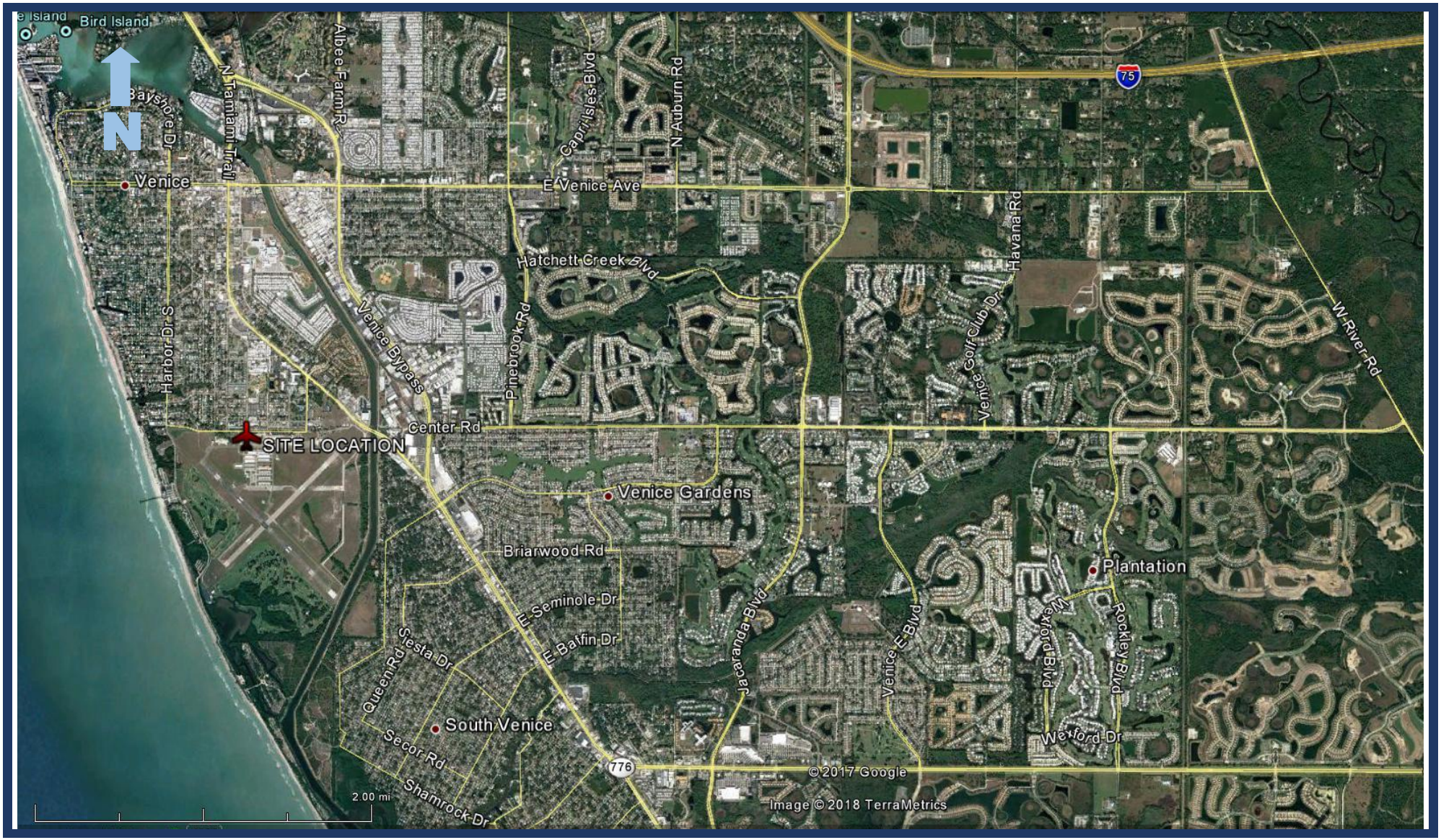
The at-completion of drilling groundwater levels were encountered at 5 to 5¼ feet below the existing ground surface. However, we anticipate the Seasonal High Groundwater Table (SHGWT) to be within 2 feet of the existing ground surface. Therefore, excavations for stormwater facility, underground utility, or any other structure extending below the SHGWT will likely require dewatering.

Groundwater drawdown may be accomplished by a series of well-point systems connected to a pump and discharged outside the construction zone as dictated by local code. It is recommended the dewatering system be activated a minimum of 3 to 5 days prior to subgrade preparations or trench excavations. The depth of the wells below the water table will be contingent upon the pumping rate and well spacing. The contactor should maintain the system to ensure that the groundwater is at an acceptable level.

6.0 REPORT LIMITATIONS

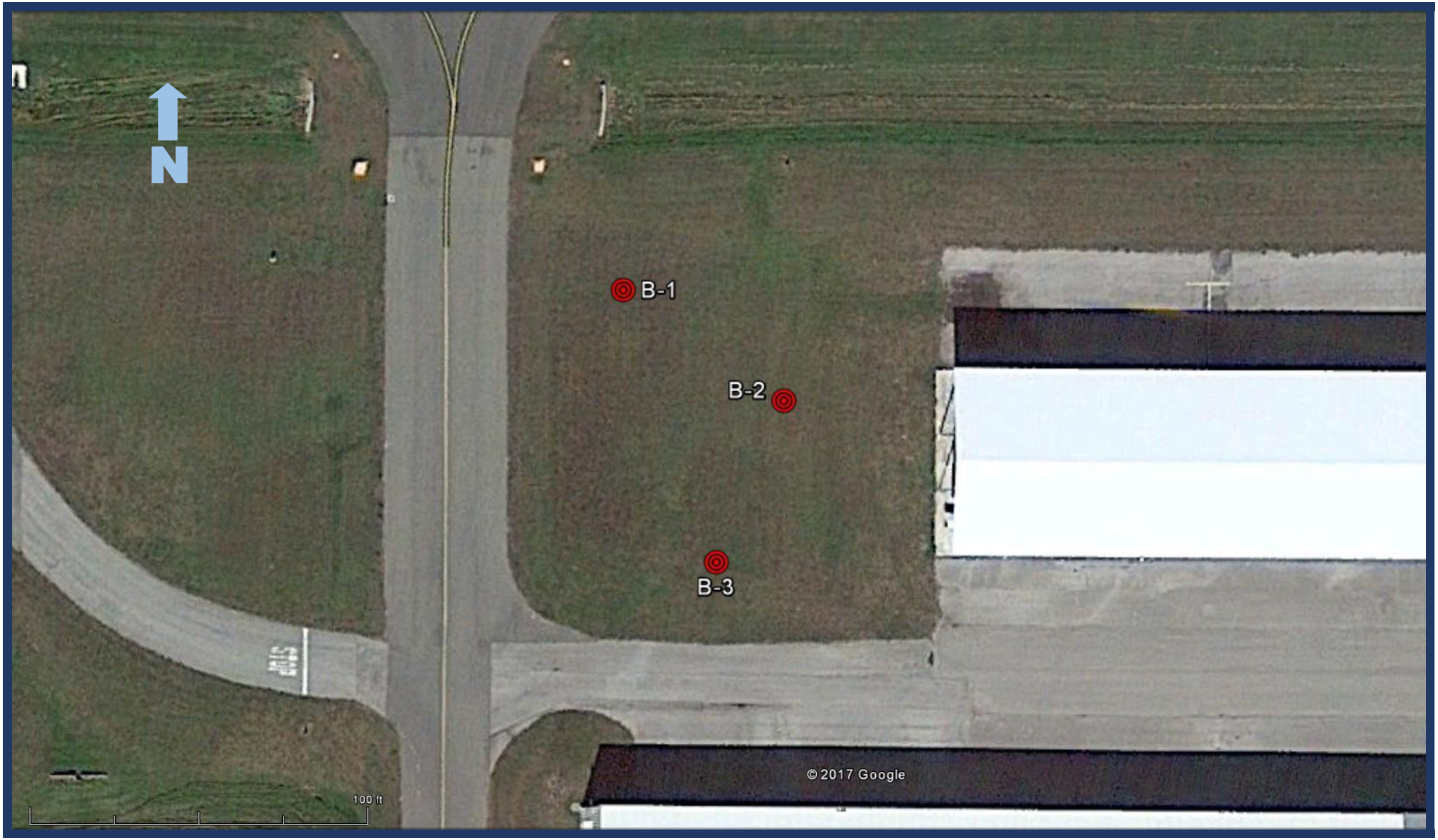
This report has been prepared for the exclusive use of the City of Venice, Florida for the specific application to the project discussed herein. Our conclusions and recommendations have been rendered using generally accepted standards of geotechnical engineering practice in the State of Florida. No other warranty is expressed or implied. AID is not responsible for the interpretations, conclusions, opinions, or recommendations of others based on the data contained herein. Environmental assessment for the presence of pollutants in the explored subsurface was beyond the scope of this exploration.

ATTACHMENTS



American Infrastructure Development, Inc. **122 SW Midtown Place, Unit 101** **Lake City, Florida 32025** **Phone: (386) 867-5563**	**Vicinity Map** **Venice Municipal Airport (VNC) - Aircraft Wash Rack** **Venice, Sarasota County, Florida** **AID, Inc. Project No. VNC17002**

Exhibit 1



American Infrastructure Development, Inc. **122 SW Midtown Place, Unit 101** **Lake City, Florida 32025** **Phone: (386) 867-5563**	**Boring Location Map** **Crystal River Airport (CGC)** **Venice Municipal Airport (VNC) - Aircraft Wash Rack** **Venice, Sarasota County, Florida** **AID, Inc. Project No. VNC17002**

Exhibit 2

American Infrastructure Development, Inc.
122 SW Midtown Place, Unit 101
Lake City, Florida 32025
Phone: (386) 867-5563

BORING NUMBER: B-1

CLIENT: Venice Municipal Airport (VNC)
PROJECT NAME: Venice Municipal Airport (VNC)-Aircraft Wash Rack
PROJECT NUMBER: VNC17002
PROJECT LOCATION: Venice, Sarasota County, Florida
DATE STARTED: 01/03/2018 COMPLETED: 01/03/2018
GROUND ELEVATION: ===
DRILLING CONTRACTOR: Reliable Field Services of Central FL, Inc.
GROUND WATER LEVELS:
DRILLING METHOD: Trailer-Mounted BR-2500, Manual Hammer
AT TIME OF DRILLING: ===
LOGGED BY: N.H. CHECKED BY: ===
AT END OF DRILLING: 5.25 feet
NOTES: ===
AFTER DRILLING: ===

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	SAMPLE TYPE NUMBER	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		LOOSE, gray to light gray, fine sand (SP) trace of silt, [A-3]		Hand Auger 1						
		LOOSE to MEDIUM STIFF, light gray to grayish brown, sand with silt (SP-SM), [A-3]		Hand Auger 2						
▼ 5			3-4-4-5 (8)	SPT 1						
			5-6-7-9 (13)	SPT 2						
10			8-9-9-12 (18)	SPT 3						
		Boring Terminated @ 10 Feet Boring Grouted To The Surface ±27.077026° N, 82.442650° W								
15		NOTE: Hand augered to 4 feet due to suspected presence of underground utility								
20										
25										
30										
35										

XXX

American Infrastructure Development, Inc.
122 SW Midtown Place, Unit 101
Lake City, Florida 32025
Phone: (386) 867-5563

BORING NUMBER: B-2

CLIENT: Venice Municipal Airport (VNC)
PROJECT NAME: Venice Municipal Airport (VNC)-Aircraft Wash Rack
PROJECT NUMBER: VNC17002
PROJECT LOCATION: Venice, Sarasota County, Florida
DATE STARTED: 01/03/2018 COMPLETED: 01/03/2018
GROUND ELEVATION: ===
DRILLING CONTRACTOR: Reliable Field Services of Central FL, Inc.
GROUND WATER LEVELS:
DRILLING METHOD: Trailer-Mounted BR-2500, Manual Hammer
AT TIME OF DRILLING: ===
LOGGED BY: N.H. CHECKED BY: ===
AT END OF DRILLING: 5 feet
NOTES: ===
AFTER DRILLING: ===

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	SAMPLE TYPE NUMBER	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		LOOSE, gray to light gray, fine sand (SP) trace of silt, [A-3]		Hand Auger 1						
		LOOSE to MEDIUM STIFF,light gray to grayish brown, sand with silt (SP-SM), [A-3]		Hand Auger 2						
▼ 5			3-4-5-5 (9)	SPT 1						
			5-5-5-8 (10)	SPT 2						
10			6-7-9-11 (16)	SPT 3						
		Boring Terminated @ 10 Feet Boring Grouted To The Surface ±27.076937° N, 82.442505° W								
15		NOTE: Hand augered to 4 feet due to suspected presence of underground utility								
20										
25										
30										
35										

XXX

American Infrastructure Development, Inc.
122 SW Midtown Place, Unit 101
Lake City, Florida 32025
Phone: (386) 867-5563

BORING NUMBER: B-3

CLIENT: Venice Municipal Airport (VNC)
PROJECT NAME: Venice Municipal Airport (VNC)-Aircraft Wash Rack
PROJECT NUMBER: VNC17002
PROJECT LOCATION: Venice, Sarasota County, Florida
DATE STARTED: 01/03/2018 COMPLETED: 01/03/2018
GROUND ELEVATION: ===
DRILLING CONTRACTOR: Reliable Field Services of Central FL, Inc.
GROUND WATER LEVELS:
DRILLING METHOD: Trailer-Mounted BR-2500, Manual Hammer
AT TIME OF DRILLING: ===
LOGGED BY: N.H. CHECKED BY: ===
AT END OF DRILLING: 5 feet
NOTES: ===
AFTER DRILLING: ===

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	SAMPLE TYPE NUMBER	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		LOOSE, gray to light gray, fine sand (SP) trace of silt, [A-3]		Hand Auger 1						
		LOOSE to MEDIUM STIFF,light gray to grayish brown, sand with silt (SP-SM), [A-3]		Hand Auger 2						
5 ▼			3-3-4-4 (7)	SPT 1						
			4-5-5-5 (10)	SPT 2						
10			7-11-13-17 (24)	SPT 3						
		Boring Terminated @ 10 Feet Boring Grouted To The Surface ±27.076807° N, 82.442566° W								
		NOTE: Hand augered to 4 feet due to suspected presence of underground utility								
15										
20										
25										
30										
35										

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