

PROJECT MANUAL



DENVER
INTERNATIONAL
AIRPORT

**2012 Annual Airfield Pavement
Rehabilitation**

CONTRACT NO. 201204726

PART I

PROJECT REQUIREMENTS

CONTRACTOR:

**INTERSTATE
HIGHWAY
CONSTRUCTION,
INC.**

Issued for Construction: March, 2012

CITY & COUNTY OF DENVER
DEPARTMENT OF AVIATION

DENVER INTERNATIONAL AIRPORT
2012 ANNUAL AIRFIELD PAVEMENT REHABILITATION
CONTRACT NO. 201204726

ADDENDUM NUMBER ONE

March 14, 2012

This Addendum Number One supersedes and/or supplements all portions of the Contract Documents with which it conflicts. Bidders must acknowledge receipt of this addendum on page B-1 of the Bid Forms.



David I Rhodes, P.E.
Deputy Manager of Aviation
Planning & Development

DENVER INTERNATIONAL AIRPORT
2012 ANNUAL AIRFIELD PAVEMENT REHABILITATION
CONTRACT NO. 201204726

ADDENDUM NUMBER ONE

Scope of this Addendum

Addendum Number One includes modifications to the following Contract Documents issued February 21, 2012. These modifications are deemed necessary by the City and County of Denver.

PART ONE, VOL. 1 - CONTRACT DOCUMENTS

Bid Forms Revisions:

- Remove Bid Form dated 2/21/2012 and replace with attached Bid Form

PART TWO, VOL. 2 – TECHNICAL SPECIFICATIONS

Division I – General Requirements Revisions:

- Remove Table of Contents dated 2/21/2012 and replace with attached Table of Contents
- Remove and Replace Section 1340 – Shop & Working Drawings, Product Data & Samples
- Remove Section 01402 – DIA Quality Assurance
- Add Section 01403 – Contractor Quality Control Program
- Add Section 01404 – DIA Quality Assurance for FAA Funded Projects
- Add Section 01410 – Cutting and Patching
- Add Section 01650 – System Startup, Testing, and Training
- Add Section 01730 – Operation and Maintenance Data

Division II - Technical Specifications Revisions

- Add Technical Specification Item P-401 Plant Mix Bituminous Pavements
- Add Technical Specification Item P-403 Asphalt-Treated Permeable Base
- Add Technical Specification Item 606 – Tensioned Cable Barrier
- Remove Appendix A dated 2/12/2012 & Replace with attached Appendix A
- Add Exhibit E – DIA Recycle Yard Schedule of Prices

PART TWO, VOL. 3 – DRAWINGS

- Remove Plan Sheet G1.00 in its entirety and replace with attached Plan Sheet G1.00.
- Remove Plan Sheet G4.10 in its entirety and replace with attached Plan Sheet G4.10.
- Remove Plan Sheet D1.00 in its entirety and replace with attached Plan Sheet D1.00.
- Add Plan Sheet D9.00
- Add Plan Sheet D10.00
- Add Plan Sheet D11.00
- Add Plan Sheet D12.00
- Add Plan Sheet D13.00
- Add Plan Sheet D14.00
- Add Plan Sheet D15.00
- Add Plan Sheet D16.00
- Add Plan Sheet E5.00
- Add Plan Sheet E5.10
- Add Plan Sheet E6.00
- Add Plan Sheet E7.00
- Add Plan Sheet E8.00

PART TWO, VOL. 3 – DRAWINGS – Continued

- Add Plan Sheet E8.10
- Add Plan Sheet E8.20
- Add Plan Sheet E8.30
- Add Plan Sheet E9.00
- Add Plan Sheet I1.00
- Remove Plan Sheet C6.00 in its entirety and replace with attached Plan Sheet C6.00.
- Remove Plan Sheet C8.00 in its entirety and replace with attached Plan Sheet C8.00.
- Remove Plan Sheet C10.00 in its entirety and replace with attached Plan Sheet C10.00.
- Add Plan Sheet G0002 – Tensioned Cable Barrier Traffic Control Plan
- Add Plan Sheet G0001 – Tensioned Cable Barrier Site Layout Plan

The total number of pages (including cover sheet) contained in this Addendum Number One is five hundred and thirty-one pages (531).

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End of Addendum Number One

**CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION
DENVER INTERNATIONAL AIRPORT
2012 ANNUAL AIRFIELD PAVEMENT REHABILITATION
CONTRACT NUMBER 201204726**

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Separately Published*:	General Contract Conditions
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*City and County of Denver, Department of Aviation and
Department of Public Works, Standard Specifications for
Construction, General Contract Conditions, 1999 Edition

PART II TECHNICAL PROVISIONS

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**CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION
DENVER INTERNATIONAL AIRPORT
2012 Annual Airfield Pavement Rehabilitation
CONTRACT NUMBER 201204726**

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*City and County of Denver, Department of Aviation and Department of Public Works, Standard Specifications for Construction, General Contract Conditions, 1999 Edition

**CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION
NOTICE OF INVITATION FOR BIDS
CONTRACT NO. 201204726
2012 Annual Airfield Pavement Rehabilitation**

Denver, Colorado

February 21, 2012

Sealed bids for Contract No. 201204726, 2012 Annual Airfield Pavement Rehabilitation will be received no later than:

2:00 PM, Wednesday, March 21, 2012 Local Time

in the triple wide trailer, located within the DIA South Campus at 27301 E. 71st Avenue, Unit #2, Denver, CO 80249. Bids must be time stamped no later than 2:00 PM, Wednesday, March 21, 2012, immediately after which a public bid opening will commence. Any bids to be submitted more than one hour prior to Bid Opening shall be submitted at the office of Business Management Services, attention Jennifer Cahill, Room 8810, Airport Office Building (AOB), Denver International Airport, 8500 Peña Blvd., Denver, CO 80249-6340.

GENERAL STATEMENT OF WORK

This project will provide rehabilitation of portland cement concrete pavement (PCCP) panels located on the Terminal Apron, De-Ice Pad A, Taxiway H, Taxiway M, and the southern section of Taxiway P. In addition to PCCP pavement rehabilitation, this project will remove 6 De-Ice Booms and associated equipment located on De-Ice Pad A. Pavement Rehabilitation involves the removal and replacement of concrete slabs that are near the end of useful life.

DOCUMENTS AVAILABLE

Contract documents, including specifications, will be available on the DIA Contract Procurement website at <http://business.flydenver.com/bizops/bids.asp> beginning February 21, 2012.

PREQUALIFICATION

Each bidder must be pre-qualified in the category of 5(b) Roadways and Paving: Concrete, at the \$7,500,000.00 level, in accordance with the City's Rules and Regulations Governing Prequalification of Contractors. Each bidder must have submitted a prequalification application a minimum of ten (10) calendar days prior to the bid opening date. Applications must be returned to the Department of Public Works, Prequalification Section, Dept. 506, 201 West Colfax Avenue, Denver, CO 80202. To view the Rules and Regulations and to obtain a prequalification application, please visit our website at www.denvergov.org/prequalification, or call 720-865-2539 for prequalification information ONLY.

PRE-BID CONFERENCE AND INSPECTION

All bidders are invited to a pre-bid conference at 1:00 PM, Tuesday, February 28, 2012, in the triple wide trailer, located within the DIA South Campus at 27301 E. 71st Avenue, Unit #2, Denver, CO 80249. A site visit will be conducted immediately following the Pre-Bid Conference. Due to the security requirements, all bidders who are interested in attending the site visit are

required to email the Project Manager, Robert "Brent" Nichols, P.E. at Robert.Nichols@flydenver.com, by 5:00 PM, Wednesday, February 22, 2012. Any requests received after this date/time will not be accepted due to time constraints to process the security requirements.

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION

Federally-funded construction, reconstruction, remodeling, and professional design services contracts made and entered into by the City and County of Denver are subject to Federal statutes and regulations regarding Disadvantaged Business Enterprise participation.

The Director of the Division of Small Business Opportunity (DSBO) is authorized to establish project goals for expenditures on construction, reconstruction and remodeling and professional design services work let by the City and County of Denver. The specific goal for this project is **12% Disadvantaged Business Enterprise (DBE)**.

The project goal must be met with certified participants as set forth in 49 CFR Part 26 or through the demonstration of a sufficient good faith effort under 49 CFR Part 26.

The Director of the Division of Small Business Opportunity urges all participants in the construction, reconstruction, remodeling, and professional design services projects not to discriminate against women and minorities or any other persons and to assist in achieving these goals.

MISCELLANEOUS

As its best interests may appear, the City and County of Denver reserves the right to reject any or all bids and to waive informalities in bids.

The work under the Contract is subject to minimum wage rates established by the City and County of Denver Career Service Board.

Kim Day
Manager of Aviation

Publication Dates: February 21, 2012, February 22, 2012, February 23, 2012
Published in The Daily Journal

DO NOT PUBLISH ANYTHING BELOW THIS LINE



Manager of Aviation

9 Feb 2012

Date



Deputy Manager for Planning and Development

2/9/12

Date



Director, Division of Small Business Opportunity

2/9/12

Date

**INSTRUCTIONS TO BIDDERS
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**CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION**

IB-1 INSTRUCTIONS TO BIDDERS

These Instructions to Bidders are a part of the Contract Documents and are intended to serve as a guide to bidders. They are general in nature and may be amended or supplemented as needed to support any one specific invitation to bid. Each bidder shall prepare its bid in strict compliance with all requirements of the Contract Documents and by careful application of these instructions.

IB-2 BIDDING

The bound copy of these Contract Documents contains Bid Forms and Bid Data Forms. The bidder must complete these Bid Forms and submit them as its bid.

Each bid must be enclosed in a sealed envelope, addressed to the Manager of Aviation, showing on the face of the envelope the name of the bidder, the project number, and descriptive title of the work for which the offer is made. The Notice of Invitation for Bids identifies where and when the bid must be delivered.

Addenda to the contract documents will be issued by publication in their entirety on the DIA Contract Procurement Website, www.flydenver.com/contracts, from which each addendum document may be downloaded by planholders. Such addenda may include replacements for or additions to some or all of the pages of the Bid Forms, and all Bid Form pages added by addendum shall be submitted with the Bid Forms. Either a complete addendum or a notice of its issuance will be posted on the Contractor's Bulletin Board. Prior to submitting bids, Bidders shall read the Contractor's Bulletin Board and/or DIA Contract Procurement website to confirm that they have received all addenda.

If Sensitive Security Information ("SSI") is provided to potential bidders prior to award of the Contract, each potential bidder shall be required to comply with Department of Aviation, Standard Policies and Procedures No. 6003, "Contractor Protection of Sensitive Security Information," or its successor. A copy of this Policies and Procedures document will be provided with the Bid Documents, or upon request by the Department of Aviation, Business Management Services Office.

Each bidder shall submit the following, completed and executed in accordance with the Contract Documents:

- (1) the separately bound Bid Forms booklet;
- (2) all Bid Form pages not bound in such booklet which are included in any addendum to the Contract Documents;
- (3) the Bidder's Bid Bond or Bid Guarantee in conformance with IB-13; and
- (4) the Bidder/Contractor Disclosure Form described in IB-29 and included with the Bid Forms, unless the Bidder has a current disclosure form on file with the City Clerk.

IB-3 COMPLETING AND SIGNING BID FORMS

The bidder must complete the Bid Forms by legibly writing or printing in ink, words or figures, or both if required, all the bidder's offered prices for performing the work. All blank spaces which require a response of the bidder must be properly filled in. In filling out the Bid Forms, the bidder should avoid making changes to the extent possible, but, if changes are necessary, any interlineation, white outs, or erasures should be initialed.

For any contracts containing unit prices, the bidder shall specify in the Bid Forms a unit price for each item for which a quantity is given and shall write in figures the products of the respective unit prices and quantities in the "Amount" column provided for that purpose.

Each bidder must sign the Bid Forms and give the bidder's current business address. If an individual, the signature must be of the individual offering the bid; if a partnership, the signature must be that of a general partner; and if a joint venture, by each joint venture participant in their individual capacity as a corporation, partnership, or individual; if a corporation, both the president or a vice president and the secretary must sign and the seal of the corporation must be affixed. Signatures of other persons may be acceptable if the Bid contains evidence satisfactory to the Manager to prove that the other persons are authorized to bind the bidder.

IB-4 UNACCEPTABLE BIDS

The City will not accept Bids from bidders in arrears to the City upon debt or contract, or which are defaulters (as surety or otherwise) upon any obligation to the City, or that are deemed irresponsible or unreliable by the Manager of Aviation. A history or pattern of litigation against the City and County of Denver by any bidder, proposed subcontractor, interested party, or any person, firm, or corporation affiliated with any bidder, among other items, will be considered by the Manager in determining the responsibility and reliability of bidders. Bidders may be required to submit satisfactory evidence that they have a practical knowledge of the particular work bid upon and that they have the necessary financial resources to complete the proposed work.

IB-5 ONLY ONE BID ACCEPTED

The City will accept only one Bid for the same work from any one bidder. This includes Bids that may be submitted under different names by one firm or corporation. Evidence of collusion among bidders shall be grounds for exclusion of any bidder who is a participant in any such collusion.

IB-6 OPENING OF BIDS

Bidders are invited to be present at the bid opening which shall occur in the triple wide trailer, located within the DIA South Campus at 27301 E. 71st Avenue, Unit #2, Denver, CO 80249 on the date set forth in the Notice of Invitation for Bids.

IB-7 CONSIDERATION OF BIDS

After the Bids are opened and read and any discrepancies have been reviewed, bids

will be compared based on the Total Contract Bid Amount written on page B-1 of the Bid Letter.

If a discrepancy exists between a price or amount written in words and the price or amount written in figures, the price or amount written in words shall govern, except that in the case where a price or amount shown in figures has been crossed out and replaced with a new, legible, initialed figure, the initialed figure shall govern.

Any bid discrepancies which the City corrects in accordance with the general rules described above shall be corrected with the understanding that the Apparent Low Bidder waives any claims against the City because of the bidder's mistakes in its bid.

The City reserves the right to waive informalities, to reject any and all bids, and to advertise for new bids where it is in the best interest of the City.

IB-8 INFORMAL AND UNBALANCED BIDS

Bids shall be considered informal and may be rejected for the following reasons:

- (a) If the bid is on a form other than the Bid Forms furnished by the City, or if the form is altered or any part thereof is detached.
- (b) If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the bid incomplete, indefinite, or ambiguous.
- (c) If the bidder fails to acknowledge in the bid receipt of any or all addenda current on the date of opening of bids.
- (d) If the bid does not contain a unit price or lump sum amount for each item listed except in the case of authorized alternative items.
- (e) If there is an interlineation, white out, or erasure in the Bid Forms.
- (f) If the bid is unbalanced so that (1) each pay item does not reasonably carry its own proportion of cost, or (2) any pay item contains an inadequate or unreasonable price.

IB-9 BASIS FOR SELECTING THE APPARENT LOW BIDDER

The selection of the Apparent Low Bidder will be made on the basis of the lowest responsive bid by a qualified bidder whose bid complies with all of the requirements prescribed herein. The lowest bidder shall be determined by the Total Contract Bid Amount. This selection shall be subject to the approval of such resulting contract in accordance with the Charter and ordinances of the City and County of Denver.

IB-10 NOTICE TO APPARENT LOW BIDDER - EXECUTION OF CONTRACT

The Apparent Low Bidder will be given written notice of such status on the form included in the Bid Documents within sixty (60) days from the date of opening of bids.

The Apparent Low Bidder shall execute the contract and return it to the City along with the required bonds and insurance forms within five (5) consecutive working days from and including the date of the Notice to Apparent Low Bidder. When the executed contract and the required bonds and insurance certificates are received, approval for the City to contract with the Apparent Low Bidder shall be sought in accordance with the Charter of the City and County of Denver. Such notice shall not create any rights in the Apparent Low Bidder to any contract with the City.

IB-11 CONFORMED TECHNICAL SPECIFICATIONS AND CONTRACT DOCUMENTS

The bidder understands that the City may elect, in its sole discretion, to deliver either one of the contract documents described below for execution.

- (a) A bound document containing the original Bid Documents and all of the prebid addenda, or
- (b) A bound document containing Part I of the original Bid Documents, the portions of the addenda which apply to Part I, and a single conformed set of Technical Specifications and Contract Documents which are produced by posting or otherwise incorporating in Part II of the original Bid Documents all of the changes to Part II which are described in the prebid addenda. If the City elects to prepare a conformed set of Technical Specifications and Contract Drawings, the following provision shall be incorporated in the Conformed Technical Specifications after the first page of its Table of Contents:

CONFORMED CONSTRUCTION DOCUMENTS

The Technical Specifications and the Contract Drawings which were included in the Bid Documents, hereinafter referred to as the "Bid Document Specifications and Drawings," have been conformed by the City. The conformed Technical Specifications and Contract Drawings were prepared by posting or otherwise incorporating the changes noted in the prebid addenda into the Bid Document Specifications and Drawings to form a single set of construction documents. This set of construction documents is attached hereto and is hereinafter referred to in this document as the "Issued for Construction Documents."

The City's objective in preparing the Issued for Construction Documents is to produce a single set of documents which the Contractor and City will use during construction and which will facilitate the administration of the Contract. The city, however, recognizes that discrepancies between the Issued for Construction Documents and the prebid addenda could occur. Therefore, the Contractor and City agree that both parties shall have 90 days after a fully executed contract is delivered to the Contractor to identify any such discrepancies.

If the Contractor identifies any discrepancy, it shall describe it in a written notice delivered to the City's Project Manager within the 90-day period. If the City agrees that a discrepancy exists, the City shall correct the Issued for Construction Documents in accord with the written notice to assure that the Issued for Construction Documents accurately reflect and are consistent with the Bid Document Specifications and Drawings and changes thereto reflected in the prebid addenda.

If the City identifies a discrepancy, it shall describe it in a written notice delivered to the Contractor's Superintendent within the above-described 90-day period. The City shall, thereafter, correct the Issued for Construction Documents in accord with the written notice. If the Contractor disagrees with any City proposed correction or any City refusal to

accept a Contractor proposed correction, the Contractor shall have the right to submit a Contractor Change Request and request a Change order in accordance with General Condition 1103.

During the 90-day period, the Bid Document Specifications and Drawings and the prebid addenda shall be part of the Contract Documents and are incorporated herein by this reference. After the 90-day period has elapsed, the parties (1) agree that the Issued for Construction Documents, as corrected pursuant to this provision, accurately reflect all of the changes to the Bid Document Specifications and Drawings contained in the addenda, and (2) agree that the Bid Document Specifications and Drawings and the portions of the prebid addenda which pertain thereto shall no longer be considered Contract Documents.

IB-12 QUANTITIES IN THE BID FORM ENTITLED SCHEDULE OF PRICES AND QUANTITIES (PART 2 OF THE BID FORMS)

Except for items designated as Lump Sum, the quantities appearing in the Bid Forms are approximate only and are included for the purpose of comparing of bids.

Payment to the Contractor will be based on the actual quantities of work performed, measured, and accepted or materials furnished in accordance with the Contract Documents.

Any of the estimated quantities of work and materials shown in the Bid Forms may each be increased, decreased, or omitted as provided in the General Conditions, Special Conditions, or Technical Specifications.

IB-13 BID GUARANTEE; BONDS; INSURANCE

As a guarantee of good faith on the part of the bidder, each Bid must be accompanied by a Bid guarantee consisting of either a certified or cashier's check made payable without condition to the order of the City and County of Denver or a bid bond written by an approved corporation surety in favor of the City and County of Denver. If the Bid of a bidder is acceptable and the bidder is notified by the Manager of Aviation that it is considered to be the Apparent Low Bidder and said bidder fails to (1) execute a contract in the form prescribed, (2) furnish the payment and performance bonds described in Title 15 of the General Conditions, (3) furnish the required evidence of insurance described in Title 16 of the General Conditions or in the Special Conditions, or (4) satisfy any other condition precedent to contract execution within its power within five (5) working days after such notice is made by the City, said bid guarantee shall be forfeited to the City as liquidated damages and not as a penalty. The bid guarantee shall be in the amount of five percent (5%) of the Total Contract Bid Amount written in the Bid Letter of the Bid Forms. A Bid Bond form for execution by the bidder is supplied with each set of contract documents. IF A BID BOND IS USED, IT MUST BE THE FORM OF BID BOND SUPPLIED WITH THE CONTRACT DOCUMENTS.

IB-14 RETURN OF BID GUARANTEE

As soon as bid prices have been compared, bid guarantees of all except the three lowest bidders will be returned. When the Apparent Low Bidder executes the contract and delivers to the City satisfactory performance and payment bonds and required insurance documentation, and any other conditions precedent to contract execution by the City have been satisfied, including, where applicable, City Council contract approval, the bid guarantees of the three lowest bidders shall be returned to them.

IB-15 CONTRACTOR'S BULLETIN BOARD; WWW.FLYDENVER.COM

It shall be conclusively presumed that the Bidder did, before submitting a bid, read all addenda, posted decisions, and other information items relevant to the Bid which appeared on the Contractor's Bulletin Board and the DIA Contract Procurement website at www.flydenver.com/contracts.

The Contractor's Bulletin Board is located at Denver International Airport, 8500 Peña Blvd., Denver, CO 80249-6340, on the wall south of the entrance to the Airport Office Building (AOB). The AOB entrance is reached by way of the corridor leading to Concourse A from the North end of the Terminal on Level 6, and is located west of the Concourse A security screening area. The AOB entrance and the Contractor's Bulletin Board are both located outside the security screening area.

IB-16 SITE INSPECTION AND INVESTIGATIONS

Prior to submitting an offer, the bidder shall inspect the work site and its surroundings. A site visit will be undertaken at the time of the pre-bid conference. Requests for additional site visits must be made at least five (5) working days prior to the bid opening and such visits must be requested in a letter sent to Robert Nichols, Planning & Development Office, 7th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, Colorado, 80249-6340. For purposes of the contract, it shall be conclusively presumed that the bidder has made a thorough inspection of the site and has waived the right to later claim extra payment or time extensions for conditions which would have been evident during that inspection.

Drawings and specifications, defining the work to be done, were prepared on the basis of interpretation by design professionals of information derived from investigations of the work site and site condition data provided by the City. Such information and data are subject to sampling errors, and the interpretation of the information and data depends to a degree on the judgment of the design professional. In view of this, the bidder is invited to make additional investigations as the bidder's judgment dictates the need for such investigations. If the bidder desires to perform site investigations, it shall request in writing the right to do so. This request shall be sent to Robert Nichols, Planning & Development Office, 7th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, Colorado, 80249-6340; fax number: PMfax.

Because the bid information cannot be guaranteed, the Contractor shall have assumed the risks attendant to successful performance of the work except for the risk of encountering differing site conditions which are defined in the General Conditions and shall never make claim for additional payments or time extensions on the grounds that the nature or amount of work to be done was not understood by the bidder at the time of bidding.

IB-17 INTERPRETATION OF BID DOCUMENTS

During the Bid period, Bidder shall request, in writing, clarification or interpretation of any apparent errors or omissions in the contract documents, any apparent inconsistencies between different provisions of the contract documents, or any other

point in the contract documents which the Bidder believes requires clarification or interpretation by the City. Any such request must be submitted in writing by email to contract.procurement@flydenver.com, must have the words "Request for Clarification" and "Contract No. 201204726" in the email subject line, and must be received not later than ten (10) calendar days before the date and time set for receipt of Bids. For purposes of the contract, it shall be conclusively presumed that prior to bidding, the Bidder requested clarification or interpretation of any apparent errors, inconsistencies, or other point in the contract documents believed to require clarification or interpretation, and has waived the right to later claim extra payment or time extensions on account of any such error, omission, inconsistency, or other matter in the contract documents.

Information about any interpretation or clarification made by the City in response to such request will be posted on the DIA Contract Procurement website, www.flydenver.com/contracts. It shall be the Bidder's responsibility to ensure it has reviewed all such interpretations or clarifications. After Bids are opened, all Bidders must abide by the decision of the Manager of Aviation or his authorized representative as to the interpretation or clarification. If the Manager of Aviation or his authorized representative determines that his decision or interpretation requires that an addendum to the Bid documents be issued, such addendum will be posted on the DIA Contract Procurement website and either the complete addendum or a notice of its issuance will be posted on the Contractor's Bulletin Board. It shall be the Bidder's responsibility to ensure it has received all such addenda, and each Bidder must acknowledge receipt of all addenda on the Bid Forms when it submits its Bid.

The City shall not be bound by and the Bidder shall not rely on any oral interpretation or clarification of the Bid Documents.

IB-18 MATERIALS AND SUBSTITUTIONS

It is often convenient and practical to specify materials and equipment to be incorporated into the work by a proprietary name or by the name of its manufacturer. When so specified and further qualified by the phrases "or equal" or "or equivalent," it shall be understood that such specification is not intended to limit the material and equipment selection process. Rather, the specification is intended to indicate a standard of quality and capability which will be accepted. However, all bidders desiring to use materials other than the specified material must obtain the written approval of the Project Manager. Any such request must be submitted in writing to Project Manager, Robert Nichols, P.E.; fax: (303) 342-2322. Planning & Development, Room 7830, Airport Office Building, 8500 Peña Boulevard, Denver, Colorado, 80249-6340, and received not later than ten (10) calendar days prior to the date and time set for opening of bids so that all such approvals will be included in addenda to ensure full and complete disclosure to all potential bidders of all approved equal or equivalent materials. All requests for approval of equal or equivalent material shall contain adequate technical data to clearly demonstrate equivalency. Incomplete submittals will not be reviewed. Requests must be submitted on the attached form titled "Request for 'or equal' Approval." Requests containing inadequate or incomplete information will not be considered.

If the bidder is awarded the contract and elects to use an "OR EQUAL" which has been added by addendum, the bidder shall be deemed to have warranted that;

- (a) the use of the "OR EQUAL" fulfills the specification requirements contained in the Contract Documents.
- (b) the installation of the "OR EQUAL" will not impact the spatial requirements for the Work or the scheduling of work performed by the City or other contractors.

Additionally, the bidder agrees that it shall modify any building system(s) (HVAC, structural, electrical, etc.) impacted by the use of an "OR EQUAL" at no cost to the City or other contractors under contract with the City and shall make no claims for delay or disruption arising out of such modification.

IB-19 WITHDRAWAL OF BID

A bidder may withdraw its Bid at any time prior to the time for opening of bids set forth in the Notice of Invitation for Bids by making written request to the Manager of Aviation. After the expiration of the bid period, no bid can be withdrawn for one hundred twenty (120) calendar days after the date bids are opened or until after a contract for the work described in these Bid Documents is fully executed by the City, whichever date is earlier.

Such a request must be signed by persons authorized to bind the bidder as defined in IB-3, "Completing and Signing Bid Forms."

IB-20 SUBCONTRACTOR LISTS IN BID

The bidder shall, on the forms included in the Bid Forms, identify each element of the work which the bidder plans to subcontract, provide an estimate of the total cost to perform each element, and include the name and address of the proposed subcontractor.

IB-21 PERMIT FEES

The Contractor agrees to pay the permit fees associated with the construction of this project described in General Condition 316, and in the Special Conditions and Technical Specifications.

IB-22 TAXES

1. General. Bidders are referred to the General Conditions, G.C. 322, as to taxes to which they may be subject in performing the Work under this contract, including but not limited to sales and use taxes and the Denver Occupational Privilege Tax. The following instructions are to be considered along with the General Conditions and not in lieu of them.
2. Sales and Use Tax. Construction and building materials sold to contractors and subcontractors for use on structures, roads, streets, highways, and other public works owned by the City and County of Denver at Denver International Airport are exempt from state, RTD, and Cultural Facilities District sales and use taxes. However, such materials will be subject to sales and use taxes imposed by the

City and County of Denver.

3. Exemption Certificates – Sales and Use Tax. It is responsibility of the Contractor and its subcontractors to apply to the Colorado Department of Revenue (“CDOR”) for a certificate, or certificates, of exemption indicating that their purchase of construction or building materials is for a public project, and to deliver to the City copies of such applications as soon as possible after approval by the CDOR. Bidders shall not include in their bid amounts the exempt State, RTD, and Cultural Facilities District Sales and Use Taxes.
4. Denver Occupational Privilege Tax. Any employee working for a contractor or a subcontractor who earns over \$500 working in Denver during a calendar month is subject to the payment of the Employee Occupational Privilege Tax. The Contractor and any subcontractor must pay the Business Occupational Privilege Tax for each of its employees who are subject to such tax.

IB-23 DISADVANTAGED BUSINESS ENTERPRISES (DBE) REQUIREMENTS

Department of Transportation (DOT) 49 CFR Part 26 (“Part 26”) applies to this Project and will be incorporated into any agreement entered into by the City and contained in County of Denver Bid Documents. It is the policy of DOT and the City and County of Denver to ensure non-discrimination in the award and administration of DOT-assisted contracts financed in whole or in part with Federal funds. Consequently, the Bidders must fully comply with the DBE requirements of Part 26 in bidding and performing hereunder.

Part 26 provides for the adoption of a good faith goals program, to be administered by the Division of Small Business Opportunity (DSBO). As such, each bidder must comply with the terms and conditions of the Part 26 in making its bid and, if awarded the Contract, in performing all Work thereunder. A bidder's failure to comply with Part 26, any Rules or Regulations promulgated pursuant thereto, or any additional requirements contained herein may render a bid non-responsive and may constitute cause for rejection.

In order to comply with the bid requirements of Part 26, a Bidder shall either meet the established DBE Project goal or, in the alternative, demonstrate that the bidder has made sufficient good faith efforts to meet the goal. In preparing a bid to meet the established DBE Project goal, bidders should consider the following instructions relating to compliance with Part 26:

1. Under Part 26, the Director of the DSBO establishes a project goal for this project. The specific goal for this project is stated in the Notice of Invitation for Bids bound herein.
2. In preparing its bid, each Bidder shall list on the Bid Form pages entitled "List of Proposed Disadvantaged Business Enterprise Bidders, Sub-contractors, Suppliers, Manufacturers, or Brokers" the name, address, work description/supply, committed level of participation and other required information for each DBE of any tier which the bidder intends to use in performing the Work on this Project. Only DBEs identified and the levels of participation listed for each on this Bid Form page at the time of bid opening will be considered in

determining whether the bidder has met the designated participation goal. Additional, revised or corrected participation submitted after bid opening will not be considered in determining responsiveness.

3. All DBE firms listed on the Bid Form must be properly certified under guidelines of the Department of Transportation 49 CFR Part 26 by the City of Denver DSBO's Office or the State of Colorado Department of Transportation (CDOT's) Office in order to count towards meeting the designated goals. Both DSBO and CDOT maintain a current listing of certified DBE firms which can be accessed on CDOT's website at http://www.dot.state.co.us/app_ucp/ Bidders are encouraged to utilize this directory to assist them in locating DBEs for the work/supply required on the project. The most current directories must be utilized in preparing a bid. DBE certification does not, however constitutes a representation or warranty by the City as to the qualifications of any listed firm.
4. In accordance with the requirements of Part 26, DSBO will evaluate each bid to determine the responsiveness of the bid to Part 26 requirements. In determining if a bidder's committed levels of participation meet or exceed the stated DBE goal, DSBO will base its calculation of applicable amounts and percentages on the total base bid amount, not including any listed alternates, of each bid as follows:
 - a. The bid information provided by the agency will be used to determine the total base bid amount of each bid. Each bidder's total base bid amount will be multiplied by the DBE percentage goal established for the project to determine the exact dollar amounts of required DBE participation for the project. These amounts will then be compared against the dollar amounts for the DBE firm(s) committed for participation by the bidder. If the total dollar amount of participation listed meets or exceeds the established DBE dollar amount goal listed, then the DSBO will determine that goals have been met.
 - b. In addition, DSBO will determine the exact commitment percentage for each listed DBE firm by dividing the dollar amount listed for each firm by the total base bid dollar amount submitted by the bidder. These individual percentages, when totaled for all listed DBEs, will establish the total committed percentage level of DBE participation that the bidder must comply with during the life of the contract. In all cases, the committed percentage level of DBE participation must equal or exceed the assigned DBE goal for the project.
 - c. In providing the exact dollar amount of participation for each listed DBE firm a bidder should take care never to round up in determining whether or not the total of these amounts meets or exceeds the established percentage goal. The goal must be met or exceeded by both dollar amounts and percentage for DSBO to determine that the bidder has met or exceeded the applicable DBE goal.
 - d. As previously mentioned, compliance with the DBE goal will be determined on the base bid alone. If a bid contains alternates, participation contained in any alternate will not count towards satisfaction of the project goals. However, should any designated alternate be selected by the City for

inclusion in the contract ultimately awarded, the DBE goal percentage level submitted at bid time, on the base bid, will also apply to the selected alternates and must be maintained for the life of the contract on the total contract amount, including any alternate work. Thus, even though such participation will not be considered in evaluating bids, bidders are urged to consider participation in preparing bids for designated alternates.

5. In accordance with Part 26 the City and County of Denver will require the total DBE participation commitment to be achieved in accordance with the following:

DBE bidders can count themselves for self-performance toward meeting the DBE goal, but only for the scope of work and at a percentage level that is performed by the DBE's own forces.

Work actually performed by DBEs is deemed to include the cost of materials and supplies purchased and equipment leased by the DBE from non-DBE sources. Work subcontracted can only count if the subcontractor is another DBE.

The entire fee or commission charged by a DBE, if reasonable and not excessive, will be counted.

Under Joint Ventures, the total value of distinct and clearly defined portions of the work of the contract that the DBE performs with its own workforce will be counted.

Each DBE must perform a "commercially useful function" to be counted toward the goal and at least 30% of the work must be performed by a DBE of the total cost of its contract for the DBE to be presumed to be performing a "commercially useful function".

Supplies or materials can be only counted for 60% of the total cost of the materials or supplies toward meeting the DBE goal and a DBE manufacture can count 100% of the cost of the materials or supplies toward the goal.

In utilizing the DBE participation of a broker, only the bona fide fees and commissions earned by them for their performance of a commercially useful function will count toward meeting the project goals. The bidder must separate the bona fide brokerage fees and commissions from the actual cost of the supplies or materials provided to determine the actual dollar amount of participation that can be counted towards meeting the goal.

6. On or before the fifth (5th) working day after bid opening, all of the bidders are required to submit an executed "DBE Letter of Intent" for each DBE listed on the Bid Form as a subcontractor, supplier, manufacturer, or broker of any tier. Each Letter of Intent shall be submitted only for the DBEs listed at the time of bid opening, since this is the only participation that will be counted toward satisfaction of the project goals. A form for the DBE Letter of Intent is included with the Bid Form. The DBE Letter of Intent is a written communication from the

bidder to the City evidencing an understanding that the bidder has or will enter into a contractual relationship with the DBE and/or that its subcontractor(s) and supplier(s), manufacturer(s), and broker(s) will do so. Each DBE Letter of Intent shall be accompanied by a copy of the City and County of Denver's DBE certification letter for each proposed DBE firm identified at bid time that has been certified by the City prior to bid time. Bidders are urged to carefully review these Letters before submission to the City to ensure that they are properly completed and executed by the appropriate parties.

In preparing a bid to demonstrate a good faith effort, bidders should consider the following instructions relating to compliance with Part 26:

- a. If any bidder is unable to meet the designated project DBE goal at the time the bids are opened or elects to present a good faith effort in lieu of or in addition to attempting to satisfy the designated project goals, that bidder shall submit on or before the fifth (5th) working day after the bid opening a detailed statement, with supporting documentation, setting forth its good faith efforts made prior to bid opening. This statement shall address each of the following items in the good faith effort. The different kinds of efforts as well as the quantity and intensity of the efforts will be considered in determining whether the bidder has made a good faith effort. A bidder who fails to meet the project goal and cannot show, to the Director's satisfaction, that it made a good faith effort to meet the DBE goal shall be considered non-responsive.
- b. The statement of good faith efforts shall include a specific response to each of the following items. In addition a bidder may include any additional information the bidder believes may be relevant. Failure of a bidder to show good faith efforts as to any one of the following categories may render its overall good faith showing insufficient and its bid non-responsive. Items (1) through (7) of the good faith effort are set forth below:
 1. If pre-bid meetings are scheduled by the City at which DBEs may be informed of subcontracting opportunities under a proposed contract to be bid, attendance at such pre-bid meetings is not mandatory; however, bidders are responsible for the information provided at these meetings. The good faith effort statement must reflect the bidder's knowledge of the information provided at these meetings.
 2. Written verification of the placing of an advertisement soliciting bids from DBEs for three (3) consecutive days in general or construction-related publications approved by the Director. All such advertisements must expressly advertise a given project and expressly state that DBE participation on that project is being sought; other incidental references to the project or listing of the bidder as a planholder are not sufficient. All such advertisements shall begin at least fifteen (15) days prior to bid opening. If the City publishes notice for bids on a project less than fifteen (15) days prior to bid opening, verification of advertisements for at least four (4) consecutive days shall be provided.
 3. Verification of efforts made by the bidder to contact, by written notice, all certified DBEs who have the capability to perform the work of the

contract, that their interest in the contract is being solicited, in sufficient time to allow the DBEs to participate effectively is required. The notice shall expressly describe the potential subcontracting, supplier or broker opportunities for all applicable certification categories for the particular project.

4. Verification that, reasonably consistent with industry practice and the bidder's past practices on similar projects, the bidder analyzed the needs of the project in light of such industry practice and past practice, together with the goal of facilitating DBE participation on the project, and identified portions of the work to be performed by DBEs in order to achieve the project goal.
5. For each DBE which contacted the bidder or which the bidder contacted or attempted to subcontract with, consistent with industry practice, a statement giving the reasons why the bidder and the DBE did not succeed in reaching a subcontracting, supplier, manufacturer or broker agreement.
6. Verification that the bidder rejected DBEs because they did not submit the lowest bid or they were not qualified. Such verification shall include a verified statement of the amounts of all bids received from potential subcontractors, suppliers, manufacturers or brokers on the project and a verified statement that the bidder rejected DBEs because they did not submit the lowest bid from among such bids or were not qualified.
7. Verification that the bidder made efforts to assist DBEs in obtaining bonds, if any are required.

In accordance with Part 26 the bidder agrees that it is committed to meeting either the DBE participation goal or the DBE participation set forth in its statement of good faith efforts. This commitment must be expressly indicated on the "Commitment to Disadvantaged Business Enterprise Participation" form included with the Bid Form. This commitment includes the following understandings:

1. The bidder understands it must maintain the committed DBE participation goal level throughout the life of the Contract consistent with 49 C.F.R. Section 26.53(f).
2. The bidder understands that it must establish and maintain records and submit regular reports, as required, which will allow the City to assess progress toward satisfying the DBE participation goal and other affirmative action efforts.
3. The bidder understands that if Change Orders or any other Contract modifications are issued under the Contract, the bidder shall have a continuing obligation to immediately inform DSBO in writing of any agreed upon increase or decrease in the scope of work of such Contract, regardless of whether such increase or decrease in scope of work has been reduced to writing at the time of notification.
4. The bidder understands that if change orders or other contract modifications are

issued under the Contract that include an increase in the scope of work of a contract for construction, reconstruction, or remodeling, whether by amendment, change order, force account or otherwise which increases the dollar value of the contract, whether or not such change is within the scope of work designated for performance by a DBE at the time of contract award, then such amendment, change order or other modification shall be contemporaneously submitted to the DSBO. Those amendments, change orders, force accounts or other contract modifications that involve a changed scope of work that cannot be performed by existing project subcontractors or by the Bidder shall be subject to goals or good faith efforts for DBEs equal to the original goal on the contract which were included in the bid.

All bidders are charged with knowledge of and are solely responsible for complying with each requirement of Part 26 in making a bid and, if awarded, in performing the Work described in the Contract Documents. These instructions are intended only to generally assist the bidder in preparing and submitting a compliant bid. Should any questions arise regarding specific circumstances, bidders must consult 49 CFR Part 26, appropriate DOT Rules and Regulations, or contact the Project's designated DSBO representative at (720) 913-1700.

INSTRUCTIONS TO BIDDERS - All bidders must submit a DSBO's Bidder's Information Form for themselves, as well as any subcontractor/supplier/manufacture/manufacture representative/broker that contacted the bidder or that the bidder contacted who provided a bid or quote, regardless if the firm is a DBE or a non-DBE firm. DSBO is required by DOT 49 CFR Part 26 Regulations to create and maintain a bidders list on DOT-assisted projects. Therefore, bidders need to provide these completed forms at the time of bid as a part of their Bid Form and Submittal Document.

IB-24 WAGE RATE REQUIREMENTS

The Davis Bacon Act and the United States Department of Labor regulations regarding payment of wages will apply to wages paid for work performed under this contract. A copy of the current applicable wage rates is included in the bid documents. If the Department of Labor issues a modification to those wage rates more than ten (10) days prior to the scheduled bid opening, those modifications will be published in an addendum issued to all prospective bidders by the City in accordance with FAA regulations. The FAA may determine on a case-by-case basis whether wage rate modifications issued by the Department of Labor less than ten (10) days prior to bid opening must be included in an addendum. Modifications issued by the Department of Labor which are not included in an addendum will not apply to this contract.

The wage rates identified in the bidding documents, including addenda, will be in effect for the life of the contract.

IB-25 CONSTRUCTION SCHEDULING

The bidder should refer to the General Conditions, Special Conditions, and Division I of the Technical Specifications for scheduling requirements for this contract.

IB-26 EQUAL EMPLOYMENT OPPORTUNITY

1. Article III, Division 2 of Chapter 28 applies to this contract. It is the policy of the City to provide equal opportunity in employment without regard to race, color, creed, sex, national origin, religion, marital status, or political opinion or affiliation. It is hereby deemed and declared to be for the public welfare and in the best interest of the City to require bidders, contractors and subcontractors soliciting and receiving, directly or indirectly, compensation from or through the City, for the performance of such contracts, to meet certain affirmative action and equal employment opportunity requirements. Additionally, contractors and subcontractors that hold any contracts which are federally-assisted shall be required to adhere to the Department of Labor's Contract Compliance program under Executive Order 11246 as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60-4.
2. After the Notice to Apparent Low Bidder has been issued, the Apparent Low Bidder shall submit the following to the Division of Small Business Opportunity:
 - (a) A statement that the bidder shall implement the affirmative action steps set forth in the Rules and Regulations and Bid Conditions of the Manager of Public Works pertaining to Equal Employment Opportunity, attached hereto, or the bidder's affirmative action plan which meets these requirements, and
 - (b) A projection of its anticipated workforce for this contract on the attached "EEO Questionnaire." Both of these submittals are required before the Division of Small Business Opportunity will approve the Notice to Proceed.
3. The bidder which is awarded this contract shall comply with the provisions and requirements, including the goals of minority and female participation and specific affirmative action steps, set forth in the Rules and Regulations and Bid Conditions of the Manager of Public Works pertaining to Equal Employment Opportunity, as said rules and regulations may be amended or readopted from time to time by the Manager of Public Works or the Director of the Division of Small Business Opportunity.

IB-27 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

The bidder certifies, by submission of its bid or acceptance of this contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or involuntarily excluded from participation in any government contract by any Federal, State, or local government department or agency. It further agrees by submitting its bid that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the bidder or any lower tier participant is unable to certify to this statement, it shall attach an explanation to its bid.

IB-28 BIDDER DISCLOSURE ORDINANCE

Pursuant to D.R.M.C. 20-69, any bid in excess of \$100,000.00 must be accompanied by a separate detachable page setting forth the following information:

- (1) The name of any officer, director, owner or principal of the business entity, including identity of any shareholder who owns or controls 5% or more of the business entity, and either 1) the names of his or her spouse, and children under eighteen years of age; or 2) a statement that he or she or his or her spouse, or children, if any, under the age of eighteen have or have not made a contribution, as defined in D.R.M.C. 15-32, or contribution in kind, as defined in D.R.M.C. 15-32, to any candidate, as defined in D.R.M.C. 15-32, during the last five years and identifying by name himself or herself or any spouse or child under the age of eighteen who has made such a contribution or contribution in-kind to a candidate.
- (2) The names of any subcontractors or suppliers whose share of the bid exceeds \$100,000.00 of the contract or formal bid amount.
- (3) The names of any unions with which the bidder has a collective bargaining agreement.

If the total bid amount is in excess of \$500,000.00, the information required in (1) above must be provided at the time of bid submittal, and the information required in (2) and (3) must be submitted in a timely fashion prior to award. The list of subcontractors required by this instrument is different and separate from the bidding list required on BF-4.

If the total bid amount is less than \$500,000.00 but more than \$100,000.00, such information must be provided prior to award of the contract. Failure to provide the required information in a timely fashion shall render any bid to which D.R.M.C. 20-69 applies non-responsive.

While a bidder or supplier who has already disclosed such information need not provide such information with a second or subsequent bid or proposal unless such information has changed, it shall be the responsibility of each such bidder or proposer to verify that such information is still current as of the date of such subsequent bid or proposal and is in fact on file with the City Clerk.

A form which may be used for such disclosure is contained in the Special Conditions Section of the Contract Documents. The form is entitled: Bidder/Contractor/Vendor/Proposer Disclosure. Failure to provide or update the required information in a timely fashion shall render any bid to which D.R.M.C. 20-69 applies non-responsive.

IB-29 INSURANCE REQUIREMENTS

In preparing its Bid, the Bidders shall assure that insurance requirements contained in the Contract Documents are met. In accordance with the provisions of General Contract Condition 1601, INSURANCE, the minimum insurance requirements for this Contract are set forth in the form **CITY AND COUNTY OF DENVER INSURANCE CERTIFICATE** contained in the Special Conditions Section of the Contract

Documents. Bidders are urged to consider in preparing a bid hereunder that the Contractor and all subcontractors performing Work on the Project must comply with each condition, requirement or specification set forth in the form certificate, unless such requirements are specifically excepted in writing by the City's Risk Management Administrator. The Contractor must either include all subcontractors performing work hereunder as insureds under each required policy or furnish a separate certificate (on the form certificate provided) for each subcontractor.

REQUEST FOR "OR EQUAL" APPROVAL

Contract No.: 201204726
 Title: 2012 Annual Airfield Pavement Rehabilitation

This request, **in duplicate**, must be received by the City Project Manager and Designer of Record at the following addresses, by noon at least 10 days prior to bid date.

City Project Manager:

 Robert Nichols
 Planning & Development Office
 Denver International Airport
 7th Floor, Airport Office Building
 8500 Peña Boulevard
 Denver, CO 80249-6240
 Fax: PMfax

To be completed and signed by requesting party:

Specification Section/Drawing Number:	Page No./Paragraph No./Subparagraph No.:
Specified Product:	Specified Manufacturer:
	Specified Model No.:
"Or Equal" Product:	"Or Equal" Manufacturer:
	"Or Equal" Model No.
Reason for "Or Equal" substitution:	
Prior Applications [Installations of at least 3 years length]:	
(1) Project: _____	Date: _____
(2) Project: _____	Date: _____
(3) Project: _____	Date: _____

[PAGE 1 OF 2 PAGES]

General product literature/catalog cuts/drawings or other appropriate information detailing the "Or Equal" product with respect to the project specifications must be attached to this form for approval.

I have reviewed the attached product literature and certify the following:

- (1) That the above described "Or Equal" product fulfills the specification requirements as detailed in the Contract Documents.
- (2) That the installation of the above described "Or Equal" product in no way impacts the spatial requirements of the project.
- (3) That I, if selected as the Contractor, shall modify any building system(s) (HVAC, structural, electrical, etc.) impacted by the use of the above described "Or Equal" product at no additional cost to the City and County of Denver and shall make no claim for delay with respect to any such modification.
- (4) That the above described "Or Equal" product meets all physical and performance attributes of the specified material or equipment except (if no difference, so state):

REQUESTING PARTY: _____

Date: _____ By: _____

Title: _____

For City use:

<input type="checkbox"/> Approved	<input type="checkbox"/> Disapproved	Date: _____
Reason for disapproval [if applicable]:		
DESIGNER OF RECORD:		
[Signature]		
PROJECT MANAGER:		Date:
[Signature]		
DEPUTY MANAGER:		Date:
[Signature]		
Bidder(s) Notified By	Addendum No.	Date:

THIS IS PAGE 2 OF 2 PAGES

**PREVAILING
WAGES**



DENVER
THE MILE HIGH CITY

Career Service Authority
Denver's Human Resource Agency

201 W. Colfax, Department 412
Denver, CO 80202
p: 720.913.5751
f: 720.913.5720
www.denvergov.org/csa

TO: All Users of the City of Denver Prevailing Wage Schedules
FROM: Meredith Creme, Associate Human Resource Professional
DATE: Friday January 13, 2012
SUBJECT: Latest Change to Prevailing Wage Schedules

Please be advised, prevailing wage rates for some building, heavy, and highway construction trades have not been updated by the United States Department of Labor (DOL) since March 1, 2002. The Career Service Authority Board, in their meeting held on April 21, 2011, approved the use of the attached supplemental wage rates until prevailing wage rates for these classifications of work are again published by the United States Department of Labor in accordance with the Davis-Bacon Act. The rates will be provided as a supplemental to the Davis-Bacon Highway rates issued by CSA.

The effective date for this publication is **Friday January 13, 2012** and applies to the City and County of Denver for **HIGHWAY CONSTRUCTION PROJECTS** in accordance with the Denver Revised Municipal Code, Section 20-76(c).

General Wage Decision No. CO120019
Superseded General Decision No. CO20100021
Modification No. 0
Publication Date: 01-06-2012
(11 pages)

Unless otherwise specified in this document, apprentices shall be permitted only if they are employed pursuant to, and individually registered in, a bona fide apprenticeship program registered with the U.S. Department of Labor (DOL). The employer and the individual apprentice must be registered in a program, which has received prior approval, by the DOL. Any employer, who employs an apprentice and is found to be in violation of this provision, shall be required to pay said apprentice the full journeyman scale.

For questions call (720) 913-5009

Attachments as listed above.

General Decision Number: CO120019 01/06/2012 CO19

Superseded General Decision Number: CO20100021

State: Colorado

Construction Type: Highway

Counties: Denver and Douglas Counties in Colorado.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/06/2012

CARP9901-008 10/01/2010

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 24.00	11.28

ELEC0068-016 03/01/2011

	Rates	Fringes
TRAFFIC SIGNALIZATION:		
Traffic Signal Installation		
Zone 1.....	\$ 26.42	4.75%+8.68
Zone 2.....	\$ 29.42	4.75%+8.68

TRAFFIC SIGNAL INSTALLER ZONE DEFINITIONS

Zone 1 shall be a 35 mile radius, measured from the following addresses in each of the following cities:

- Colorado Springs - Nevada & Bijou
- Denver - Ellsworth Avenue & Broadway
- Ft. Collins - Prospect & College
- Grand Junction - 12th & North Avenue
- Pueblo - I-25 & Highway 50

All work outside of these areas shall be paid Zone 2 rates.

ENGI0009-008 05/01/2011

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
(3)-Hydraulic Backhoe (Wheel Mounted, under 3/4 yds), Hydraulic Backhoe (Backhoe/Loader combination), Drill Rig Caisson (smaller than Watson 2500 and similar), Loader (up to and including 6 cu. yd.).....	\$ 23.67	9.22
(3)-Loader (under 6 cu. yd.) Denver County.....	\$ 23.67	9.22
(3)-Motor Grader (blade- rough) Douglas County.....	\$ 23.67	9.22

(4)-Crane (50 tons and under), Scraper (single bowl, under 40 cu. yd).....	\$ 23.82	9.22
(4)-Loader (over 6 cu. yd) Denver County.....	\$ 23.82	9.22
(5)-Drill Rig Caisson (Watson 2500 similar or larger), Crane (51-90 tons), Scraper (40 cu.yd and over),.....	\$ 23.97	9.22
(5)-Motor Grader (blade-finish) Douglas County.....	\$ 23.97	9.22
(6)-Crane (91-140 tons).....	\$ 24.12	9.22

 SUCO2011-004 09/15/2011

	Rates	Fringes
CARPENTER (Excludes Form Work)...	\$ 19.27	5.08
CEMENT MASON/CONCRETE FINISHER		
Denver.....	\$ 20.18	5.75
Douglas.....	\$ 18.75	3.00
ELECTRICIAN (Excludes Traffic Signal Installation).....	\$ 35.13	6.83
FENCE ERECTOR (Excludes Link/Cyclone Fence Erection).....	\$ 13.02	3.20
GUARDRAIL INSTALLER.....	\$ 12.89	3.20
HIGHWAY/PARKING LOT STRIPING:Painter		
Denver.....	\$ 12.62	3.21
Douglas.....	\$ 13.89	3.21
IRONWORKER, REINFORCING (Excludes Guardrail Installation).....	\$ 16.69	5.45
IRONWORKER, STRUCTURAL (Includes Link/Cyclone Fence Erection, Excludes Guardrail Installation).....	\$ 18.22	6.01
LABORER		
Asphalt Raker.....	\$ 16.29	4.25
Asphalt Shoveler.....	\$ 21.21	4.25
Asphalt Spreader.....	\$ 18.58	4.65
Common or General		
Denver.....	\$ 16.76	6.77
Douglas.....	\$ 16.29	4.25
Concrete Saw (Hand Held)....	\$ 16.29	6.14
Landscape and Irrigation....	\$ 12.26	3.16
Mason Tender-Cement/Concrete		
Denver.....	\$ 16.96	4.04
Douglas.....	\$ 16.29	4.25
Pipelayer		

Denver.....	\$ 13.55	2.41
Douglas.....	\$ 16.30	2.18
Traffic Control (Flagger)...	\$ 9.55	3.05
Traffic Control (Sets Up/Moves Barrels, Cones, Install Signs, Arrow Boards and Place Stationary Flags) (Excludes Flaggers).....	\$ 12.43	3.22
PAINTER (Spray Only).....	\$ 16.99	2.87
POWER EQUIPMENT OPERATOR:		
Asphalt Laydown		
Denver.....	\$ 22.67	8.72
Douglas.....	\$ 23.67	8.47
Asphalt Paver		
Denver.....	\$ 24.97	6.13
Douglas.....	\$ 25.44	3.50
Asphalt Roller		
Denver.....	\$ 23.13	7.55
Douglas.....	\$ 23.63	6.43
Asphalt Spreader.....	\$ 22.67	8.72
Backhoe/Trackhoe		
Douglas.....	\$ 23.82	6.00
Bobcat/Skid Loader.....	\$ 15.37	4.28
Boom.....	\$ 22.67	8.72
Broom/Sweeper		
Denver.....	\$ 22.47	8.72
Douglas.....	\$ 22.96	8.22
Bulldozer.....	\$ 26.90	5.59
Concrete Pump.....	\$ 21.60	5.21
Drill		
Denver.....	\$ 20.48	4.71
Douglas.....	\$ 20.71	2.66
Forklift.....	\$ 15.91	4.68
Grader/Blade		
Denver.....	\$ 22.67	8.72
Guardrail/Post Driver.....	\$ 16.07	4.41
Loader (Front End)		
Douglas.....	\$ 21.67	8.22
Mechanic		
Denver.....	\$ 22.89	8.72
Douglas.....	\$ 23.88	8.22
Oiler		
Denver.....	\$ 23.73	8.41
Douglas.....	\$ 24.90	7.67
Roller/Compactor (Dirt and Grade Compaction)		
Denver.....	\$ 20.30	5.51
Douglas.....	\$ 22.78	4.86
Rotomill.....	\$ 16.22	4.41
Screed		
Denver.....	\$ 22.67	8.38
Douglas.....	\$ 29.99	1.40
Tractor.....	\$ 13.13	2.95
TRAFFIC SIGNALIZATION:		
Groundsman		
Denver.....	\$ 17.90	3.41
Douglas.....	\$ 18.67	7.17

TRUCK DRIVER

Distributor		
Denver.....	\$ 17.81	5.82
Douglas.....	\$ 16.98	5.27
Dump Truck		
Denver.....	\$ 15.27	5.27
Douglas.....	\$ 16.39	5.27
Lowboy Truck.....	\$ 17.25	5.27
Mechanic.....	\$ 26.48	3.50
Multi-Purpose Specialty & Hoisting Truck		
Denver.....	\$ 17.49	3.17
Douglas.....	\$ 20.05	2.88
Pickup and Pilot Car		
Denver.....	\$ 14.24	3.77
Douglas.....	\$ 16.43	3.68
Semi/Trailer Truck.....	\$ 18.39	4.13
Truck Mounted Attenuator....	\$ 12.43	3.22
Water Truck		
Denver.....	\$ 26.27	5.27
Douglas.....	\$ 19.46	2.58

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION

Career Service Authority
Supplemental to the Davis-Bacon *HIGHWAY* Construction Projects rates
(Specific to the Denver Projects)
(Supp 35, Date: 01-13-2012)

Classification		Base	Fringe
Millwrights		\$28.00	\$10.00
Line Construction:			
	Lineman, Gas Fitter/Welder	\$36.88	\$9.55
	Line Eq Operator/Line Truck Crew	\$25.74	\$8.09
Power Equipment Operators (Tunnels Above and Below Ground, shafts and raises):			
	GROUP 1	\$25.12	\$10.81
	GROUP 2	\$25.47	\$10.85
	GROUP 3	\$25.57	\$10.86
	GROUP 4	\$25.82	\$10.88
	GROUP 5	\$25.97	\$10.90
	GROUP 6	\$26.12	\$10.91
	GROUP 7	\$26.37	\$10.94
Power Equipment Operators:			
	GROUP 1	\$22.97	\$10.60
	GROUP 2	\$23.32	\$10.63
	GROUP 3	\$23.67	\$10.67
	GROUP 4	\$23.82	\$10.68
	GROUP 5	\$23.97	\$10.70
	GROUP 6	\$24.12	\$10.71
	GROUP 7	\$24.88	\$10.79
Ironworkers (Ornamental)		\$24.80	\$10.03
Laborers (Removal of Asbestos)		\$21.03	\$8.55
Plumbers		\$30.19	\$13.55
Pipefitters		\$30.45	\$12.85
Truck Drivers:			
	GROUP 1	\$18.42	\$10.00
	GROUP 2	\$19.14	\$10.07
	GROUP 3	\$19.48	\$10.11
	GROUP 4	\$20.01	\$10.16
	GROUP 5	\$20.66	\$10.23
	GROUP 6	\$21.46	\$10.31

POWER EQUIPMENT OPERATOR CLASSIFICATIONS
(TUNNELS ABOVE AND BELOW GROUND, SHAFTS, AND RAISES):

GROUP 1 - Brakeman

GROUP 2 - Motorman

GROUP 3 - Compressor

GROUP 4 - Air Tractors; Grout Machine; Gunnite Machine; Jumbo Form

GROUP 5 - Concrete Placement Pumps; Mucking Machines and Front End Loaders, Underground, Slusher; Mine Hoist Operator; Mechanic

GROUP 6 - Mechanic Welder

GROUP 7 - Mole

NOTE: Any equipment listed below being used in tunnel work, below or above ground shall be paid not less than \$2.00 per hour above the listed wage rates.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS:

GROUP 1 - Air compressor, brakeman, drill operator -smaller than Watson 2500 and similar, operators of 5 or more light plants, welding machines, generators, single unit conveyor, pumps, vacuum well point system, tractor, under 70 hp with or without attachments compressors, 360 C.F.M. or less

GROUP 2 - Conveyor, handling building materials, ditch witch and similar trenching machine, forklift, haulage motor man, pugmill, portable screening plant with or without a spray bar, screening plants, with classifier, self-propelled roller, rubber-tires under 5 tons.

GROUP 3 - asphalt plant, backfiller; cableway signalman; C.M.I. and similar, concrete batching plants, concrete finish machine, concrete gang saw on concrete paving, concrete mixer, less than 1 yd., under 8 inches, distributors, bituminous surfaces dozer, drill, diamond or core, elevating graders, elevator operator, lubricating and service engineer, grout machine, gunnite machine, hoist, 1 drum, horizontal directional drill operator, hydraulic backhoes; road stabilization machine, sandblasting Machine, single unit portable crusher, with or without washer, Tie tamper, wheel mounted, trenching machine operator, winch on truck.

GROUP 4 - Cable operated power shovels, draglines, clamshells, 5 cubic yards and under, concrete mixer over 1 Cubic yard, concrete pavers 34E or similar, grade Checker, hoist, 2 drums, mechanic, mixer mobile, Portable crusher, with or without washer; tractor with sideboom, roto-M ill and similar, welder.

GROUP 5 - Cable operated power shovels, draglines, clamshells and Backhoes over 5 cubic yards, caisson drill Watson 2500 similar or larger, motor grader blade-finish, hoist 3 drum or more.

GROUP 6 - Cableway, derrick, quad nine push unit, wheel excavator, belt or elevating loader.

GROUP 7 - tower cranes all types.

TRUCK DRIVER CLASSIFICATIONS:

GROUP 1 - Greasemen, Servicemen and Ambulance Drivers, Battery Men, Shuttle Truck or Bus, Flat Rack Tandem Axle.

GROUP 2 - Fork Lift Driver, Straddle Truck Driver, Lumber Carrier, Liquid and Bulk Tankers Single Axle, Combination, Euclid Electric or Similar, Specialty and Hoisting, Truck Drivers Fuel Truck, Grease Truck, Combination Fuel and Grease.

GROUP 3 - Truck Driver Snow Plow, Truck Driver Dump or Type Jumbo and similar type equipment.

GROUP 4 - Cement Mixer Agitator Truck over 10 cubic yards to and including 15 cubic yards, Tire Man, Cab Operated Distributor Truck Driver.

GROUP 5 - Heavy Duty Diesel Mechanic, Body Man, Welders or Combination Men.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

EEO QUESTIONNAIRE
Contract No: 201204726

1. Name of Business: _____
2. Address: _____
3. City, State, Zip Code: _____
4. Telephone Number: (____) _____
5. Name and title of your firm's EEO Contact: _____
6. Are you an affiliate or a subsidiary of another business organization (branches, etc.)?
 Yes No
7. Type of business you are engaged in: _____
8. Does the organization have a procedure for resolving discrimination complaints?
 Yes No
9. Has your firm been charged with discrimination within the past eighteen (18) months?
 Yes No
10. Is your firm required to submit an EEO-1 annually to the EEOC?
 Yes No
11. Are you now working or have you worked on a City and County of Denver contract during the past twelve (12) months? Yes No
 If yes, complete the following information:

<u>Type of Contract</u>	<u>Contract Number</u>	<u>Total Cost of Each Contract</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(You may use additional sheets if necessary)

(Page 1 of 2 pages)

PROJECTION OF ANTICIPATED WORKFORCE
Contract No. 201204726

12. List the number of anticipated new employees needed by the contractor to perform this contract by trade/craft positions.

ANTICIPATED NUMBER OF NEW EMPLOYEES FOR THIS CONTRACT

Trade Craft	Estimated Total Manpower	Estimated Total Hours	Number of Employees Minority/Female	Total Estimated Employees Minority/Female
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

13. What is the anticipated number of employees from the apparent low bidder's current work force to be utilized to perform this contract? _____

14. Estimate manpower utilization for the project below:

ESTIMATE OF MANPOWER UTILIZATION

Trade Craft	Estimated Total Manpower	Estimated Total Hours	Number of Employees Minority/Female	Total Estimated Employees Minority/Female
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

15. Will the estimated total manpower (anticipated new hires and current staff to be utilized on this contract) meet the City's minority employment and female employment goals?
 Yes No

DENVER INTERNATIONAL AIRPORT

BID FORMS

CONTRACT NAME: 2012 Annual Airfield Pavement Rehabilitation
Contract No.: 201204726

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**DENVER INTERNATIONAL AIRPORT
BID FORMS**

**CONTRACT NAME: 2012 Annual Airfield Pavement Rehabilitation
Contract No.: 201204726**

Bid Letter

BIDDER Interstate Highway Construction, Inc.

Manager of Aviation
City and County of Denver
Business Management Services (Procurement) Office
Airport Office Building, Room 8810
Denver International Airport
8500 Peña Boulevard
Denver, Colorado 80249

This letter is in response to the Notice of Invitation for Bids first published on February 21, 2012, for Contract No. 201204726, Denver International Airport, 2012 Annual Airfield Pavement Rehabilitation.

This contract is for:

This project will provide rehabilitation of portland cement concrete pavement (PCCP) panels located on the Terminal Apron, De-Ice Pad A, Taxiway H, Taxiway M, and the southern section of Taxiway P. In addition to PCCP pavement rehabilitation, this project will remove 6 Deice Booms and associated equipment located on De-Ice Pad A. Pavement Rehabilitation involves the removal and replacement of concrete slabs that are near the end of useful life.

The undersigned Bidder declares that it has carefully examined the location of the proposed work and has carefully read and examined all of the Contract Documents which include, but are not limited to, the Contract Drawings, Technical Specifications, Construction Contract General Conditions, Special Conditions, Instruction to Bidders, and EEO provisions, and hereby proposes to furnish all labor, materials, equipment, tools, transportation and services, and to discharge all duties and obligations necessary and required to perform and complete the Work as required in the Contract Documents which are provided herewith and by this reference made a part hereof for the prices shown in the bid forms and totaled below:

Total Contract Bid Amount: Six Million, Four Hundred Ninety six Thousand,
Two Hundred Thirty one Dollars
and Thirty seven Cents (\$ 6,496,231.37).

The undersigned acknowledges receipt, understanding and full consideration of the following addenda to the Contract Documents:

Addenda Nos.: One

The undersigned agrees that this bid is a firm offer to the City to perform and complete the Contract described above which cannot be withdrawn for one hundred twenty (120) calendar days after the bids are opened or until after a contract for the work described in these bid documents is fully executed by the City, whichever date is earlier.

The undersigned Bidder hereby agrees to appear at Denver International Airport, Business Management Services Office, Room 8810, Airport Office Building, at any time within five (5) working days from the date of a written notice from the Manager to do so, mailed and/or faxed to the business address of Bidder and at that time the Bidder shall: (1) deliver an executed Contract which conforms with this bid; (2) furnish the required performance and payment bonds in the sum of the Total Contract Bid Amount shown above, executed by a surety company acceptable to the Manager; and (3) furnish the required insurance documents.

Enclosed herewith is a bid guarantee, as defined in the Instructions to Bidders, in the amount of which bid guarantee the undersigned Bidder agrees is to be paid to and become the property of the City as liquidated damages should the bid be considered to be the best by the City and the undersigned Bidder notified that it is the apparent low bidder and it fails to enter into contract in the form prescribed and to furnish the required performance and payment bonds and evidences of insurance within five (5) working days as stipulated above.

Attached and incorporated herein are the proposed Schedule of Prices and Quantities and Bid Data Forms. All of the forms must be completed. Bidder acknowledges that the City may incorporate, at its option, any or all of the data submitted by the Bidder into a contract arising out of this Bid.

The undersigned Bidder acknowledges the right of the City to waive informalities in the bids, to reject any or all bids submitted, and to re-advertise for bids.

The undersigned certifies that it has examined and is fully familiar with all of the provisions of the Contract Documents and is satisfied that they are accurate; that it has carefully checked all words and figures and all statements made in these Bid forms; and that it has satisfied itself with respect to the actual site conditions and the nature and location of the Work, the general and local conditions which may be encountered in the performance of the Work, and other matters which in any way affect the Work or the cost thereof.

[CERTIFICATION AND SIGNATURE ON FOLLOWING PAGES]

This bid is submitted upon the declaration that neither, I (we), nor, to the best of my (our) knowledge, none of the members of my (our) firm or company have either directly or indirectly entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this bid.

Dated this 21st day of March, 2012.

BUSINESS ADDRESS OF BIDDER: P. O. Box 4356
City, State, Zip Code: Englewood, CO 80155
Telephone Number of Bidder: (303) 790-9100
Fax Number of Bidder: (303) 790-8524
Social Security or Employer Id. No. of Bidder: 38-1504686

SIGNATURE OF BIDDER:

If a Corporation:

PRINT NAME OF CORPORATION:

Interstate Highway Construction, Inc.

Attest:

(Corporate Seal)


Secretary Lori L. Taylor

a Michigan Corporation

By: 
President J. Kenyon Schaeffer

If a Limited Liability Company:

PRINT NAME OF LIMITED LIABILITY COMPANY:

Organized in the State of _____

By: _____
Manager

[signature blocks for partnerships, limited partnerships and joint ventures are on following pages]

If a Partnership:

PRINT NAME OF PARTNERSHIP:

By: _____
General Partner

If an Individual:

_____, doing

business as _____

Signature: _____

(Signature blocks for joint ventures are on the next page)

If a Joint Venture, signature of all Joint Venture partners is required:

PRINT NAME OF JOINT VENTURE:

Joint Venture Partner -- Name of Firm:

Joint Venture Partner -- Name of Firm:

Corporation () or Partnership ()

Corporation () or Partnership ()

By: _____
Signature

By: _____
Signature

Title: _____

Title: _____

Required for a corporation:

Required for a corporation:

ATTEST:
(Corporate Seal)

ATTEST:
(Corporate Seal)

Secretary

Secretary

Joint Venture Partner -- Name of Firm:

Joint Venture Partner -- Name of Firm:

Corporation () or Partnership ()

Corporation () or Partnership ()

By: _____
Signature

By: _____
Signature

Title: _____

Title: _____

Required for a corporation:

Required for a corporation:

ATTEST:
(Corporate Seal)

ATTEST:
(Corporate Seal)

Secretary

Secretary

SCHEDULE OF PRICES AND QUANTITIES

BIDDER: INTERSTATE HIGHWAY CONSTRUCTION

**DENVER INTERNATIONAL AIRPORT
2012 ANNUAL AIRFIELD PAVEMENT REHABILITATION
CONTRACT NO. 201204726**

Schedule of Prices and Quantities

ITEM NO	DESCRIPTION	EST. QTY.	UNIT	UNIT PRICE	AMOUNT
01050a	Layout of Work and Surveys	1	LS	\$50,372.62	\$50,372.62
01505a	Mobilization	1	LS	\$222,978.00	\$222,978.00
01575a	Cover Elevated Edge Lights	200	EA	\$32.25	\$6,450.00
01575b	Cover Sign Panels	20	EA	\$164.54	\$3,290.80
01575c	Install Shorting Plug on Secondary Isolation Transformer	400	EA	\$103.17	\$41,268.00
01575d	Install Tie Back	8	EA	\$568.67	\$4,549.36
01576a	Traffic Control	1	LS	\$765,486.42	\$765,486.42
01576b	Flagger	3,700	HR	\$24.85	\$91,945.00
01576c	Gate Guard	925	HR	\$41.25	\$38,156.25
P-150a	Remove 17-inch Reinforced Concrete Pavement	10,864	SY	\$27.67	\$300,606.88
P-150b	Remove 17-inch Non-Reinforced Concrete Pavement	13,025	SY	\$24.83	\$323,410.75
P-150c	Pavement Marking Removal	9,500	SF	\$2.22	\$21,090.00
P-150d	Demolish L-868B Base Can	91	EA	\$196.96	\$17,923.36
P-150e	Demolish L-868C Base Can	30	EA	\$221.94	\$6,658.20
P-150f	Remove and Cap Area Drains and Pipe	200	LF	\$20.15	\$4,030.00
P-150g	Remove De-Ice Booms & Associated Electrical Panels, Cap Plumbing, Export Off Site	6	EA	\$46,701.41	\$280,208.46
P-152a	Unclassified Excavation, Export Off Site	2,518	CY	\$19.31	\$48,622.58
P-152b	DIA Upper Select Fill Borrow Embankment	1,157	CY	\$19.89	\$23,012.73
P-161a	Bondbreaker Fabric	23,889	SY	\$2.66	\$63,544.74
P-162a	Repair Soil Cement Base with CLSM (Flowable Fill)	300	CY	\$90.67	\$27,201.00
P-301a	Soil-Cement Base Course (12-Inch)	1,736	SY	\$18.56	\$32,220.16
P-301b	Hydrated Cement	50	TON	\$113.94	\$5,697.00
P-304a	Cement-Treated Base Course (8-Inch)	1,736	SY	\$30.12	\$52,288.32
P-401a	Bituminous Surface Course (3-inch)	36	TON	\$211.51	\$7,614.36
P-401b	Bituminous Base Course (7-inch)	84	TON	\$211.51	\$17,766.84
P-403a	Asphalt Treated Permeable Base Course (5-7 inch)	209	SY	\$84.61	\$17,683.49
P-501a	Install 17-inch Portland Cement Concrete Pavement, Plain (LP)	10,864	SY	\$125.81	\$1,366,799.84
P-501b	Install 17-inch Portland Cement Concrete Pavement, Reinforced	13,025	SY	\$151.81	\$1,977,325.25
P-501c	Concrete Blockout	8	EA	\$1,511.18	\$12,089.44

BIDDER: INTERSTATE HIGHWAY CONSTRUCTION

ITEM NO	DESCRIPTION	EST. QTY.	UNIT	UNIT PRICE	AMOUNT
P-501d	Spall Repair Around Light Can	20	SF	\$1,230.04	\$24,600.80
P-501e	Spall Repair	100	SF	\$393.11	\$39,311.00
P-610a	Repair Cement Treated Base with 1,200 psi concrete (8-Inch)	230	SY	\$165.84	\$38,143.20
P-620a	Pavement Marking	8,000	SF	\$2.00	\$16,000.00
P-620b	Non-Reflective Pavement Marking	4,500	SF	\$1.90	\$8,550.00
D-751a	Adjustment of Grate Elevation of Existing 1-Grate Inlet	1	EA	\$15,515.27	\$15,515.27
D-751b	Adjustment of Grate Elevation of Existing 2-Grate Inlet	1	EA	\$16,583.49	\$16,583.49
D-751c	Adjustment of Grate Elevation of Existing 4-Grate Inlet	3	EA	\$18,848.04	\$56,544.12
L-108a	Install Cable, 1/C #8, 19 strand, 5kV, L-824, Type B	16,104	LF	\$2.65	\$42,675.60
L-108b	Install Cable, 2/C #8, 19 strand, 5000V, L-824, Type B, Temporary Jumper	2,000	LF	\$6.53	\$13,060.00
L-110a	Install 1-way, 2-inch PVC Concrete Encased Duct	150	LF	\$20.18	\$3,027.00
L-110b	Install 1-way, 2-inch PVC Duct in CLSM	100	LF	\$27.94	\$2,794.00
L-110c	Remove 1-way, 2-inch PVC Concrete Encased Duct	50	LF	\$2.83	\$141.50
L-125a	Remove and Reinstall Existing Taxiway Edge Light Fixture	121	EA	\$138.88	\$16,804.48
L-125b	Install new Transformer	20	EA	\$362.22	\$7,244.40
L-125c	Install L-868B 22" Base Can	116	EA	\$1,592.95	\$184,782.20
L-125d	Install L-868B 26" Base Can	6	EA	\$1,809.89	\$10,859.34
L-125e	Install New L-852C, Bi-directional, Narrow Beam, Taxiway Centerline Light on Base Can	66	EA	\$1,058.72	\$69,875.52
L-125f	Drill Out Existing Light Can Bolt and Rethread Existing Bolt Hole	100	EA	\$97.51	\$9,751.00
L-125g	Install New L-852D, Bi-directional, Wide Beam, Taxiway Centerline Light on Base Can	52	EA	\$1,094.09	\$56,892.68
L-125h	Install New L-852D, Uni-directional, Wide Beam, Taxiway Centerline Light on Base Can	4	EA	\$1,211.53	\$4,846.12
L-125i	Install New Steel Plate Blank on Taxiway Centerline Base Can	30	EA	\$437.80	\$13,134.00
606a	Install Tensioned Cable Barrier	100	LF	\$21.15	\$2,115.00
606b	Install Tensioned Cable Barrier Anchors	4	EA	\$3,172.70	\$12,690.80
TOTAL					<u>\$6,496,231.37</u>

DENVER INTERNATIONAL AIRPORT

**2012 Annual Airfield Pavement Rehabilitation
Contract No. 201204726**

Bid Data Forms

Bidder shall submit its Bid Data in accordance with the format shown on each of the following Bid Data Forms. Bidder shall prepare and use as many sheets as are necessary to provide the information required. Bidder shall ensure that each page of its Bid Data is completed and properly identified with the Bid Data form name, Bidder's name, and page number.

DENVER INTERNATIONAL AIRPORT

2012 Annual Airfield Pavement Rehabilitation
Contract No. 201204726

Bid Data Forms
INFORMATION ABOUT CONTRACTOR

1. Name of Bidder/Contractor: Interstate Highway Construction, Inc.
2. Type of business entity: Corporation
NOTE: If bidder is a **partnership** or **joint venture**, give full names of all partners or joint venturers. Bid must be signed by all joint venturers. If bidder is a **limited liability company**, bid must be signed by authorized manager (may be signed by member-manager if LLC is organized to allow management by members).
3. Prequalified by City and County of Denver as Construction Contractor : Categories: 1, 5b, 5d
Monetary Limit: 1 - \$5,000,000; 5b - \$25,000,000
5d - \$10,000,000
4. Address of Contractor: P. O. Box 4356
Englewood, CO 80155
Physical: 7135 S. Tucson Way, Englewood, CO 80112
Telephone: (303) 790-9100 Fax: (303) 790-8524
5. Established where and when: East Lansing, Michigan 02/08/56
6. Contractor's Banks: U. S. Bank, 950 17th St., 8th Floor, Denver, CO 80202
(303) 585-4109 Jeff McBride, Vice President
7. Principal Officers of Contractor (managers and members if LLC):
Name: J. Kenyon Schaeffer Name: John D. Medberry
Title: President Title: Vice President
Name: Lori L. Taylor Name: Jeffrey C. Littmann, Treasurer
Title: Secretary Title: Treasurer

8. Bidder's/Contractor's City and License No.: _____
County of Denver Contractor
License if it has obtained one: Class: _____

A contractor license is required prior to start of construction but not prior to bid submittal.

9. Bidder's/Contractor's state of incorporation (state of organization if an LLC or partnership): Michigan

10. Bidder's Surety: Federal Insurance Company

11. Surety's State of Incorporation: Indiana

12. Address of Contractor in other areas (if different from No. 4): _____

13. Name and address of person to receive payments: Interstate Highway Construction, Inc.

P. O. Box 4356

Englewood, CO 80155

14. If the Bidder/Contractor is a joint venture, it shall attach a certified copy of the joint venture agreement. The joint venture agreement will not be included as a Contract Document.

15. The Bidder/Contractor shall identify all applicable labor agreements (if any) to be used in the performance of the Work: None

DENVER INTERNATIONAL AIRPORT

**2012 Annual Airfield Pavement Rehabilitation
Contract No. 201204726**

Bid Data Forms

LIST OF PROPOSED SUBCONTRACTORS WHICH
ARE NOT DBE SUBCONTRACTORS

Bidder shall list below the name, business address, work assignment and dollar value of each subcontractor that is not a DBE subcontractor which will perform work or labor or provide services to the Bidder relating to this contract in an amount greater than one and one-half percent of the Bidder's total bid. Only one subcontractor for each portion of the work shall be listed. Any proposed subcontractors to be utilized by the Bidder that are certified as a Small Business Enterprise shall also be listed on the "List of Proposed Subcontractors" attached to these Bid Forms.

If the bidder does not identify a subcontractor to perform portions of the work which could be subcontracted on this form or the List of Proposed DBE Subcontractors, the Bidder, if it is awarded the contract, agrees not to subcontract such portions that exceed one and one half percent of the total bid amount until the Contractor has advised the Deputy Manager of Aviation - Maintenance and Planning & Development ("Deputy Manager") in writing of the reasons why the subcontractor was not listed in the bid and complied with the requirements of General Condition 502.

If the bidder is awarded the contract and does not enter into a subcontract with a subcontractor listed below or on the List of Proposed DBE Subcontractors, the Contractor agrees not to subcontract any of the work assignment identified for that subcontractor until the Contractor has advised the Deputy Manager in writing of the reasons why a different subcontractor is being used and has obtained approval of the Deputy Manager of the substitution. This requirement does not affect the applicability of 502.

Subcontractor	Work Assignment	Subcontract Dollar Value
NAME: <u>MEZA CONSTRUCTION</u> ADDRESS: _____ PHONE: _____	REINFORCING & INLETS	\$442,000.00

Subcontractor	Work Assignment	Subcontract Dollar Value
NAME: <u>TRIPLE R TRAFFIC CONTROL</u> ADDRESS: _____ PHONE: _____	TRAFFIC CONTROL	\$ 170,000.00
NAME: <u>STURGEON ELECTRIC</u> ADDRESS: _____ PHONE: _____	ELECTRIC	\$ 522,000.00
NAME: _____ ADDRESS: _____ PHONE: _____		
NAME: _____ ADDRESS: _____ PHONE: _____		
NAME: _____ ADDRESS: _____ PHONE: _____		
NAME: _____ ADDRESS: _____ PHONE: _____		
NAME: _____ ADDRESS: _____ PHONE: _____		
NAME: _____ ADDRESS: _____ PHONE: _____		

(This page can be duplicated if additional sheets are required.)

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION

List of Proposed
Disadvantaged Business Enterprise
Bidders, Subcontractors, Suppliers (Manufacturers) or Brokers

The undersigned bidder proposes to utilize the following Disadvantaged Business Enterprise (DBE) for the project. All listed firms are CURRENTLY certified by the City and County of Denver. Only bona fide commissions may be counted for Brokers. Please copy and attach this page to list additional DBE firms for this project.

Check Box If Applicable:

Subcontractor or Supplier (Manufacturer) or Broker

Business Name: MEZA CONSTRUCTION

Address: _____

Type of Service: REINFORCING & INLETS

Contact Person: _____

Dollar Amount: \$ 442,000.00 Percent of Project 6.80 %

Check One Box:

Subcontractor or Supplier (Manufacturer) or Broker

Business Name: TRIPLE R TRAFFIC CONTROL

Address: _____

Type of Service: TRAFFIC CONTROL

Contact Person: _____

Dollar Amount: \$ 170,000.00 Percent of Project 2.61 %

Check One Box:

Subcontractor or Supplier (Manufacturer) or Broker

Business Name PERFORMANCE ELECTRIC

Address _____

Type of Service ELECTRICAL SUPPLY

Contact Person _____

Dollar Amount \$ 65,500.00 Percent of Project 1.00 %

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION

List of Proposed
Disadvantaged Business Enterprise
Bidders, Subcontractors, Suppliers (Manufacturers) or Brokers

The undersigned bidder proposes to utilize the following Disadvantaged Business Enterprise (DBE) for the project. All listed firms are CURRENTLY certified by the City and County of Denver. Only bona fide commissions may be counted for Brokers. Please copy and attach this page to list additional DBE firms for this project.

Check Box If Applicable:

Subcontractor or Supplier (Manufacturer) or Broker

Business Name: RALPH MARTINEZ TRUCKING

Address: _____

Type of Service: AGGREGATE HAUL

Contact Person: _____

Dollar Amount: \$ 105,000.00 Percent of Project 1.61 %

Check One Box:

Subcontractor or Supplier (Manufacturer) or Broker

Business Name: _____

Address: _____

Type of Service: _____

Contact Person: _____

Dollar Amount: \$ _____ Percent of Project _____ %

Check One Box:

Subcontractor or Supplier (Manufacturer) or Broker

Business Name _____

Address _____

Type of Service _____

Contact Person _____

Dollar Amount \$ _____ Percent of Project _____ %

The undersigned Bidder hereby certifies that the aforementioned subcontractors, suppliers, manufacturers and brokers have full knowledge that their names have been offered as subcontractors, suppliers, manufacturers and brokers for the work, and the Bidder further certifies that the dollar amount of work to be performed by the aforementioned DBEs was furnished to the Bidder prior to the bid opening.

The undersigned Bidder agrees that within five (5) working days after the bid opening, it shall submit to the City a "DBE" Letter of Intent" which as been completed and executed by each of its DBE subcontractors, suppliers, and brokers on the form contained in the Contract Documents.

The undersigned Bidder acknowledges the right of the City to reject any or all bids submitted to waive informalities in bids and to re-advertise this project for bids.

The undersigned certifies that it has carefully checked all words and figures and all statements made in these Bid Forms.

This bid is submitted upon the declaration that neither, I (we), nor, to the best of (our) knowledge none of the members of my (our) firm or company have either directly or indirectly entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this bid.

Business Address of Bidder: P. O. Box 4356

City, State, Zip Code: Englewood, CO 80155

Telephone Number of Bidder: (303) 790-9100

Social Security or Employer Id. No. of Bidder: 38-1504686

Name and location relative thereto, please refer to

Name: J. Kenyon Schaeffer

Title: President

Address: P. O. Box 4356, Englewood, CO 80155

The undersigned acknowledges receipt, understanding, and full consideration of the following addenda to the Contract Documents:

Addenda Numbers	Date
<u>1</u>	<u>March 14, 2012</u>

SIGNATURE J. Kenyon Schaeffer, President

March 21, 2012

DATE

COMMITMENT TO DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION

**2012 Annual Airfield Pavement Rehabilitation
Contract No. 201204726
BID DATA FORMS**

THE UNDERSIGNED HAS SATISFIED THE REQUIREMENTS OF INSTRUCTIONS TO BIDDERS, IB-23 IN THE FOLLOWING MANNER (Please check appropriate space):

 X The Bidder is committed to a minimum of 12.02 % DBE utilization for this contract. The Bidder understands that it must submit Letters of Intent for each DBE listed in the Bid Forms within five working days after bid opening.

 The Bidder is unable to meet the contract goal of 12% DBE but is committed to meet at a minimum _____% DBE participation on this contract. The Bidder understands that it must submit a detailed statement and documentation of good faith efforts it made prior to bid opening in its attempts made to meet the DBE contract goals and a Letter of Intent for each DBE listed in the Bid Forms within five working days after bid opening.

Bidder: Interstate Highway Construction, Inc.
(Name of Firm)

By:  J. Kenyon Schaeffer, President
(Signature) (Title)

Address: P. O. Box 4356, Englewood, CO 80155



DENVER
THE MILE HIGH CITY

Office of Economic Development
Division of Small Business Opportunity
Compliance Unit – DIA
 EMAIL: small.business@flydenver.com
 8500 Pena Blvd, AOB, Suite 7810
 Denver, CO 80249
 Phone: 303-342-2189
 Fax: 303-342-2190

LETTER OF INTENT (LOI)

*All lines must be completed or marked N/A for Not Applicable
 Submit the attached completed checklist with this letter.*

Project No.:

Project Name:

**A. The Following Section Is To Be Completed by the Bidder/Consultant
 This Letter of Intent Must be Signed by the Bidder/Consultant and M/WBE, SBE or DBE**

Name of Bidder/Consultant:		Phone:	
Contact Person:	Email:	Fax:	
Address:	City:	State:	Zip:

**B. The Following Section is To Be Completed by the M/WBE, SBE or DBE, at any Tier
 This Letter of Intent Must be Signed by the M/WBE, SBE or DBE and Bidder/Consultant**

Name of Certified Firm:		Phone:	
Contact Person:	Email:	Fax:	
Address:	City:	State:	Zip:

Please check the designation which applies to the certified firm.	<input type="checkbox"/>	MBE/WBE (√)	<input type="checkbox"/>	SBE (√)	<input type="checkbox"/>	DBE (√)
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Indirect Utilization: If this M/WBE, SBE or DBE is not a direct first tier subcontractor/subconsultant, supplier or broker to the Bidder/ Consultant, please indicate the name of the subcontractor/subconsultant, supplier or broker which is utilizing the participation of this firm:

A Copy of the M/WBE, SBE or DBE Letter of Certification must be Attached

Identify the scope of the work to be performed or supply item that will be provided by the M/WBE/SBE/DBE. **On unit price bids only, identify which bid line items the M/WBE/SBE/DBEs scope of work or supply corresponds to.**

<input type="checkbox"/>	Subcontractor/Subconsultant (√)	<input type="checkbox"/>	Supplier (√)	<input type="checkbox"/>	Broker (√)
--------------------------	---------------------------------	--------------------------	--------------	--------------------------	------------

Bidder intends to utilize the aforementioned M/WBE, SBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor M/WBE, SBE or DBE bid amount is:

\$		%
----	--	---

Consultant intends to utilize the aforementioned M/WBE, SBE or DBE for the Work/Supply described above. The percentage of the work of the total subconsultant M/WBE, SBE or DBE will perform is:

		%
--	--	---

If the fee amount of the work to be performed is requested, the fee amount, is:

\$	
----	--

Bidder/Consultant's Signature:	Date:
Title:	

M/WBE, SBE or DBE Firm's Signature:	Date:
Title:	

If the above named Bidder/Consultant is not determined to be the successful Bidder/Consultant, this Letter of Intent shall be null and void.

Letter of Intent (LOI) Checklist

*All lines must be completed or marked N/A for Not Applicable
Submit the attached completed checklist with this letter.*

Completed	
<input type="checkbox"/>	Project Number & Project Name
<input type="checkbox"/>	Section A: Name of Bidder/Consultant, Contact Person, Address, City, State, Zip, Phone, Email
<input type="checkbox"/>	Section B: Name of Certified Firm, Contact Person, Address, City, State, Zip, Phone, Email
<input type="checkbox"/>	Designation checked for MBE/WBE, SBE or DBE
<input type="checkbox"/>	Indirect Utilization: Name of subcontractor/subconsultant, supplier or broker is indicated if using the participation of a 2 nd tier subcontractor/subconsultant, supplier or broker.
<input type="checkbox"/>	Scope of work performed or item supplied by M/WBE, SBE or DBE
<input type="checkbox"/>	Line items performed, if line-item bid.
<input type="checkbox"/>	Copy of M/WBE, SBE or DBE Letter of Certification Attached
<input type="checkbox"/>	Designation checked for Subcontractor/Subconsultant, Supplier or Broker
	If project is a hard bid...
<input type="checkbox"/>	Bidder has indicated dollar amount for value of work going to Subcontractor/ Subconsultant, Supplier or Broker
<input type="checkbox"/>	Bidder has indicated percentage for value of work going to Subcontractor/ Subconsultant, Supplier or Broker
	If project is an RFP/RFQ...
<input type="checkbox"/>	Consultant has indicated percentage for value of work going to Subcontractor/ Subconsultant, Supplier or Broker Name & contact name for MWBE.
<input type="checkbox"/>	Fee amount if fee amount of work to be performed is requested.
<input type="checkbox"/>	Bidder/Consultant's Signature, Title & Date
<input type="checkbox"/>	M/WBE, SBE or DBE Firm's Signature, Title and Date

The complete and accurate information that is required for the Letter of Intent is based on the following sections of the Ordinance: Section 28-63 and Section 28-68. Failure to complete this information on the Letter of Intent (LOI) may automatically deem a bid or proposal non-responsive.

201 W. Colfax
 Denver, Colorado
 80202
 Phone: 720-913-1700
 Fax: 720-913-1803

**Division of Small Business
 Opportunity**

JOHN W. HICKENLOOPER
 Mayor

Denver International Airport
 Airport Office Building
 Suite 7810
 8500 Pena Boulevard
 Denver, Colorado 80249-6340
 Phone: 303-342-2180
 Fax: 303-342-2190

BIDDER'S INFORMATION FORM*

The City & County of Denver (CCD) has established a Disadvantaged Business Enterprise (DBE) Program in accordance with regulations of the U.S. Department of Transportation (DOT) 49 CFR Part 26.

§§ 26.11(b) (c) requires that CCD create and maintain a bidders list consisting of information about all DBE and non-DBE firms that bid or quote on DOT-assisted contracts. This includes firms bidding on prime contracts and bidding or quoting subcontracts on DOT-assisted contracts.

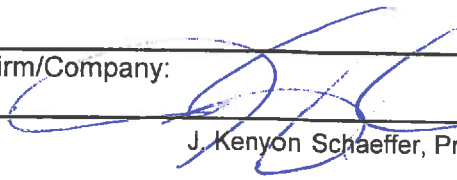
DSBO will safeguard from disclosure to third parties information regarded as confidential business information, consistent with Federal, State, and local law.

Contractors/Consultants must complete this form and request each subcontractor/supplier/sub-consultant bidding to the Prime to complete the form and return to the Prime. The Prime must submit all completed forms to DSBO with their bid/proposal.

*"Bidders Information Form" requirement applies to all prime contractors, prime consultants, subcontractors, suppliers, sub-consultants that bid/quote on a DOT-assisted contract.

Bidding as a: <input checked="" type="checkbox"/> Contractor or <input type="checkbox"/> Sub Contractor/Supplier/Sub-consultant		
Type of Work/Service: Prime Contractor and Concrete Paving		
Name of Firm/Company: Interstate Highway Construction, Inc.		
Address of Firm/Company: Street: P. O. Box 4356 City: Englewood State: CO Zip: 80155		
Telephone: (303) 790-9100	Fax: (303) 790-8524	E-Mail: estimating@ihcquality.com
Are you certified by any governmental agency as a Disadvantaged Business Enterprise? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO If yes, by whom:		
Age of Firm/Company: 65 Years		
Annual Gross Receipts of Firm/Company: \$ 170,000,000		
Date Submitted: March 21, 2012		

Signature of Designated Representative of Firm/Company:

A handwritten signature in blue ink, consisting of several loops and a long horizontal stroke, is written over the signature line.

J. Kenyon Schaeffer, President

Bidder Interstate Highway Construction, Inc.

DENVER INTERNATIONAL AIRPORT

**2012 Annual Airfield Pavement Rehabilitation
Contract No. 201204726**

**Bid Data Forms
EQUAL OPPORTUNITY REPORT STATEMENT**

Each Bidder shall complete and sign the Equal Opportunity Report Statement. A Bid may be considered unresponsive and may be rejected, in the Owner's sole discretion, if the Bidder fails to provide the fully executed Statement or fails to furnish required data. The Bidder shall also, prior to award, furnish such other pertinent information regarding its own employment policies and practices as well as those of its proposed subcontractors as the FAA, the Owner, or the Executive Vice Chairman of the President's Committee may require.

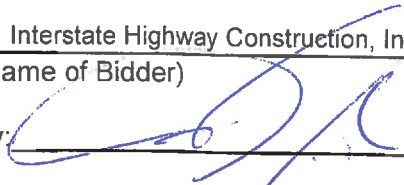
The Bidder shall furnish similar Statements executed by each of its first-tier and second-tier subcontractors and shall obtain similar compliance by such subcontractors, before awarding subcontracts. No subcontract shall be awarded to any non-complying subcontractor.

Equal Opportunity Report Statement
as Required in 41 CFR 60-1.7(b)

The Bidder shall complete the following statements by checking the appropriate blanks. Failure to complete these blanks may be grounds for rejection of bid:

1. The Bidder has X 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 has X 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 has X has not ___ filed with the Joint Reporting Committee the annual compliance report on Standard Form 100 (EEO-1 Report).
4. The Bidder does X does not ___ employ fifty or more employees.

Dated: March 21, 2012

Interstate Highway Construction, Inc.
(Name of Bidder)
By: 
Title: J. Kenyon Schaeffer, President

Bidder Interstate Highway Construction, Inc.

DENVER INTERNATIONAL AIRPORT

**2012 Annual Airfield Pavement Rehabilitation
Contract No. 201204726**

Bid Data Forms

**CERTIFICATION OF NON-SEGREGATED FACILITIES
(Must be completed and submitted with the Bid)**

The Bidder certifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location under its control, where segregated facilities are maintained. The Bidder certifies further that it will not maintain or provide for its employees segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location under its control, where segregated facilities are maintained. The Bidder agrees that a breach of this certification is a violation of the equal opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or any other reason. The Bidder agrees that (except where it has obtained identical certification from proposed subcontractors for specific time period) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the equal opportunity clause, and that it will retain such certification in its files.

DATED: March 21, 2012

Interstate Highway Construction, Inc.
(Name of Bidder)

By: 

Title: J. Kenyon Schaeffer, President

Bidder INTERSTATE HIGHWAY CONSTRUCTION, INC.

**DENVER INTERNATIONAL AIRPORT
2012 Annual Airfield Pavement Rehabilitation
Contract No. 201204726**

Bid Bond

KNOW ALL MEN BY THESE PRESENTS

THAT INTERSTATE HIGHWAY CONSTRUCTION, INC., as Principal, and FEDERAL INSURANCE COMPANY, a corporation organized and existing under and by virtue of the laws of the State of Indiana, and authorized to do business within the State of Colorado as Surety, are held and firmly bound unto the City and County of Denver, Colorado, as Obligee, in the full and just sum of FIVE PERCENT OF THE TOTAL AMOUNT BID Dollars and NO Cents (\$ 5%-----) lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents:


WHEREAS, the said Principal is herewith submitting its Bid, dated on March 21st, 2012, for the construction of Contract No. 201204726, 2012 Annual Airfield Pavement Rehabilitation, Denver International Airport, as set forth in detail in the contract documents for the City and County of Denver, Colorado, and said Obligee has required as a condition for receiving said Bid that the Principal deposit specified bid security in the amount of not less than five percent (5%) of the amount of said Bid, as it relates to work to be performed for the City, conditioned that in event of failure of the Principal to execute the Contract for such construction and furnish required Performance and Payment Bond if the Contract is offered him, that said sum be paid immediately to the Obligee as liquidated damages, and not as a Penalty, for the Principal's failure to perform.

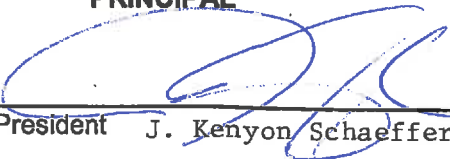
The condition of this obligation is such that if the aforesaid Principal shall, within the period specified therefor, on the prescribed form presented to him for signature, enter into a written Contract with the Obligee in accordance with his bid as accepted, and give Performance and Payment Bond with good and sufficient surety or sureties, upon the form prescribed by the Obligee, for the faithful performance and the proper fulfillment of said Contract, or in the event of withdrawal of said bid within the time specified, or upon the payment to the Obligee of the sum determined upon herein, as liquidated damages and not as a Penalty, in the event the Principal fails to enter into said Contract and give such Performance and Payment Bond within the time specified, then this Obligation shall be null and void, otherwise to remain in full force and effect.


[END OF PAGE]

Signed, sealed and delivered this 21st day of March, 2012.

Attest:


Secretary Lori L. Taylor
[SEAL if bidder a corporation]

INTERSTATE HIGHWAY CONSTRUCTION, INC.
PRINCIPAL
By: 
President J. Kenyon Schaeffer

FEDERAL INSURANCE COMPANY
SURETY
By: 
Attorney-in-Fact MONA D. WEAVER

(ATTACH POWER OF ATTORNEY)

Power of Attorney shall be certified as to the date of bid.


LOCKTON
LOCKTON COMPANIES, LLC
8110 E Union Ave, Ste 700 / Denver, CO 80237-2966
303-414-6000 / FAX: 303-865-6000
www.lockton.com



**Chubb
Surety**

**POWER
OF
ATTORNEY**

**Federal Insurance Company
Vigilant Insurance Company
Pacific Indemnity Company**


**Attn: Surety Department
15 Mountain View Road
Warren, NJ 07059**

Know All by These Presents, That FEDERAL INSURANCE COMPANY, an Indiana corporation, VIGILANT INSURANCE COMPANY, a New York corporation, and PACIFIC INDEMNITY COMPANY, a Wisconsin corporation, do each hereby constitute and appoint Sarah Gorman, Kyle Williams of Phoenix, Arizona and John J. Browning, Anuj Jain, Charles M. McDaniel, Sheila J. Montoya, Angela M. Tindol and Mona D. Weaver of Denver, Colorado

each as their true and lawful Attorney- In- Fact to execute under such designation in their names and to affix their corporate seals to and deliver for and on their behalf as surety thereon or otherwise, bonds and undertakings and other writings obligatory in the nature thereof (other than bail bonds) given or executed in the course of business, and any instruments amending or altering the same, and consents to the modification or alteration of any instrument referred to in said bonds or obligations.

In Witness Whereof, said FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY have each executed and attested these presents and affixed their corporate seals on this **9th** day of **November, 2009**


Kenneth C. Wendel, Assistant Secretary


David B. Norris, Jr., Vice President

STATE OF NEW JERSEY
County of Somerset

On this **9th** day of **November, 2009**

before me, a Notary Public of New Jersey, personally came Kenneth C. Wendel, to me known to be Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY, the companies which executed the foregoing Power of Attorney, and the said Kenneth C. Wendel, being by me duly sworn, did depose and say that he is Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY and knows the corporate seals thereof, that the seals affixed to the foregoing Power of Attorney are such corporate seals and were thereto affixed by authority of the By- Laws of said Companies; and that he signed said Power of Attorney as Assistant Secretary of said Companies by like authority; and that he is acquainted with David B. Norris, Jr., and knows him to be Vice President of said Companies; and that the signature of David B. Norris, Jr., subscribed to said Power of Attorney is in the genuine handwriting of David B. Norris, Jr., and was thereto subscribed by authority of said By-Laws and in deponent's presence.

Notarially



STEPHEN B. BRADT
Notary Public, State of New Jersey
No. 2321087
Commission Expires Oct. 25, 2014


Notary Public

CERTIFICATION

Extract from the By- Laws of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY:

"All powers of attorney for and on behalf of the Company may and shall be executed in the name and on behalf of the Company, either by the Chairman or the President or a Vice President or an Assistant Vice President, jointly with the Secretary or an Assistant Secretary, under their respective designations. The signature of such officers may be engraved, printed or lithographed. The signature of each of the following officers: Chairman, President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary and the seal of the Company may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing Assistant Secretaries or Attorneys- In- Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such power of attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached."

I, Kenneth C. Wendel, Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY (the "Companies") do hereby certify that

- (i) the foregoing extract of the By- Laws of the Companies is true and correct,
- (ii) the Companies are duly licensed and authorized to transact surety business in all 50 of the United States of America and the District of Columbia and are authorized by the U.S. Treasury Department; further, Federal and Vigilant are licensed in Puerto Rico and the U.S. Virgin Islands, and Federal is licensed in American Samoa, Guam, and each of the Provinces of Canada except Prince Edward Island; and
- (iii) the foregoing Power of Attorney is true, correct and in full force and effect.

Given under my hand and seals of said Companies at Warren, NJ this **MARCH 21ST, 2012**




Kenneth C. Wendel, Assistant Secretary

IN THE EVENT YOU WISH TO NOTIFY US OF A CLAIM, VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE CONTACT US AT ADDRESS LISTED ABOVE, OR BY Telephone (908) 903- 3493 Fax (908) 903- 3356 e-mail: surety@chubb.com

BIDDER/CONTRACTOR/VENDOR/PROPOSER DISCLOSURE

Bidding Entity's/ Proposer's Name

Date this form was completed

Address

(____) _____
Telephone Number

City, State, Zip Code

Signature of Officer/Owner

Section 20-69, D.R.M.C. requires the disclosure of the name of each officer, director, shareholder who owns or controls 5% or more of the business entity, principal, and owner of each bidding or proposing entity, AND either (1) disclosure of the names of the spouses of those individuals and the names of their children under the age of eighteen (18), or (2) a statement in lieu of the disclosure of the names of such spouses and children as set forth below in the "Certified Statement in Lieu of Disclosure." The names of officers, directors, 5% shareholders, principals and owners must be disclosed in either event. Required disclosures also include the names of any subcontractor/supplier receiving more than \$100,000.00 of work and the names of any unions with which the bidder/proposer has a collective bargaining agreement. This page may be photocopied if additional space is required.

The individuals listed below are disclosed as having the noted relationship with the business entity/proposer listed above. Show appropriate letter in the box to the left. Use center box for relationship to another line number: A=Officer, B=Director, C=Principal, D=Owner, E=Controller of 5% or more of the stock, F=Spouse, G=Child under age 18, H=Subcontractor, I=Supplier, J=Union. Identify with an asterisk (*) all listed persons who have made a contribution or contribution in-kind, as defined by Section 15-32, D.R.M.C., within the last five years.

1. <input type="checkbox"/> <input type="checkbox"/>	9. <input type="checkbox"/> <input type="checkbox"/>
2. <input type="checkbox"/> <input type="checkbox"/>	10. <input type="checkbox"/> <input type="checkbox"/>
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8. <input type="checkbox"/> <input type="checkbox"/>	16. <input type="checkbox"/> <input type="checkbox"/>

THIS IS PAGE 1 OF 2 PAGES

**BIDDER/CONTRACTOR/VENDOR/PROPOSER CERTIFIED STATEMENT
IN LIEU OF DISCLOSURE OF NAMES OF SPOUSES AND CHILDREN**

I hereby certify that, except as identified by an asterisk above, no officer, director, shareholder who owns or controls 5% or more of the business entity, principal, or owner or his or her spouse or child under eighteen years of age has made a contribution, as defined at Section 15-32 D.R.M.C., or a contribution in-kind, as defined at Section 15-32 D.R.M.C., to a candidate, as defined at Section 15-32 D.R.M.C., during the last five years.

Signature of Officer/Owner of Bidding/Proposing Entity

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION
NOTICE TO APPARENT LOW BIDDER

Date: [Date]

To: [Bidder name and address]

The Manager of Aviation, having considered the Bids submitted for the construction of Contract No. 201204726, 2012 Annual Airfield Pavement Rehabilitation, Denver International Airport, as set forth in detail in the Contract Documents for the City and County of Denver, Colorado and it appearing that your Bid is fair, equitable and in the best interest of said City and County, the said Bid with a Total Contract Bid Amount of _____ Dollars (\$ _____) is hereby declared to be acceptable, subject to the approval of the execution of the contract by the City in accordance with the Charter of the City and County of Denver.

In accordance with the terms of the Contract Documents, you are required to execute the formal Contract and furnish the required Performance Bond, Payment Bond and insurance certificates within five (5) consecutive working days from and including the date of this Notice. In addition, you are required to submit the EEO information described in IB-27 before a Notice to Proceed may be issued.

The bid security submitted with your Bid will be returned upon execution of the Contract, the City's receipt of the required Performance and Payment Bonds and insurance certificates, and, if required, City Council approval of the contract. If you should fail to execute the Contract and furnish the Performance and Payment Bonds and insurance certificate within the time limit specified, said bid security will be retained by the City and County of Denver as liquidated damages, and not as a penalty, for the delay and extra work caused thereby.

All construction contracts made and entered into by the City and County of Denver are subject to applicable City and/or Federal Affirmative Action and Equal Employment Opportunity Rules and Regulations, and each contract requiring payment by the City of Five Million Dollars (\$5,000,000.00) or more shall first be approved by the City Council acting by Ordinance and in accordance with Section 3.2.6 of the Charter of the City and County of Denver.

Prior to issuance of Notice to Proceed, all Affirmative Action and Equal Employment Opportunity requirements must be completed.

CITY AND COUNTY OF DENVER

By _____
Manager of Aviation

C O N T R A C T

THIS CONTRACT, made and entered into as of the date indicated on the City signature page below, by and between the **CITY AND COUNTY OF DENVER**, a municipal corporation of the State of Colorado, hereinafter referred to as the "CITY", Party of the First Part, and **INTERSTATE HIGHWAY CONSTRUCTION, INC.**, a corporation organized and existing under and by virtue of the laws of the State of Michigan, hereinafter referred to as the "CONTRACTOR", Party of the Second Part;

W I T N E S S E T H

WHEREAS, the City, for at least three (3) consecutive days, advertised that sealed bids would be received for furnishing all labor, tools, supplies, equipment, materials and everything necessary and required for the construction and installation of Contract No. 201204726, 2012 Annual Airfield Pavement Rehabilitation, Denver International Airport;

WHEREAS, bids to said advertisement have been received by the Manager of Aviation, who has recommended that a contract for said work be made and entered into with the above named Contractor who was the lowest, responsive, qualified bidder therefor; and

WHEREAS, said Contractor is now willing and able to perform all of said work in accordance with the Contract Documents and its bid;

NOW, THEREFORE, for and in consideration of the compensation to be paid the Contractor, the mutual agreements hereinafter contained, and subject to the terms hereinafter stated, it is mutually agreed as follows:

ARTICLE I - CONTRACT DOCUMENTS: It is agreed by the parties hereto that the following list of instruments, drawings and documents which are attached hereto and bound herewith or incorporated herein by reference constitute and shall be referred to either as the Contract Documents or the Contract, and all of said instruments, drawings and documents taken together as a whole constitute the Contract between the parties hereto, and they are as fully a part of this agreement as if they were set out verbatim and in full herein:

Advertisement of Notice of Invitation for Bids

Instructions to Bidders

Addenda (if any)

Bid Forms

Bid letter

Schedule of Prices and Quantities

Bid Data Forms

DBE Letters of Intent

Notice to Apparent Low Bidder

Contract

Performance Bond

Payment Bond

Notice to Proceed

Form of Final Receipt

Construction Contract General Conditions.

Special Conditions

Prevailing wage schedules.

Insurance certificate(s)
Equal Employment Opportunity Provisions
Federal Requirements and Assurances
Technical Specifications
Contract Drawings
Approved Shop Drawings
Change Directives
Change Orders

ARTICLE II - SCOPE OF WORK: The Contractor agrees to and shall furnish all labor and tools, supplies, equipment, superintendence, materials and everything necessary for and required to do, perform and complete all of the work described, drawn, set forth, shown and included in said Contract Documents.

ARTICLE III - TERMS OF PERFORMANCE: The Contractor agrees to begin the performance of the work required under this Contract within ten (10) days after being notified to commence work by the Deputy Manager of Aviation – Planning & Development and agrees to fully complete the Work in its entirety within one hundred thirty (130) consecutive calendar days from the date of said Notice to Proceed. This period of performance is also referred to as Contract Time. The Contractor is not authorized to commence work prior to its receipt of the Notice to Proceed.

ARTICLE IV - LIQUIDATED DAMAGES: It is understood and agreed by and between the City and the Contractor that, if the Contractor fails to achieve Substantial Completion of the Work within the Contract Time or fails to substantially complete the Work described in a Milestone Area within the time set forth in the Special Conditions, the City will suffer substantial damages, which damages would be difficult to accurately determine. The parties hereto have considered the possible elements of damages and have agreed that the amount of liquidated damages for the Contractor's failure to substantially complete the work within the Contract Time or to substantially complete the work described in Milestone Areas within the time set forth in the Special Conditions shall be those amounts listed in the Special Conditions. If the Contractor shall fail to pay such liquidated damages promptly upon demand therefor, the Surety on its Performance Bond and Payment Bond shall pay such damages. Also, the City may withhold all, or any part of, such liquidated damages from any payment due the Contractor. Additional provisions relating to liquidated damages are set forth in the Construction Contract General Conditions and Special Conditions.

ARTICLE V - TERMS OF PAYMENT: The City agrees to pay the Contractor for the performance and completion of all of the Work as required by the Contract Documents, and the Contractor agrees to accept as its full and only compensation therefor, a total amount of Six Million, Four Hundred Ninety-Six Thousand, Two Hundred Thirty-One and 37/100 Dollars (\$6,496,231.37).

Payments will be made to the Contractor in accordance with the City's Prompt Payment Ordinance, D.R.M.C., Section 20-107, et. seq., subject to the maximum contract amount stated above. Contractor agrees that interest and late fees shall be payable by the City hereunder only to the extent authorized and provided for in the City's Prompt Payment Ordinance.

Payment hereunder will be in accordance with the provisions of the Contract Documents, including Title 9 of the General Conditions, and will be made solely and exclusively from funds appropriated and otherwise lawfully made available for the purposes of this Contract from the

City and County of Denver Airport System, Operations and Maintenance and Capital Improvement funds. The City has no obligation to make payments from any other fund or source or to make additional appropriations or allocations to such fund to satisfy such costs or other obligations.

ARTICLE VI - DISPUTES: It is agreed and understood by the parties hereto that disputes regarding this contract shall be resolved by administrative hearing under procedures described in Revised Municipal Code Section 5-17.

ARTICLE VII - CONTRACT BINDING: It is agreed that this Contract shall be binding on and inure to the benefit of the parties hereto, their heirs, executors, administrators, assigns and successors.

ARTICLE VIII - SEVERABILITY: If any part, portion or provision of this Contract shall be found or declared null, void, or unenforceable for any reason whatsoever by any court of competent jurisdiction or any governmental agency having authority thereover, only such part, portion, or provision shall be affected thereby and all other parts, portions and provisions of this Contract shall remain in full force and effect.

ARTICLE IX - ASSIGNMENT: The Contractor shall not assign the whole or any part of its duties, rights, and interests in this Contract without first obtaining the written consent of the Manager.

ARTICLE X - APPROVALS: In the event this Contract calls for the payment by the City of Five Million Dollars (\$5,000,000.00) or more, approval by the Board of Councilmen of the City and County of Denver, acting by Ordinance in accordance with Section 3.2.6 of the Charter of the City and County of Denver, is and shall be an express condition precedent to the lawful and binding execution and performance of this Contract.

ARTICLE XI - JOINT VENTURE: If the Contractor is a Joint Venture, the partners to the Joint Venture shall be jointly and severally liable to the City for the performance of all duties and obligations of the Contractor which are set forth in the Contract.

ARTICLE XII - NO DISCRIMINATION IN EMPLOYMENT: In connection with the performance of work under this Contract, the Contractor agrees not to refuse to hire, discharge, promote or demote, or to discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, gender, age, military status, sexual orientation, gender variance, marital status, or physical or mental disability; and the Contractor further agrees to insert the foregoing provision in all subcontracts hereunder.

ARTICLE XIII – DEFENSE AND INDEMNIFICATION:

- A. To the fullest extent permitted by law, the Contractor hereby agrees to defend, indemnify, and hold harmless City, its appointed and elected officials, agents and employees against all liabilities, claims, judgments, suits or demands for damages to persons or property arising out of, resulting from, or related to the work performed under this Contract that are due to the negligence or fault of the Contractor or the Contractor's agents, representatives, subcontractors, or suppliers ("Claims"). This indemnity shall be interpreted in the broadest possible manner consistent with the applicable law to indemnify the City.
- B. Contractors duty to defend and indemnify City shall arise at the time written notice of the

Claim is first provided to City regardless of whether suit has been filed and even if Contractor is not named as a Defendant.

- C. Contractor will defend any and all Claims which may be brought or threatened against City and will pay on behalf of City any expenses incurred by reason of such Claims including, but not limited to, court costs and attorney fees incurred in defending and investigating such Claims or seeking to enforce this indemnity obligation. Such payments on behalf of City shall be in addition to any other legal remedies available to City and shall not be considered City's exclusive remedy.
- D. Insurance coverage requirements specified in this Contract shall in no way lessen or limit the liability of the Contractor under the terms of this indemnification obligation. The Contractor shall obtain, at its own expense, any additional insurance that it deems necessary for the City's protection. Contractor's indemnification obligation hereunder is not limited to third party claims.
- E. This defense and indemnification obligation shall survive the expiration or termination of this Contract.

ARTICLE XIV - WAIVER OF CRS 13-20-801, et seq.: Notwithstanding any other provision of this Contract, the Contractor specifically waives all of the provisions of Colorado Revised Statutes §§ 13-20-801 – 80 as they may relate to the Contractor's performance under this Contract.

ARTICLE XV - COORDINATION OF SERVICES: The Contractor agrees to perform its work under this Contract in accordance with the operational requirements of DIA, and all work and movement of personnel or equipment on areas included within the DIA site shall be subject to the regulations and restrictions established by the City or its authorized agents.

ARTICLE XVI - COMPLIANCE WITH ALL LAWS AND REGULATIONS: All of the work performed under this Contract by the Consultant shall comply with all applicable laws, rules, regulations and codes of the United States and the State of Colorado, and with the charter, ordinances and rules and regulations of the City and County of Denver.

ARTICLE XVII – PROMPT PAY: The Contractor is subject to D.R.M.C. Section 20-112 wherein the Contractor is to pay its subcontractors in a timely fashion. A payment is timely if it is mailed to the subcontractor no later than seven days after receipt of any payment from City. Any late payments are subject to a late payment penalty as provided for in the prompt pay ordinance (Section 20-107 through 20-118).

ARTICLE XVIII – COLORADO OPEN RECORDS ACT: The Contractor acknowledges that the City is subject to the provisions of the Colorado Open Records Act, Colorado Revised Statutes §24-72-201 et seq., and the Contractor agrees that it will fully cooperate with the City in the event of a request or lawsuit arising under such act for the disclosure of any materials or information which the Contractor asserts is confidential and exempt from disclosure. Any other provision of this Contract notwithstanding, including exhibits, attachments and other documents incorporated into this Contract by reference, all materials, records and information provided by the Contractor to the City shall be considered confidential by the City only to the extent provided in the Open Records Act, and the Contractor agrees that any disclosure of information by the City consistent with the provisions of the Open Records Act shall result in no liability of the City.

[END OF PAGE]

Contract Control Number:

IN WITNESS WHEREOF, the parties have set their hands and affixed their seals at Denver, Colorado as of

SEAL

CITY AND COUNTY OF DENVER

ATTEST:

By _____

APPROVED AS TO FORM:

REGISTERED AND COUNTERSIGNED:

By _____

By _____


By _____



IN WITNESS WHEREOF, the parties have caused this Agreement to be executed at Denver, Colorado as of the date indicated on the City signature page.

Contract Control Number: 201204726

Vendor Name: Interstate Highway Construction, Inc.

By: 

Name: J. Kenyon Schaeffer
(please print)

Title: President
(please print)

ATTEST: (if required)

By: 

Name: Lori L. Taylor
(please print)

Title: Secretary
(please print)



PERFORMANCE BOND

BOND NO. 8155-48-36

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned INTERSTATE HIGHWAY CONSTRUCTION, INC., a corporation organized under the laws of the State of Michigan, hereinafter referred to as the "Contractor" and Federal Insurance Company, a corporation organized under the laws of the State of Indiana, and authorized to transact business in the State of Colorado, hereinafter referred to as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereinafter referred to as the "CITY", in the penal sum of Six Million, Four Hundred Ninety-Six Thousand, Two Hundred Thirty-One and 37/100 Dollars (\$6,496,231.37), lawful money of the United States of America, for the payment of which sum the Contractor and Surety bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally by these presents.

WHEREAS, the above Contractor has entered into a written contract with the City for furnishing all labor, materials, equipment, tools, superintendence, and other facilities and accessories for the construction of Contract No. 201204726, 2012 Annual Airfield Pavement Rehabilitation, Denver International Airport, in accordance with the Technical Specifications, Contract Drawings and all other Contract Documents therefor which are incorporated herein by reference and made a part hereof, and are herein referred to as the Contract.

NOW, THEREFORE, the condition of this performance bond is such that if the Contractor:

1. Promptly and faithfully observes, abides by and performs each and every covenant, condition and part of said Contract, including, but not limited to, its warranty provisions, in the time and manner prescribed in the Contract, and
2. Pays the City all losses, damages (liquidated or actual, including, but not limited to, damages caused by delays in the performance of the Contract), expenses, costs and attorneys' fees, that the City sustains resulting from any breach or default by the Contractor under the Contract, then this bond is void; otherwise, it shall remain in full force and effect.

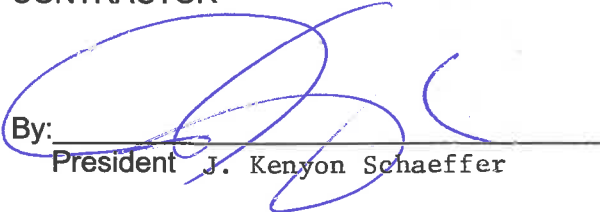
IN ADDITION, if said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, or any other supplies used or consumed by said Contractor or its subcontractors in its performance of the work contracted to be done or fails to pay any person who supplies rental machinery, tools, or equipment, all amounts due as the result of the use of such machinery, tools, or equipment in the prosecution of the work, the Surety shall pay the same in an amount not exceeding the amount of this obligation, together with interest as provided by law.

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that any and all changes in the Contract or compliance or noncompliance with the formalities in the Contract for making such changes shall not affect the Surety's obligations under this bond and the Surety hereby waives notice of any such changes.

(End of Page)


IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this ____ day of _____, 2012.

Interstate Highway Construction, Inc.
CONTRACTOR

By: 

President J. Kenyon Schaeffer

Federal Insurance Company
SURETY

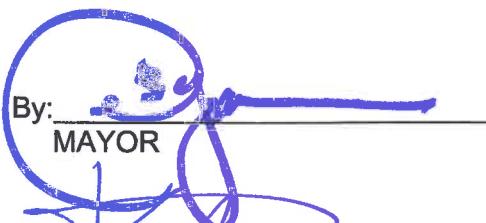
By: 

Attorney-in-Fact
Mona D. Weaver



LOCKTON
LOCKTON COMPANIES, LLC
8110 E Union Ave, Ste 700 / Denver, CO 80237-2966
303-414-6000 / FAX: 303-865-6000
www.lockton.com

(Accompany this bond with Attorney-in-Fact's authority from the Surety to execute bond, certified to include the date of the bond.)

CITY AND COUNTY OF DENVER

By: 

MAYOR

By: 

Manager of Aviation

APPROVED AS TO FORM:

DOUGLAS J. FRIEDNASH, Attorney for the
City and County of Denver

By: 

Assistant City Attorney



**Chubb
Surety**

**POWER
OF
ATTORNEY**

**Federal Insurance Company
Vigilant Insurance Company
Pacific Indemnity Company**

**Attn: Surety Department
15 Mountain View Road
Warren, NJ 07059**

Know All by These Presents, That FEDERAL INSURANCE COMPANY, an Indiana corporation, VIGILANT INSURANCE COMPANY, a New York corporation, and PACIFIC INDEMNITY COMPANY, a Wisconsin corporation, do each hereby constitute and appoint Sarah Gorman, Kyle Williams of Phoenix, Arizona and John J. Browning, Anuj Jain, Charles M. McDaniel, Sheila J. Montoya, Angela M. Tindol and Mona D. Weaver of Denver, Colorado

each as their true and lawful Attorney- In- Fact to execute under such designation in their names and to affix their corporate seals to and deliver for and on their behalf as surety thereon or otherwise, bonds and undertakings and other writings obligatory in the nature thereof (other than bell bonds) given or executed in the course of business, and any instruments amending or altering the same, and consents to the modification or alteration of any instrument referred to in said bonds or obligations.

In Witness Whereof, said FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY have each executed and attested these presents and affixed their corporate seals on this **9th** day of **November, 2009**


Kenneth C. Wendel, Assistant Secretary


David B. Norris, Jr., Vice President

STATE OF NEW JERSEY

ss.

County of Somerset

On this **9th** day of **November, 2009**

before me, a Notary Public of New Jersey, personally came Kenneth C. Wendel, to me

known to be Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY, the companies which executed the foregoing Power of Attorney, and the said Kenneth C. Wendel, being by me duly sworn, did depose and say that he is Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY and knows the corporate seals thereof, that the seals affixed to the foregoing Power of Attorney are such corporate seals and were thereto affixed by authority of the By- Laws of said Companies; and that he signed said Power of Attorney as Assistant Secretary of said Companies by like authority; and that he is acquainted with David B. Norris, Jr., and knows him to be Vice President of said Companies; and that the signature of David B. Norris, Jr., subscribed to said Power of Attorney is in the genuine handwriting of David B. Norris, Jr., and was thereto subscribed by authority of said By-Laws and in deponent's presence.

Notarial Seal



STEPHEN B. BRADT
Notary Public, State of New Jersey
No. 2321097
Commission Expires Oct. 25, 2014


Notary Public

CERTIFICATION

Extract from the By- Laws of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY:

"All powers of attorney for and on behalf of the Company may and shall be executed in the name and on behalf of the Company, either by the Chairman or the President or a Vice President or an Assistant Vice President, jointly with the Secretary or an Assistant Secretary, under their respective designations. The signature of such officers may be engraved, printed or lithographed. The signature of each of the following officers: Chairman, President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary and the seal of the Company may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing Assistant Secretaries or Attorneys- In- Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such power of attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached."

I, Kenneth C. Wendel, Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY (the "Companies") do hereby certify that

- (i) the foregoing extract of the By- Laws of the Companies is true and correct,
- (ii) the Companies are duly licensed and authorized to transact surety business in all 50 of the United States of America and the District of Columbia and are authorized by the U.S. Treasury Department; further, Federal and Vigilant are licensed in Puerto Rico and the U.S. Virgin Islands, and Federal is licensed in American Samoa, Guam, and each of the Provinces of Canada except Prince Edward Island; and
- (iii) the foregoing Power of Attorney is true, correct and in full force and effect.

Given under my hand and seals of said Companies at Warren, NJ this




Kenneth C. Wendel, Assistant Secretary

IN THE EVENT YOU WISH TO NOTIFY US OF A CLAIM, VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE CONTACT US AT ADDRESS LISTED ABOVE, OR BY Telephone (908) 903- 3493 Fax (908) 903- 3656 e-mail: surety@chubb.com

PAYMENT BOND

BOND NO. 8155-48-36

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned INTERSTATE HIGHWAY CONSTRUCTION, INC., a corporation organized under the laws of the State of Michigan, hereinafter referred to as the "Contractor" and Federal Insurance Company, a corporation organized under the laws of the State of Indiana, and authorized to transact business in the State of Colorado, hereinafter referred to as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereinafter referred to as the "CITY", in the penal sum of Six Million, Four Hundred Ninety-Six Thousand, Two Hundred Thirty-One and 37/100 Dollars (\$6,496,231.37), lawful money of the United States of America, for the payment of which sum the Contractor and Surety bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally by these presents.

WHEREAS, the above Contractor has entered into a written contract with the City for furnishing all labor, materials, tools, superintendence, and other facilities and accessories for the construction of Contract No. 201204726, 2012 Annual Airfield Pavement Rehabilitation, Denver International Airport, in accordance with the Technical Specifications, Contract Drawings and all other Contract Documents therefor which are incorporated herein by reference and made a part hereof, and are herein referred to as the Contract.

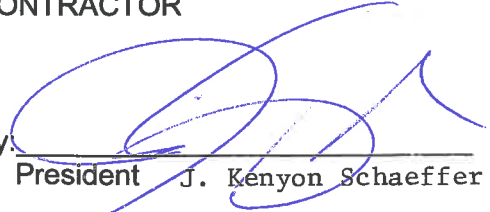
NOW, THEREFORE, the condition of this payment bond obligation is such that if the Contractor shall at all times promptly make payments of all amounts lawfully due to all persons supplying or furnishing it or its subcontractors with labor and materials, rental machinery, tools, or equipment, used or performed in the prosecution of work provided for in the above Contract and shall indemnify and save harmless the City to the extent of any and all payments in connection with the carrying out of such Contract which the City may be required to make under the law, then this obligation shall be null and void, otherwise, it shall remain in full force and effect;

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that any and all changes in the Contract, or compliance or noncompliance with the formalities in the Contract for making such changes shall not affect the Surety's obligations under this bond and the Surety hereby waives notice of any such changes.

[END OF PAGE]

IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this ____ day of _____, 2012.


Interstate Highway Construction, Inc.
CONTRACTOR

By: 

President J. Kenyon Schaeffer


LOCKTON
LOCKTON COMPANIES, LLC
8110 E Union Ave, Ste 700 / Denver, CO 80237-2966
303-414-6000 / FAX: 303-865-6000
www.lockton.com

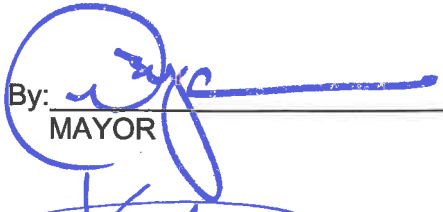
Federal Insurance Company
SURETY

By: 

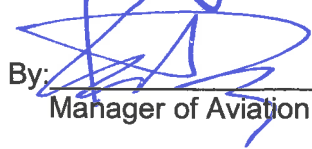
Attorney-in-Fact
Mona D. Weaver

(Accompany this bond with Attorney-in-Fact's authority from the Surety to execute bond, certified to include the date of the bond.)

CITY AND COUNTY OF DENVER

By: 

MAYOR

By: 

Manager of Aviation

APPROVED AS TO FORM:

DOUGLAS J. FRIEDNASH, Attorney for the
City and County of Denver

By: 

Assistant City Attorney



**Chubb
Surety**

**POWER
OF
ATTORNEY**

**Federal Insurance Company
Vigilant Insurance Company
Pacific Indemnity Company**

**Attn: Surety Department
15 Mountain View Road
Warren, NJ 07059**

Know All by These Presents, That FEDERAL INSURANCE COMPANY, an Indiana corporation, VIGILANT INSURANCE COMPANY, a New York corporation, and PACIFIC INDEMNITY COMPANY, a Wisconsin corporation, do each hereby constitute and appoint Sarah Gorman, Kyle Williams of Phoenix, Arizona and John J. Browning, Anuj Jain, Charles M. McDaniel, Sheila J. Montoya, Angela M. Tindol and Mona D. Weaver of Denver, Colorado

each as their true and lawful Attorney- In- Fact to execute under such designation in their names and to affix their corporate seals to and deliver for and on their behalf as surety thereon or otherwise, bonds and undertakings and other writings obligatory in the nature thereof (other than bail bonds) given or executed in the course of business, and any instruments amending or altering the same, and consents to the modification or alteration of any instrument referred to in said bonds or obligations.

In Witness Whereof, said FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY have each executed and attested these presents and affixed their corporate seals on this **9th** day of **November, 2009**

Kenneth C. Wendel, Assistant Secretary

David B. Norris, Jr., Vice President

STATE OF NEW JERSEY

ss.

County of Somerset

On this **9th** day of **November, 2009**

before me, a Notary Public of New Jersey, personally came Kenneth C. Wendel, to me known to be Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY, the companies which executed the foregoing Power of Attorney, and the said Kenneth C. Wendel, being by me duly sworn, did depose and say that he is Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY and knows the corporate seals thereof, that the seals affixed to the foregoing Power of Attorney are such corporate seals and were thereto affixed by authority of the By- Laws of said Companies; and that he signed said Power of Attorney as Assistant Secretary of said Companies by like authority; and that he is acquainted with David B. Norris, Jr., and knows him to be Vice President of said Companies; and that the signature of David B. Norris, Jr., subscribed to said Power of Attorney is in the genuine handwriting of David B. Norris, Jr., and was thereto subscribed by authority of said By- Laws and in deponent's presence.

Notarial Seal



STEPHEN B. BRADT
Notary Public, State of New Jersey
No. 2321097
Commission Expires Oct. 25, 2014

Notary Public

CERTIFICATION

Extract from the By- Laws of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY:

"All powers of attorney for and on behalf of the Company may and shall be executed in the name and on behalf of the Company, either by the Chairman or the President or a Vice President or an Assistant Vice President, jointly with the Secretary or an Assistant Secretary, under their respective designations. The signature of such officers may be engraved, printed or lithographed. The signature of each of the following officers: Chairman, President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary and the seal of the Company may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing Assistant Secretaries or Attorneys- In- Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such power of attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached."

I, Kenneth C. Wendel, Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY (the "Companies") do hereby certify that

- (i) the foregoing extract of the By- Laws of the Companies is true and correct,
- (ii) the Companies are duly licensed and authorized to transact surety business in all 50 of the United States of America and the District of Columbia and are authorized by the U.S. Treasury Department; further, Federal and Vigilant are licensed in Puerto Rico and the U.S. Virgin Islands, and Federal is licensed in American Samoa, Guam, and each of the Provinces of Canada except Prince Edward Island; and
- (iii) the foregoing Power of Attorney is true, correct and in full force and effect.

Given under my hand and seals of said Companies at Warren, NJ this



Kenneth C. Wendel, Assistant Secretary

IN THE EVENT YOU WISH TO NOTIFY US OF A CLAIM, VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE CONTACT US AT ADDRESS LISTED ABOVE, OR BY Telephone (908) 903- 3493 Fax (908) 903- 3656 e-mail: surety@chubb.com

CITY AND COUNTY OF DENVER

DEPARTMENT OF AVIATION

NOTICE TO PROCEED

Date:

TO: [Bidder name and address]

You are hereby authorized and directed to proceed on this date with the work of constructing Contract No. 201204726, 2012 Annual Airfield Pavement Rehabilitation, Denver International Airport, Denver, Colorado, as set forth in detail in the Contract Documents for the City and County of Denver.

The bid security submitted with your bid is herewith returned to you.

CITY AND COUNTY OF DENVER

By _____
Deputy Manager of Aviation
Planning & Development

CITY AND COUNTY OF DENVER

DEPARTMENT OF AVIATION

FINAL RECEIPT

Denver, Colorado

Received this date of the City and County of Denver, as full and final payment of the cost of the construction of Contract No. 201204726, 2012 Annual Airfield Pavement Rehabilitation, Denver International Airport, Denver, Colorado, provided for in the foregoing Contract, _____ Dollars and _____ Cents (\$_____), in cash, being the remainder of the full amount accruing to the undersigned by virtue of said Contract; said cash also covering and including full payment for the cost of all extra work and material furnished by the undersigned in the construction of said improvements, and all incidentals thereto, and the undersigned hereby releases said City and County from all claims whatsoever growing out of said Contract.

And these presents are to certify that all persons doing work upon or furnishing materials for said improvements under the foregoing Contract have been paid in full.

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION
DEPARTMENT OF PUBLIC WORKS
STANDARD SPECIFICATIONS FOR CONSTRUCTION
CONSTRUCTION CONTRACT GENERAL CONDITIONS
1999 EDITION

TABLE OF CONTENTS

The General Contract Conditions are separately bound
and may be purchased as described in the
Special Conditions

**CONSTRUCTION CONTRACT GENERAL CONDITIONS
1999 EDITION**

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SPECIAL CONDITIONS
Contract No. 201204726

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SPECIAL CONDITIONS

SC-1 CONSTRUCTION CONTRACT GENERAL CONDITIONS

The Construction Contract General Conditions which constitute a part of the Contract Documents are set forth in a separately published document, entitled "City and County of Denver, Department of Aviation and Department of Public Works, Standard Specifications for Construction, General Contract Conditions," 1999 Edition, the Table of Contents to which is bound herein (which may be informally referred to as the Orange Book). The General Conditions book is available for purchase for \$10.00 per copy at the following locations during the business hours stated, Monday through Friday, excluding holidays:

Office of the Cashier
Wellington E. Webb Municipal Office
Building, 2nd Floor
201 West Colfax Avenue
Denver, Colorado, USA 80202
7:30 a.m. to 4:30 p.m.

Business Management
Services Office
Department of Aviation
Rm. 8810 Airport Office Bldg.
8500 Peña Boulevard
Denver, CO 80249
8:00 A.M. to 4:00 P.M.

The General Conditions are also available on the DIA Contract Procurement website at www.flydenver.com/contracts.

SC-2 DRAWINGS AND SPECIFICATIONS TO BE FURNISHED BY THE CITY

The City will provide the following Contract Documents to the Contractor at no expense to the Contractor:

Document	Quantity
Volumes I & 2 (See the Master Table of Contents, page TOC-ii, for the content of these volumes)	2 copies
Volume 3	1 copy
Contract Drawings - reproducible	
Change Orders and Change Directives	1 copy

Additional copies of the foregoing documents will be furnished to the Contractor at the Contractor's expense. The Contractor will be responsible for supplying all subcontractors with copies of the Contract Documents at its expense.

If Sensitive Security Information ("SSI") is provided to the Contractor, the Contractor shall be required to comply with Department of Aviation, Standard Policies and Procedures No. 6003, "Contractor Protection of Sensitive Security Information," or its successor, and 49 C.F.R. § 1520, or its successor.

The City will not supply any copies of the General Contract Conditions to the Contractor at City expense.

SC-3 REVISIONS TO G.C. 201

The second sentence of General Condition 201 is amended to read: "The unit

responsible for this management and control is the Planning & Development Office under the supervision of the Deputy Manager of Aviation for Maintenance and Planning & Development.”

SC-4 CITY LINE OF AUTHORITY AND CONTACTS

In accordance with General Condition 214, the City's line of authority for administration of this Contract is:

Manager of Aviation (the “Manager” under G.C. 112). The Manager of Aviation is Kim Day, Executive Office, 9th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

Deputy Manager of Aviation for Planning & Development (the “Deputy Manager” under G.C. 109), who reports to the Manager. The Deputy Manager is David Rhodes, Planning & Development Office, 7th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

Assistant Manager of Aviation for Planning & Development (the “Assistant Manager”), reports to the Deputy Manager. The Project Manager reports to the Assistant Manager. The Assistant Manager is Michael Steffens Planning & Development Division, 7th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

Project Manager, the City representative who has day to day administrative responsibility of this Contract, and who reports to the Deputy Manager. All notices, requests, pay applications (pursuant to G.C. 902), and other correspondence from the Contractor shall be sent to the assigned Project Manager unless otherwise provided in this Contract. The Project Manager for this Contract is: Robert Nichols, Planning & Development Office, 7th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249, phone 303-342-2200.

The Manager may from time to time substitute a different City official as the designated “Deputy Manager” hereunder, and any such change will be effective upon the issuance of written notice to the Contractor which identifies the successor Deputy Manager. The Deputy Manager may from time to time change the assigned Project Manager, and any such change will be effective upon the issuance of written notice to the Contractor which identifies the successor Project Manager.

SC-5 CONTRACTOR PERFORMANCE; SUBCONTRACTING

With respect to General Condition 501, no more than 30% of the work may be subcontracted.

SC-6 COOPERATION WITH OTHERS

The Technical Specifications describe the constraints on the physical work site areas. These descriptions are not exhaustive and the Contractor is required to coordinate its activities and work as may be required to meet FAA or City requirements while performing work on DIA.

Without limiting the foregoing, the following contracts administered by the City involve

or may involve work overlapping or adjoining the Work under this Contract, and may be prosecuted concurrently with the Work performed under this Contract. There may also be other adjoining or overlapping contracts which are not listed.

Contract No.	Description
TBD	RW 16L/34R Concrete Rehabilitation
201103917	2012 Airfield Joint Rehabilitation
TBD	Denver Water Taxiway AA Vault Improvements

SC-7 PROSECUTION AND COMPLETION OF THE WORK:

The Work to be performed under the Contract is described in the Technical Specifications and Contract Drawings. The Contractor shall complete the Work within one hundred thirty (130) calendar days from Notice to Proceed.

The Work to be performed under the Contract is divided into the following Milestone Areas which are described in the Technical Specifications or Contract Drawings. The Contractor shall complete the work included within these areas within the number of days set forth below:

Milestone	Date of Completion (or, days from NTP)
1.	32Days
2.	45Days
3.	130Days

SC-8 LIQUIDATED DAMAGES

If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time, the Contractor shall be liable to the City for liquidated damages at the rate of \$3,000.00 per day until substantial completion is achieved. [Additionally, if the Contractor fails to substantially complete the Work described in a project Milestone within the time specified in SC-7 PROSECUTION AND COMPLETION OF THE WORK, the Contractor shall be liable to the City for liquidated damages at the following rates per day until such substantial completion is achieved:

Failure to substantially complete the Work described in Milestone:

	Amount per day
1.	\$3000.00
2.	\$3000.00
3.	\$3000.00

Article IV of the Contract and General Condition 602 cover payment and withholding of liquidated damages.

SC-9 SECURITY AND PERSONNEL ACCESS

The Contractor shall conduct all its activities at the Airport in compliance with the Airport security system, which is administered by the Airport Operations Division. The Contractor shall obtain the proper access authorizations for its employees, subcontractors and suppliers (i.e., Badges and Permits), and shall be responsible for

such persons' compliance with all the Airport rules and regulations, including those regarding security. A copy of the Contractors' section of the Airport Security rules and regulations are available for Contractor review at the Airport Access Services Office, Concourse A East Subcore, 4th Level. Persons regularly entering the construction areas must obtain personnel access from the Airport Access Services Office and must display same upon entering and be prepared to display same while onsite. Any employee, subcontractor or supplier who violates such rules may be subject to revocation of his access authorization, including authorization for access to secured areas.

The security status of the Airport is subject to change without notice. These contract Special Conditions are applicable to the current security status of the Airport. Should the security status of the Airport change at any time during the term of this Contract, a written notice shall be issued to the Contractor detailing all applicable security modifications. The Contractor shall take **immediate steps** to comply with those security modifications.

If these security modifications involve any additional project cost, the Contractor shall submit a Contractor Change Request in accordance with the General Conditions for the additional cost. The Contractor Change Request shall outline in specific detail the effects of the security modifications on the Contractor's performance of the Contract, and shall provide a detailed cost breakdown for each item for which the Contractor is requesting reimbursement.

The Contractor shall return to the City, at contract completion or termination, or upon demand by the City, all access keys issued to it by the City to security critical areas of the Airport. If the Contractor fails to return any such key or keys at contract completion or termination or upon demand by the City, the Contractor shall be liable to the City for all the City's costs, including the City's labor costs for employees, incurred in re-coring doors and any other work which is required to prevent compromise of the Airport security system. In order to collect such costs hereunder, the City may withhold funds in such amount from any amounts due and payable to the Contractor under this Contract.

SC-10 CONSTRUCTION ACCESS

The work site(s) is(are) located at the Terminal Apron, De-Ice Pad A, Taxiway H, Taxiway M, and the southern section of Taxiway P. The Contractor shall have access to the work site via Gate 7 and Gate 10.

The City will not provide parking spaces for the Contractor's employees or subcontractor employees at the Airport. Arrangements for transportation and parking for all of its and its subcontractors employees will be the responsibility of the Contractor. The Total Contract Bid Amount or Contract Amount shall include any and all costs associated with the Contractor's and subcontractors' employee parking. Information about parking facilities and charges is available from the Airport Parking Office. Refundable deposits are required for all parking passes.

Unless specifically required by the Contract Documents, the Contractor shall install no fences or other physical obstructions on or around any project work area without the approval of the City.

SC-11 VEHICLE PERMITTING

Vehicle access on the Airport Operation Area ("AOA") is controlled by and requires permission from the Airport Access Services Office. It is not anticipated that the Contractor will need to operate vehicles on the AOA to perform the Work. Only direct construction support vehicles and/or equipment will be allowed in the contractor's work areas or sites.

SC-12 VENDORS AND SUPPLIERS

The Contractor shall provide the Project Manager's office with a list of its equipment/material vendors and suppliers. Vendors or suppliers shall access the construction work areas via the Contractor's access route, described in SC-10 above. All delivery vehicles are subject to search.

SC-13 SITE COMMUNICATIONS

Any site communications at DIA must be approved by DIA Operations.

SC-14 USE, POSSESSION OR SALE OF ALCOHOL OR DRUGS

The Contractor and its officers, agents, and employees shall cooperate and comply with the provisions of Executive Order No. 94 and Attachment A thereto concerning the use, possession, or sale of alcohol or drugs. Violation of these provisions or refusal to cooperate with implementation of the policy can result in the City's barring the Contractor from City facilities or participating in City operations.

SC-15 ATTORNEY'S FEES

Colorado Revised Statute 38-26-107 requires that in the event any person or company files a verified statement of amounts due and unpaid in connection with a claim for labor and materials supplied on this project, the City shall withhold from payments to the Contractor sufficient funds to insure the payment of any such claims. Should the City and County of Denver be made a party to any lawsuit to enforce such unpaid claims or any lawsuit arising out of or relating to such withheld funds, Contractor agrees to pay to the City its costs and a reasonable attorney's fee. Because the City Attorney Staff does not bill the City for legal services on an hourly basis, Contractor agrees a reasonable fee shall be computed at the rate of one hundred dollars per hour of City Attorney time.

SC-16 INSURANCE TO BE PROVIDED BY THE CONTRACTOR

In accordance with the provisions of Title 16 of the General Conditions, the minimum insurance requirements for this contract are set forth in the Sample Insurance Certificate attached to these Special Conditions. The Contractor specifically agrees to comply with each condition, requirement or specification set forth in the attachment for each required coverage during all periods when the required coverage's are in effect.

Contractor and sub-contractors shall procure and maintain until all of their obligations have been discharged, including any warranty periods under this Contract are satisfied, insurance against claims for injury to persons or damage to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or sub-contractors.

The insurance requirements herein are minimum requirements for this Contract and in no way limit the indemnity covenants contained in this Contract.

The City and County of Denver in no way warrants that the minimum limits contained herein are sufficient to protect the Contractor from liabilities that might arise out of the performance of the work under this Contract by the Contractor, his agents, representatives, employees or sub-contractors. The Contractor shall assess its own risks as it deems appropriate and/or prudent, maintain higher limits and/or broader coverages. The Contractor is not relieved of any liability or other obligations assumed or pursuant to the Contract by reason of its failure to obtain or maintain insurance in sufficient amounts, duration or types.

Contractor shall furnish the City and County of Denver with certificates of insurance (ACORD form or equivalent approved by CCD) as required by this Contract. The certificates for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf.

All certificates and any required endorsements are to be received and approved by the City before work commences. Each insurance policy required by this Contract must be in effect at or prior to commencement of work under this Contract and remain in effect for the duration of the project. Failure to maintain the insurance policies as required by this Contract or to provide evidence of renewal is a material breach of the Contract. All insurance coverages for sub-contractors shall be subject to the minimum requirements identified in the Exhibit. All sub-contractors certificates and endorsements shall be received and approved by the Contractor before work commences. The City reserves the right to request copies of these certificates at any time.

All certificates required by this Contract shall be sent directly to Denver International Airport, Business & Technologies, Airport Office Building, Room 8810, 8500 Pena Boulevard, Denver, Colorado 80249. The City project/Contract number and project description shall be noted on the certificate of insurance. The City reserves the right to require complete, certified copies of all insurance policies required by this Contract at any time.

The parties hereto understand and agree that the City and County of Denver, its officers, officials and employees, are relying on, and do not waive or intend to waive by any provisions of this Contract, the monetary limitations or any other rights, immunities and protections provided by the Colorado Governmental Immunity Act, §§ 24-10-101 - 120, C.R.S., or otherwise available to the City and County of Denver, its officers, officials and employees.

SC-17 SUBCONTRACTOR RELEASES

The release form referred to in General Condition 907 is attached to these Contract

Documents. It is entitled "Denver International Airport Partial Release."

SC-18 REVISIONS TO G.C. 210

General Contract Condition 210 is amended to read as follows:

"210 DIVISION OF SMALL BUSINESS OPPORTUNITY

"The Director of the Division of Small Business Opportunity (DSBO) (formerly known as the "Mayor's Office of Contract Compliance"), or persons under the Director's administrative control, will review the employment practices of the Contractor and all levels of Subcontractors and Suppliers, and the utilization by the Contractor of Small Business Enterprises (SBE) and/or Disadvantaged Business Enterprises (DBE), in connection with work performed under the Contract. The reviews will be made to determine whether or not all applicable rules, regulations, ordinances, and laws governing equal employment opportunity, affirmative action programs and SBE and DBE requirements are complied with. The DSBO is a division of the Mayor's Office of Economic Development. The City's SBE program requirements are found at Section 28-201 *et. seq.*, of the Denver Revised Municipal Code."

SC-19 ADDITIONAL AFFIRMATIVE ACTION REQUIREMENTS, FEDERAL PROVISIONS

This contract is subject and subordinate to the terms, reservations, restrictions, and conditions of any existing or future agreements between the City and the United States, the execution of which has been or may be required as a condition precedent to the transfer of federal rights or property to the City for airport purposes, and the expenditure of federal funds for airport purposes. The "Federal Requirements" section attached hereto is made a part of this Contract.

SC-20 APPLICATIONS FOR PROGRESS PAYMENTS; G.C. 902.3

General Condition 902.3 is amended to read as follows:

"3. The Contractor shall prepare an estimate of Work completed on application for progress payment forms supplied by the Project Manager. These forms shall be completed in the computerized format or such format as required by of the Technical Specifications. The Contractor shall submit with the application for progress payment a monthly progress report and a schedule showing actual progress to date compared with scheduled progress and the releases required by G.C. 902. The Project Manager after the receipt of each application of progress payment review the application and either recommend to the Deputy Manager such amounts as the Project Manager reasonably determines are due or notify the Contractor in writing of the reasons withholding his approval as provided in G.C. 904. The estimate, when recommended by the Project Manager and signed by the Deputy Manager, establishes the total amount due the Contractor. From this estimate are deducted sums already paid and sums to be withheld. This estimate is then attached to a standard City payment voucher. The estimate of Work completed and the payment voucher, are then sent to the Auditor of the City where a pre-audit examination (including Contractor's and subcontractor's payrolls) is conducted, and upon approval by the Auditor, a warrant is issued."

SC-21 ESTIMATED QUANTITIES OF UNIT PRICED ITEMS

The "total estimated quantity" of each unit price item as stated on the bid schedules shall be the estimated quantity which is used to determine the percentage of change in such item for purposes of G.C. 1104.7

SC-22 REVISIONS TO G.C. 1901

General Condition 1901, "Notice of Substantial Completion," is revised to read as follows:

"When the Contractor considers that the Work is substantially complete as defined in G.C. 119, the Contractor shall notify the Project Manager in writing that the Work is ready for inspection and shall include with its Notice Of Substantial Completion of the Work a list of minor items to be completed or corrected that would not affect beneficial occupancy."

SC-23 REVISIONS TO G.C. 1102

G.C. 1102.2 is amended by replacing the phrase "Change Request" in all its occurrences in such G.C. with the phrase "Change Notice."

G.C. 1102.3 is amended by replacing the phrase "Field Order/Change Directive" in all its occurrences in such G.C. with the phrase "Change Directive."

SC-24 LISTING OF "ACCEPTABLE MANUFACTURERS"

The Technical Specifications list "Acceptable Manufacturers" for certain products. Such listing identifies manufacturers of certain products which have been determined by a preliminary review to be able to meet the basic product and/or system technical requirements. The listing is not intended to provide a blanket endorsement or acceptance of the manufacturer's specified products or product line. All products from listed manufacturers must meet the detailed requirements of the Technical Specifications. Products that do not meet all detailed Technical Specifications are not acceptable and will be rejected, regardless of whether the manufacturer was listed as "acceptable." The Contractor is responsible for determining the acceptability of all products under the Technical Specifications prior to submission of products for approval.

SC-25 SUBCONTRACTOR ACCEPTANCE, G.C. 502.1

General Condition 502.1 is amended to read as follows:

"1. Except as provided in the City's Small Business and Disadvantaged Business Enterprise (SBE/DBE) contracting requirements, the city recognizes that prior to bidding, the bidder may not have been able to negotiate for all portions of the Work which the bidder proposes to subcontract. The City will, therefore, permit the successful bidder to propose additional Subcontractor(s) at any time during the Contract period, provided, however, that any limitation on subcontracting has not been exceeded, and that all such SBE/DBE requirements

are adhered to. If the proposed Subcontractor(s) are acceptable and the City, by letter to the Contractor, approves of the Subcontractor(s), the Contractor may enter into agreements with these parties. If any proposed Subcontractor(s) are not acceptable to the City, the Contractor must submit for City approval the names of substitute Subcontractors."

SC-26 ADDITIONAL WITHHOLDING OF PROGRESS PAYMENTS, G.C. 909.1(F)

General Condition 909.1(F) is amended to read as follows:

"F. Failure to comply with affirmative action, equal employment opportunity, Small Business Enterprise, or Disadvantaged Business Enterprise requirements set forth in the Contract."

SC-27 REPORTING WAGES PAID, G.C. 1004.2

General Condition 1004.2 is amended to read as follows:

"2. Two (2) sets of these payroll records are required. The original shall be transmitted to the Auditor of the City and County of Denver and a copy shall be sent to the Division of Small Business Opportunity."

SC-28 DISPUTES, G.C. 1301.1 and 1301.2

General Conditions 1301.1 and 1301.2 are amended to read as follows:

"1. All disputes of any nature whatsoever regarding the Contract, including without limitation Contractor claims for additional compensation or extensions of Contract Time, and disputes involving claimed breach of or default under the Contract, shall be resolved by an administrative hearing. Such administrative hearing shall be conducted pursuant to the procedures set out in D.R.M.C §56-106 for Public Works Department Contracts, and pursuant to the procedures set out in D.R.M.C §5-17 for Department of Aviation Contracts. With respect to appropriate issues arising under the City's Ordinances governing small business enterprise (SBE) contracting, or any disadvantaged business enterprise (DBE) contracting program mandated by the federal government, the proceeding shall be conducted pursuant to D.R.M.C §28-33.

"2. If either party raises a question concerning whether any issue or claim raised in such administrative proceeding is within the scope of the Contract's dispute resolution provisions, including this GC 1301, such question shall be decided by the Hearing Officer assigned to hear the matter, if any, or by the Manager of Public Works, Manager of Aviation, or Director of the Division of Small Business Opportunity, as the case may be, if such official intends to personally conduct the administrative hearing."

SC-29 TERMINATION OF CONTRACT FOR CAUSE, G.C. 2201.1(J)

General Condition 2201.1(J) is amended to read as follows:

"J. If the Contractor fails to comply with affirmative action or small business

enterprise or disadvantaged business enterprise (SBE/DBE) requirements;"

SC-30 ACCESSIBLE PARKING SPACES, ACCESS AISLES AND ROUTES OF TRAVEL

If any Work is performed in or adjacent to parking facilities at the Airport, the Contractor is responsible for compliance with this SC-30. "Accessible" parking spaces and access aisles as used in this SC-30 mean parking spaces and access aisles which are accessible for, and reserved for use by, persons with disabilities. These parking spaces and access aisles are designed and built to standards established by federal regulations implementing the Americans with Disabilities Act of 1990 ("ADA"), and are marked by signage. "Accessible routes of travel" as used herein means routes through parking facilities which comply with ADA accessibility standards, including degree of slope and absence of obstructions.

Accessible routes of travel and accessible parking spaces and access aisles must be kept free of obstructions and construction debris at all times. No accessible parking spaces or access aisles or accessible routes of travel shall be relocated, blocked or rendered unusable unless the contractor has obtained specific advance approval in writing for such actions from the airport's ADA Compliance Officer.

When prosecution of the Work requires that accessible spaces be temporarily blocked, those accessible spaces and their access aisles shall be temporarily relocated to another location as close as possible to an accessible building entrance. Temporary signage that identifies these parking spaces and access aisles as reserved for the handicapped shall be installed, and the accessible route shall be clearly marked as required.

Before blocking or relocating accessible parking spaces or accessible routes of travel, the contractor must obtain written approval from the DIA ADA Compliance Officer, by submitting a completed request form, which will be provided to the Contractor by the Project Manager at the preconstruction meeting if it is not included as a standard form in Section 01999 of the Technical Specifications. The request shall include the location of alternative spaces and/or routes, and specifications of the temporary signage to be used. Work shall not proceed without this approval.

If a vehicle is parked in any accessible space which is either temporary or approved to be relocated, the contractor will not remove signage or take any other action which would allow the access aisle for such parking space to be blocked. Such actions must be postponed until the parking space is no longer occupied.

SC-31 NO EMPLOYMENT OF ILLEGAL ALIENS TO PERFORM WORK UNDER THE AGREEMENT:

A. The Agreement is subject to Den. Rev. Mun. Code 20-90 and the Consultant is liable for any violations as provided in the ordinance.

B. The Consultant certifies that:

(1) At the time of its execution of this Agreement, it does not knowingly

employ or contract with an illegal alien who will perform work under this Agreement.

(2) It will participate in either the E-Verify Program, as defined in § 8 17.5-101(3.7), C.R.S., to confirm the employment eligibility of all employees who are newly hired for employment to perform work under this Agreement.

C. The Consultant also agrees and represents that:

(1) It shall not knowingly employ or contract with an illegal alien to perform work under the Agreement.

(2) It shall not enter into a contract with a subcontractor that fails to certify to the Consultant that it shall not knowingly employ or contract with an illegal alien to perform work under the Agreement.

(3) It has confirmed the employment eligibility of all employees who are newly hired for employment to perform work under this Agreement, through participation in the E-Verify Program.

(4) It is prohibited from using the E-Verify Program procedures to undertake pre-employment screening of job applicants while performing its obligations under the Agreement.

(5) If it obtains actual knowledge that a subcontractor performing work under the Agreement knowingly employs or contracts with an illegal alien, it will notify such subcontractor and the City within three days. The Consultant will also then terminate such subcontractor if within three days after such notice the subcontractor does not stop employing or contracting with the illegal alien, unless during such three day period the subcontractor provides information to establish that the subcontractor has not knowingly employed or contracted with an illegal alien.

(6) It will comply with any reasonable request made in the course of an investigation by the Colorado Department of Labor and Employment under authority of § 8-17.5-102(5), C.R.S. or the City Auditor under authority of Den. Rev. Mun. Code 20-90.3.

SC-32 RETAINAGE, G.C. 908

General Condition 908 is amended to read as follows:

The City shall deduct and retain a total of five percent (5%) from the total amount of approved applications for payment, including Change Orders. The City may also deduct in addition to retainage as stated above, the additional amount(s) of any and all outstanding claims pursuant to CRS §38-26-107 from each approved application for payment.

**CITY AND COUNTY OF DENVER
RULES AND REGULATIONS AND BID CONDITIONS
OF THE
MANAGER OF PUBLIC WORKS**

**PERTAINING TO EQUAL EMPLOYMENT OPPORTUNITY
IN THE CITY AND COUNTY OF DENVER**

APPROVED FOR LEGALITY

APPROVED AND ADOPTED:

/s/

/s/

Attorney for the City and County of Denver

Manager of Public Works

Adopted and Published Pursuant to Article III, Division 2 of Chapter 28
of the
Revised Municipal Code
of the
City and County of Denver

These Rules and Regulations cancel
and supercede any and all previously
issued Rules and Regulations on the Subject.

Revised November 1, 1990

**RULES AND REGULATIONS
REGARDING
EQUAL EMPLOYMENT OPPORTUNITY**

Promulgated and adopted by the Manager of Public Works pursuant to and by authority of Article III, Division 2, Chapter 28 of the Revised Municipal Code of the City and County of Denver, and for the purpose of insuring that contractors, subcontractors and suppliers soliciting and receiving compensation for contract work from or through the City and County of Denver provide equal opportunity in employment without regard to race, color, creed, sex, national origin, age religion, material status, political opinion or affiliation or mental or physical handicap and meet certain requirements for the hiring, training, promotion, and treatment during employment of members of ethnic groups subject to differential treatment, including persons of African descent (Black), Spanish-surnamed (Hispanic), Asian-American and American Indian Groups.

RULE I – DEFINITIONS

“City” means the City and County of Denver.

“Manager means the Manager of Public Works for the City and County of Denver.

“Contract” means a contract entered into with the City and County of Denver, financed in whole or in part by local resources or funds of the City and County of Denver, for the construction of any of any public building or prosecution or completion of any public work.

- D. “Contractor” means the original party to a contract with the City and County of Denver, also referred to as the "general" or "prime" contractor.
- E. “Director” means the Director of Contract Compliance.
- F. “Subcontractor” means any person, company, association, partnership, corporation, or other entity which assumes by subordinate agreement some or all of the obligations of the general or prime contractor.
- G. “Bidding Specifications” as used in Article III, Division 2 of Chapter 28 of the Revised Municipal Code shall include BID CONDITIONS, INVITATION T BID, and NOTICE OF PROPOSAL.
- H. “Affirmative Action Program” means a set of specific and result-oriented procedures or steps to which a contractor commits himself to apply every good faith effort to employ members of ethnic minority groups, to include persons of African descent (Black), Spanish surnamed (Hispanic), Asian-American, American Indians, and persons with mental or physical handicap.
- I. “Office of Contract Compliance” means the City agency established pursuant to Article III, Division 1 of Chapter 28 of the Denver Revised Municipal Code.

RULE II – NOTICE OF HEARING

When results of conciliation efforts are unsatisfactory to the Manager and he is informed in accordance with Article III, Division 2 of Chapter 28 of the Denver Revised Municipal code that a contractor or subcontractor has apparently failed to meet affirmative action and equal employment opportunity requirements after a reasonable period of notice to correct deficiencies, the Manager will, prior to imposition of any sanctions, afford the general contractor a hearing in order to determine whether the contractor or his subcontractors have failed to comply with the affirmative action and equal employment opportunity requirements of Article III, Division 2 of Chapter 28 of the Denver Revised Municipal Code or of the contract. Written notice of such hearing shall be delivered personally or sent by certified mail, return receipt requested, to the contractor and to any subcontractor involved, at least ten (10) days prior to the date scheduled for the hearing.

RULE III – HEARING

- A. Contractors will appear at hearings and may be represented by counsel, and may present testimony orally and other evidence.
- B. Hearings shall be conducted by one or more hearing examiners designated as such by the Manager.
- C. The Director of Contract Compliance may participate in hearings as a witness.
- D. Hearings shall be held at the place specified in the notice of hearing.
- E. All oral testimony shall be given under oath or affirmation and a record of such proceedings shall be made.
- F. All hearings shall be open to the public.
- G. The hearing officer shall make recommendations to the Manager, who shall make a final decision.

REGULATIONS

REGULATION NO. 1 - ORDINANCE

The Rules and Regulations of the Manager shall be inserted in the bidding specifications for every contract for which bidding is required.

REGULATION NO. 2 - EXEMPTIONS

Each contract and subcontract, regardless of the dollar amount, shall be subject to affirmative action requirements unless specifically exempted in writing individually by the Manager. Exemptions apply only to "affirmative action" in equal employment opportunity, and are not to be construed as condonation in any manner of "discrimination" or "discriminatory practices" in employment because of race, color, creed, sex, age, national origin, religion, marital status, political opinion or mental or physical handicap.

REGULATION NO. 3 - DIRECTOR OF CONTRACT COMPLIANCE

The Director of Contract Compliance shall perform the duties assigned to such official by Article III, Division 2 Chapter 28 of the Denver Revised Municipal Code and by the Manager. The Director of Contract Compliance or designated representatives shall inform bidders and contractors of affirmative action procedures, programs, and goals in accordance with the Ordinance at pre-bid and pre-construction conference; (2) make regular on-site inspections; (3) supply contractors and subcontractors with report forms to be completed by them when requested, and furnished to the Director of Contract Compliance; and (4) review payroll records, employment records and practices of general contractors and their subcontractors and suppliers during the performance of any contract. The Director of Contract Compliance shall promptly report apparent affirmative action deficiencies to the Manager.

REGULATION NO. 4 - GOALS AND TIMETABLES

In general, goals and timetables should take into account anticipated vacancies and the availability of skills in the market place from which employees should be drawn. In addition, where discrimination in employment by a general contractor or any of his subcontractors is indicated, a corrective action program will take into account the need by the general contractor and his subcontractors to correct past discriminatory practices and reach goals of minority manpower utilization on a timely basis through such recruiting and advertising efforts as are necessary and appropriate.

REGULATION NO. 5 - AWARD OF CONTRACTS.

It shall be the responsibility of the Director of Contract Compliance to determine the affirmative action capability of bidders, contractors and subcontractors and to recommend to the Manager the award of contracts to those bidders, contractors and subcontractors and suppliers who demonstrate the ability and willingness to comply with the terms of their contract.

REGULATION NO. 6 - PUBLICATION AND DUPLICATION.

Copies of these Rules and Regulations as amended by the Manager from time to time, shall as soon as practicable and after Notice being published will be made a part of all City Contracts.

REGULATION NO. 7 - NOTICE TO PROCEED.

Prior to issuance of the Notice to Proceed, a sign-off will be required of the Director of Contract Compliance or his designee.

REGULATION NO. 8 - CONTRACTS WITH SUBCONTRACTORS.

To the greatest extent possible, the contractor shall make a good faith effort to contract with minority contractors, subcontractors and suppliers for services and supplies by taking affirmative actions which include but are not limited to the following:

1. Advertise invitations for subcontractor bids in minority community news media.
2. Contact minority contractor organizations for referral of prospective subcontractors.

3. Purchase materials and supplies from minority material suppliers.

REGULATION NO. 9 - AGENCY REFERRALS.

It shall be no excuse that the union with which the contractor or subcontractor has an agreement providing for referral, exclusive or otherwise, failed to refer minority employees.

REGULATION NO. 10 - CLAUSES.

The Manager shall include the appropriate clauses in every contract, and the contractor shall cause to be inserted in every subcontract the appropriate clauses:

1. APPENDIX A: City and County of Denver Equal Opportunity Clause - ALL CONTRACTS funded only with City and County of Denver monies.
2. APPENDIX B: Equal Opportunity Clause (11246) - ALL FEDERAL ASSISTED.
3. APPENDIX C: Section 3 - Assurance of Compliance - HUD ASSISTED PROJECTS.
4. APPENDIX D: Section 3 - Clause - HUD ASSISTED PROJECTS.

REGULATION NO. 11 - SHOW CAUSE NOTICES.

When the Manager has reasonable cause to believe that a contractor has violated Article III, Division 2 of Chapter 28 of the Denver Revised Municipal Code, he may issue a notice requiring the contractor to show cause within 15 days why enforcement procedures, or other appropriate action to insure compliance, should not be instituted.

REGULATION NO. 12 - BID CONDITIONS - AFFIRMATIVE ACTION REQUIREMENTS - EQUAL EMPLOYMENT OPPORTUNITY.

1. APPENDIX E: The Bid Conditions - Affirmative Action Requirements - Equal Employment Opportunity as amended and published by the U.S. Department of Labor Employment Standards Administration, Office of Federal Contract Compliance, shall be inserted verbatim for bidding specification in every non-exempt contract involving the use of federal funds.
2. APPENDIX F: The Bid Conditions - Affirmative Action Requirements - Equal Employment Opportunity as published by the Department of Public Works, City and County of Denver, shall be inserted verbatim as bidding specifications for every non-exempt contract using City funds.

APPENDIX B

EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

[To be included in all federal AIP construction contracts in excess of \$10,000]

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedure authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
7. The contractor will include the portion of the sentence immediately preceding paragraph

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

NOTICES TO BE POSTED PER PARAGRAPH (1) AND (3) OF THE EEO CLAUSE

EQUAL EMPLOYMENT OPPORTUNITY IS THE LAW

**Discrimination is Prohibited by
the Civil Rights Act of 1964
and by Executive Order No. 11246**

Title VII of the Civil Rights Act of 1964

Administered by: The Equal Employment Opportunity Commission

Prohibits discrimination because of Race, Color, Religion, sex, or National Origin by Employers with 25 or more employees, by Labor Organizations with a hiring hall of 25 or more members, by Employment Agencies, and by Joint Labor-Management Committees for Apprenticeship or Training.

ANY PERSON who believes that he or she has been discriminated against SHOULD CONTACT:

The Equal Employment Opportunity Commission (EEOC)
2401 E Street, NW
Washington, D.C. 20506

Executive Order No. 11256

Administered by: The Office of Federal Contract Compliance Programs

Prohibits discrimination because of Race, Color, Religion, Sex, or National Origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment, by all Federal Government Contractors and Subcontractors, and by Contractors Performing Work Under a Federal Assisted Construction Contract, regardless of the number of employees in either case.

ANY PERSON who believes that he or she has been discriminated against SHOULD CONTACT:

The Office of Federal Contract Compliance Programs
U. S. Department of Labor
Washington, D.C. 20210

APPENDIX E

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246, as amended)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area are as follows:

Timetables: Until Further Notice

Goals:

- (a) Minority Participation in Each Trade: 13.8 percent
- (b) Female Participation in Each Trade: 6.9 percent

These goals are applicable to all the contractor's construction work (whether or not it is Federal or Federally-assisted) performed in the covered area. If the contractor performs construction work in a geographic area located outside of the covered area, it shall apply the goal established for such geographic area where the work is actually performed. With regard to this second area, the contractor also is subject to the goal for both its Federally involved and non-Federally involved construction.

The contractor's compliance with the executive order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goal. The hours of minority employment and training must be substantially uniform throughout the length of the contract, and in each grade, and the contractor shall make a good faith effort to employ minorities evenly on each of its projects. The transfer of minority employees or trainees from contractor to contractor or from project to project, for the sole purpose of meeting the contractor's goal, shall be a violation of the contract, the executive order, and the regulations in 41 CFR Part 60-4. Compliance with the goal will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director, OFCCP, within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employee identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographic area in which the contract is performed.
4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is the City and County of Denver, Colorado.

STANDARD FEDERAL ASSURANCES

NOTE: As used below the term "contractor" shall mean and include the "Party of the Second Part," and the term "sponsor" shall mean the "City".

During the term of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

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

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

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

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

5. Sanctions for Noncompliance. In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor shall impose such contract sanctions as it or the FAA may determine to be appropriate, including, but not limited to:

a. Withholding of payments to the contractor under the contract until the contractor complies, and/or

b. Cancellation, termination, or suspension of the contract, in whole or in part.

6. Incorporation of Provisions. The contractor shall include the provisions of paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the sponsor or the FAA may direct as a means of enforcing such provisions including sanctions for

noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION
CONTRACT SPECIFICATIONS (41 CFR 60-4.3)
(VERSION 2, 4/23/90)**

1. As used in these specifications:

- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
- b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;
- c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
- d. "Minority" includes:
 - (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);
 - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the contractor has a collective bargaining agreement to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246 or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the contractor during the training period and the contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason

therefore along with whatever additional actions the contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or female sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do

so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor union, contractor community, or other similar groups of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's and failure of such a group to fulfill an obligation shall not be a defense for the contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally,) the contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.

10. The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and

cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

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FEDERAL REQUIREMENTS

FAA-1 GENERAL CONTRACT CLAUSES

The following general contract clauses are hereby incorporated into the Contract Documents. The word "Sponsor," when it is used herein, means the City and County of Denver.

FAA-1.1 AIP PROJECT

The work in this Contract will be undertaken and accomplished by the City and County of Denver in accordance with the with the terms and conditions of a grant agreement between the City and County of Denver and the United States under the Federal Airports Act (49 U.S.C. 1101) and part 51 of the Federal Aviation Regulations (14 CFR Part 151), pursuant to which the United States has agreed to pay a certain percentage of the costs of the project that are determined to be allowable project costs under that Act. The United States is not a party to this contract and no reference in this contract to the FAA or any representative thereof, or to any rights granted to the FAA or any representative thereof, or the United States, by the contract, makes the United States a party to this contract.

FAA-1.2 CONSENT TO ASSIGNMENT

The contractor shall obtain the prior written consent of the City and County of Denver to any proposed assignment of any interest in or part of this Contract.

FAA-1.3 CONVICT LABOR

No convict labor may be employed under this Contract.

FAA-1.4 VETERANS PREFERENCE

In the employment of labor (except in executive, administrative and supervisory positions), preference shall be given to qualified individuals who have served in the military service of the United Sates (as defined in Section 101(1) of the Soldiers' and Sailors' Civil Relief Act of 1940) and have been honorably discharged from that service, except that preference may be given only where that labor is available locally and is qualified to perform the work to which the employment relates. In the employment of labor (except in executive, administrative and supervisory positions), preference shall be given to veterans of the Vietnam era and disabled veterans. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

FAA-1.5 WITHHOLDING

Whether or not payments or advances to the City and County of Denver are withheld or suspended by the FAA, the City and County of Denver may withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics employed by the Contractor or any subcontractor on the work the full amount of wages required by this Contract.

FAA-1.6 NONPAYMENT OF WAGES

If the Contractor or subcontractor fails to pay any laborer or mechanic employed or working on the site of the work any of the wages required by this Contract the City and County of Denver may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment or advance of funds until the violations cease.

FAA-1.7 FAA INSPECTION AND REVIEW

The Contractor shall allow any authorized representative of the FAA to inspect and review any work or materials used in the performance of this Contract.

FAA-1.8 BREACH OF CONTRACT TERMS – SANCTIONS

Any violation or breach of the terms of this contract on the part of the Contractor or subcontractor may result in the suspension or termination of this Contract or such other action which may be necessary to enforce the rights of the parties to this Contract.

FAA-1.9 RIGHTS TO INVENTIONS

All rights to inventions and materials generated under this Contract are subject to regulations issued by the FAA and the City and County of Denver. Information regarding these rights is available from the FAA and the City and County of Denver.

FAA-1.10 SUBCONTRACTS

The Contractor shall insert in each of its subcontracts:

- (i) the provisions contained in paragraphs FAA-1.1 through FAA-1.9, FAA-1.13, FAA-2.1 through FAA-2.5, FAA-3.1 and 3.2, FAA-4.1 through FAA-4.10, FAA-5.1 through FAA-5.5, and FAA-6.1 through FAA-6.7;

- (ii) the Equal Opportunity Clause, specifications and notices set forth in Appendix B, "Notices to be Posted Per Paragraphs (1) and (3) of the EEO Clause," and Appendix E, "Notice of Requirements for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246, as amended)" of the Equal Employment Opportunity provisions of this Contract;
- (iii) the Davis-Bacon prevailing wage rates which are attached to the Instructions to Bidders; and
- (iv) a clause requiring the subcontractors of all tiers to include these provisions in any lower tier of subcontracts.

The Contractor shall submit to the City and County of Denver the certification attached hereto as "FAA Exhibit A." This certification shall be signed by each subcontractor and submitted to the City before the subcontractor commences work.

FAA-1.11 TERMINATION OF CONTRACT – 14 CFR §151.49

A breach of paragraphs FAA-1.6, FAA-1.7, or FAA-1.10 may be grounds for termination of the Contract.

FAA-1.12 TERMINATION OF CONTRACT – 49 CFR PART 18

1. The City and County of Denver may, by written notice, terminate this Contract in whole or in part at any time, either for the City's convenience or because of failure to fulfill the Contract obligations. Upon receipt of such notice, services shall be immediately discontinued (unless the notice directs otherwise) and all materials as may have been accumulated in performing this Contract, whether completed or in progress, delivered to the City.
2. If the termination is for the convenience of the City, an equitable adjustment in the Contract Price shall be made, but no amount shall be allowed for anticipated profit on unperformed services.
3. If the termination is due to failure to fulfill the Contractor's obligations, the City may take over the Work and prosecute the same to completion by contract or otherwise. In such case, the Contractor shall be liable to the City for any additional cost occasioned to the City.
4. If, after notice of termination for failure to fulfill contract obligations, it is determined that the Contractor had not so failed, the termination shall be deemed to have been effected for the convenience of the City. In such event, adjustment in the Contract Price shall be made as provided in Paragraph 2 of this clause.

5. The rights and remedies of the City provided in this clause are in addition to any other rights and remedies provided by law or under this Contract.

FAA-1.12 BUY AMERICAN – STEEL AND MANUFACTURED PRODUCTS

1. The Aviation Safety and Capacity Expansion Act of 1990 provides that preference be given to steel and manufactured products produced in the United States when funds are expended pursuant to a grant issued under the Airport Improvement Program. The Contractor shall deliver only domestic steel and manufactured products under this Contract as defined in paragraph 2 below, subject to the exceptions in paragraph 3 below.
2. The following terms apply to this clause:
 - (a) Steel and manufactured products. As used in this clause, steel and manufactured products include (i) those produced in the United States or (ii) a manufactured product produced in the United States, if the cost of its components mined, produced or manufactured in the United States exceeds 60 percent of the cost of all its components and final assembly has taken place in the United States. Components of foreign origin of the same class or kind as the products referred to in subparagraphs 3(a) or 3(b) shall be treated as domestic.
 - (b) Components. As used in this clause, components means those articles, materials, and supplies incorporated directly into steel and manufactured products.
 - (c) Cost of components. This means the costs for production of the components, exclusive of the final assembly labor costs.
3. The Contractor shall assure that only domestic steel and manufactured products will be used by the Contractor, subcontractors, material men and suppliers in the performance of this Contract, except those
 - (a) that the U.S. Department of Transportation has determined, under the Aviation Safety and Capacity Expansion Act of 1990, are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality;
 - (b) that the U.S. Department of Transportation has determined, under the Aviation Safety and Capacity Expansion Act of 1990, that domestic preference would be inconsistent with the public interest; or
 - (c) that inclusion of domestic material will increase the cost of the overall project contract by more than 25 percent.

FAA-1.13 INSPECTION OF RECORDS – 49 CFR PART 18

The contractor shall maintain an acceptable cost accounting system. The sponsor, the FAA, the Comptroller General of the United States, or any of their duly authorized representatives, shall be allowed access to any books, documents, papers, and records of the contractor which are directly pertinent to this Contract for the purpose of making audit, examination, excerpts, and transcriptions. The contractor shall maintain all required records for three years after the City and County of Denver makes final payment and all other pending matters are closed.

FAA-1.14 LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

No Federal appropriated funds shall be paid, by or on behalf of the contractor, 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 the making of any Federal grant and the amendment or modification of any Federal grant.

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 any Federal grant, the contractor shall complete and submit Standard Form-LLL, "Disclosure of Lobby Activities," in accordance with its instructions.

FAA-2 CIVIL RIGHTS ACT OF 1964, TITLE VI; 49 CFR PART 21 – CONTRACTUAL 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:

FAA-2.1 COMPLIANCE WITH REGULATIONS

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

FAA-2.2 NONDISCRIMINATION

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

FAA-2.3 SOLICITATIONS FOR SUBCONTRACTS, INCLUDING PROCUREMENTS OF MATERIALS AND EQUIPMENT

In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

FAA-2.4 INFORMATION AND REPORTS

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

FAA-2.5 SANCTIONS FOR NONCOMPLIANCE

In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor shall impose such contract sanctions as it or the FAA may determine to be appropriate, including, but not limited to:

- a. Withholding of payments to the contractor under the contract until the contractor complies, and/or
- b. Cancellation, termination, or suspension of the contract, in whole or in part.

FAA-2.6 INCORPORATION OF PROVISIONS

The contractor shall include the provisions of paragraphs FAA-2.1 through 2.5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the sponsor or the FAA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

FAA-2.7 NONDISCRIMINATION IN AIRPORT EMPLOYMENT OPPORTUNITIES

The contractor assures that it will comply with pertinent statutes, Executive orders and such rules as are promulgated to assure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or handicap be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision obligates the Contractor or its transferee for the period during which Federal assistance is extended to the airport program, except where Federal assistance is to provide, or is in the form of personal property or real property or interest therein or structures or improvements thereon. In these cases the provision obligates the party or any transferee for the longer of the following periods: (a) the period during which the property is used by the airport sponsor or any transferee for a purpose for which Federal assistance is extended, or for another purpose involving the provision of similar services or benefits or (b) the period during which the airport sponsor or any transferee retains ownership or possession of the property. In the case of contractors, this provision binds the contractors from the bid solicitation period through the completion of the contract.

It is unlawful for airport operators and their lessees, tenants, concessionaire and contractors to discriminate against any person because of race, color, national origin, sex, creed, or handicap in public

services and employment opportunities.

FAA-3 DBE STATEMENT

FAA-3.1 POLICY

It is the policy of the Department of Transportation that disadvantaged business enterprises as defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this agreement. Consequently, the DBE requirements of 49 CFR Part 26 apply to this agreement.

FAA-3.2 DBE OBLIGATION

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

FAA-3.3 PROMPT PAYMENT

The Contractor agrees to pay each subcontractor in accordance with City and County of Denver Revised Municipal Code Sec 20-107, et. seq. prompt payment to Contractors, Vendors, Suppliers of goods and Services to City and lessors of City. This clause applies to both DBE and non-DBE subcontractors and suppliers.

FAA-4 DAVIS BACON REQUIREMENTS – 29 CFR PART 5

FAA-4.1 MINIMUM WAGES

(1) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to laborers or mechanics, subject to the provisions of subparagraph a(4) below; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraph d of this clause. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph a(2) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and his subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(2) (i) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(A) The work to be performed by the classification requested is not performed by a classification in the wage determination;

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

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

(ii) If the contractor and the laborers and mechanics to be employed in the

classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days or receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215- 0140).

(iii) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140).

(iv) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (2)(ii) or (iii) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

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

(4) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB control number 1215-0140).

FAA-4.2 WITHHOLDING

The FAA or the sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject

to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of work, all or part of the wages required by the contract, the Federal Aviation Administration may after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

FAA-4.3 PAYROLLS AND BASIC RECORDS.

(1) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under paragraph a(4) of this clause that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB control numbers 1215-0140 and 1251-0017).

(2) (i) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph c(1) above. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB control number 1215-0149).

(ii) Each payroll submitted shall be accompanied by a "Statement of

Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(A) That the payroll for the payroll period contains the information required to be maintained under paragraph c(1) above and that such information is correct and complete;

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

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

(iii) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph c(2)(ii) of this section.

(iv) The falsification of any of the above certifications- may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(3) The contractor or subcontractor shall make the records required under paragraph c(1) of this section available for inspection, copying or transcription by authorized representatives of the sponsor, the Federal Aviation Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

FAA-4.4 APPRENTICES AND TRAINEES

(1) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an

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

(2) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any

trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

FAA-4.5 COMPLIANCE WITH COPELAND ACT REQUIREMENTS

The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

FAA-4.6 SUBCONTRACTS

The contractor or subcontractor shall insert in any subcontracts the clauses contained in paragraphs FAA-4.1 through FAA-4.10 of this contract and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

FAA-4.7 CONTRACT TERMINATION: DEBARMENT

A breach of the contract clauses in paragraphs a through j of this clause and paragraphs a through e of the fifth clause below may be grounds for termination of the contract, and for the debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

FAA-4.8 COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REQUIREMENTS

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

FAA-4.9 DISPUTES CONCERNING LABOR STANDARDS

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth

in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of his subcontractors) and the contracting agency, the U.S. Department of Labor or the employees or their representatives.

FAA-4.10 CERTIFICATION OF ELIGIBILITY

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

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

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

FAA-5 CONTRACT WORK HOURS AND SAFETY STANDARDS – 29 CFR PART 5

As used in the following, the term "laborers" and "mechanics" include watchmen and guards.

FAA-5.1 OVERTIME REQUIREMENTS

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek, whichever is greater.

FAA-5.2 VIOLATION; LIABILITY FOR UNPAID WAGES; LIQUIDATED DAMAGES

In the event of any violation of the clause set forth in section FAA-5.1, the contractor or any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph a above, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph a above.

FAA-5.3 WITHHOLDING FOR UNPAID WAGES AND LIQUIDATED DAMAGES

The Federal Aviation Administration or the sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph b above.

FAA-5.4 SUBCONTRACTS

The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs a. through d and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall

be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs a through d.

FAA-5.5 WORKING CONDITIONS

No contractor or subcontractor may require any laborer or mechanic employed in the performance of any contract to work in surroundings or under working conditions that are unsanitary, hazardous or dangerous to his health or safety as determined under construction safety and health standards (29 CFR Part 1926) issued by the Department of Labor.

FAA-6 FAA REQUIRED SUPPLEMENTAL INFORMATION AND INSTRUCTIONS TO BIDDERS

The following clauses are hereby incorporated into the Contract Documents and specifically into the Instructions to Bidders which constitute a portion of such Contract Documents.

FAA-6.1 THE CITY AND COUNTY OF DENVER: NOTICE OF NON-DISCRIMINATION

The City and County of Denver, in accordance with Title V of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.C. 2000d to 12000d-4 and Title 49, Code of Federal Regulations, Part 21, nondiscrimination in Federally-assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, socially and economically disadvantaged business enterprises will be afforded full opportunity to submit proposals in response to this invitation and will not be discriminated against on the grounds of race, color, creed, sex, or national origin in consideration for an award.

FAA-6.2 FURNISHING OF INFORMATION

When a determination has been made to award a contract or subcontract to a specific contractor, such contractor is required, prior to the award or after the award, or both, to furnish such other information as the FAA, the sponsor, or the Director of the Office of Federal Contract Compliance (OFCC) requests.

FAA-6.3 REPORT TO JOINT REPORTING COMMITTEE

A bidder must indicate whether he has previously had a contract subject to the equal opportunity clauses, whether he has filed all report forms required in such contract, and if not, a compliance report (Standard Form (SF) 100) must be submitted with his bid.

Any contractor having a Federal or Federally-assisted contract of 50,000 or more and 50 or more employees is required to file annual compliance reports on Standard Form 100 (EE0-1) with the Joint Reporting Committee in accordance with the instructions provided with the form. The contractor will provide a copy of such a report to the contracting agency within 30 days after the award of a contract if he has not submitted a complete compliance report within 12 months preceding the date of the award.

The contractor shall require its subcontractors to file an SF- 100 within 30 days after award of the subcontract if (1) it is not exempt from the provisions of these regulations in accordance with 60-1.5, (2) it has 50 or more employees, (3) it is first tier subcontractor, and (4)) it has a subcontract amounting to \$50,000 or more.

Subcontractors below the first tier which perform construction work at the site of

construction shall be required to file such a report if (1) it is not exempt from the provisions of these regulations in accordance with 60-1.5, (2) has 50 or more employees and has a subcontract amounting to \$50,000 or more.

The SF-100 is available at the following address:

Joint Reporting Committee
P.O. Box 779
Norfolk, Virginia 23501
Phone: (804) 461-1213

FAA-6.4 CERTIFICATION OF NONSEGREGATED FACILITIES

1. A Certification of Non-segregated Facilities must be submitted prior to the award of a Federally-assisted construction contract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.
2. Contractors receiving Federally-assisted construction contract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the following notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATION OF NONSEGREGATED FACILITIES

1. A Certification of Non-segregated Facilities must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.
2. Contractors receiving subcontract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

FAA-6.5 CLEAN AIR AND WATER POLLUTION CONTROL REQUIREMENTS

Contractors and subcontractors agree:

1. That any facility to be used in the performance of the contract or to benefit from the contract is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities.
2. To comply with all requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations

issued thereunder.

3. That as a condition for award of a contract they will notify the awarding official of the receipt of any communication from EPA indicating that a facility to be utilized for performance of or benefit from the contract is under consideration to be listed on the EPA List of Violating Facilities.
4. To include or cause to be included in any contract or subcontract which exceeds \$100,000 the aforementioned criteria and requirements.

FAA-6.6 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION - 49 CFR PART 29

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

FAA-6.7 TRADE RESTRICTION CLAUSE - 49 CFR PART 30

The contractor or subcontractor, by submission of an offer and/or execution of a contract, certifies that it:

- a. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);
- b. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list;
- c. has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.

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

Further, the contractor agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in each contract and in all lower tier subcontracts. The contractor may rely on the certification of a prospective subcontractor unless it has knowledge that the certification is erroneous.

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

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

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

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

FAA EXHIBIT A

**CERTIFICATION OF INCLUSION OF LABOR & EEO
REQUIREMENTS IN SUBCONTRACTS**

AIP Project No.: _____ **Airport:** DENVER INTERNATIONAL AIRPORT

Subcontract Dollar Amount: _____

The prime contractor whose signature appears below certifies that a subcontract was awarded on _____ to _____ to perform the following work: _____

All of the required clauses and certifications referred to in paragraph FAA-1.8 are incorporated into the subcontract.

SIGNATURE Date

NAME AND TITLE [PRINT OR TYPE]

**~~~~~
APPLICABLE TO SUBCONTRACTS OVER \$2,000 AND AS NOTED:**

The SUBCONTRACTOR whose signature appears below certifies that the following provisions of the prime contract of the above AIP project are incorporated into and made a part of its subcontract:

- | | |
|--|---|
| (1) Standard Equal Employment Opportunity Clauses and Specifications (if over \$10,000) | (11) Withholding of Funds for Unpaid Wages and Liquidated Damages |
| (2) Davis Bacon Act | (12) Working Conditions |
| (3) Goals and Timetables for Minority and Female Participation (if over \$10,000) | (13) Subcontracts |
| (4) Standard Assurance Provision required by 14 CFR Part 152, subpart B, "Non-discrimination in Airport Aid Program" | (14) Contract Termination – Debarment |
| (5) Minimum Wages and Wage Rates | (15) General Contract Clauses |
| (6) Payrolls and Records | (16) Regulatory Clauses relating to Non-discrimination |
| (7) Apprentices and Trainees | |
| (8) Compliance with Copeland Regulations | |
| (9) Contract Work Hours and Safety Standards | |
| (10) Violations: Liability for Unpaid Wages; Liquidated Damages | |

[SEE NEXT PAGE FOR CONTINUATION OF SUBCONTRACTOR
CERTIFICATION AND SIGNATURE]

The subcontract also contains the Certificate of Non-Segregated Facilities as a part of said subcontract.

The subcontractor whose signature appears below also acknowledges his responsibility under the subcontract for including these clauses in any lower tier subcontract.

SIGNATURE Date

NAME AND TITLE [PRINT OR TYPE]

SOURCES OF LABOR RECEIVING STANDARD FORM 36 "NOTICE OF
NONDISCRIMINATION IN EMPLOYMENT": _____

EXHIBIT A

STANDARD FEDERAL ASSURANCES
ATTACHMENT 1

NOTE: As used below the term "contractor" shall mean and include the "Party of the Second Part," and the term "sponsor" shall mean the "City".

During the term of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

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

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

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

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

5. Sanctions for Noncompliance. In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor shall impose such contract sanctions as it or the FAA may determine to be appropriate, including, but not limited to:

- a. Withholding of payments to the contractor under the contract until the contractor complies, and/or
- b. Cancellation, termination, or suspension of the contract, in whole or in part.

6. Incorporation of Provisions. The contractor shall include the provisions of

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

EXHIBIT B

NONDISCRIMINATION IN AIRPORT EMPLOYMENT OPPORTUNITIES

The Party of the Second Part assures that it will comply with pertinent statutes, Executive Orders and such rules as are promulgated to assure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or handicap be excluded from participating in any activity conducted with or benefiting from Federal assistance. This Provision obligates the Party of the Second Part or its transferee for the period during which Federal assistance is extended to the airport program, except where Federal assistance is to provide, or is in the form of personal property or real property or an interest therein or structures or improvements thereon. In these cases, this Provision obligates the Party of the Second Part or any transferee for the longer of the following periods: (a) the period during which the property is used by the sponsor or any transferee for a purpose for which Federal assistance is extended, or for another purpose involving the provision of similar services or benefits; or (b) the period during which the airport sponsor or any transferee retains ownership or possession of the property. In the case of contractors, this Provision binds the contractors from the bid solicitation period through the completion of the contract.

It is unlawful for airport operators and their lessees, tenants, concessionaires and contractors to discriminate against any person because of race, color, national origin, sex, creed, or handicap in public services and employment opportunities.

EXHIBIT C

Certification for Contracts, Grants, Loans and Cooperative Agreements

The Contractor certifies by execution of this Agreement to the best of its knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Contractor 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 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 Contractor shall complete and submit Standard Form-LLL, "Disclosure of Lobby Activities," in accordance with its instructions.

(3) The Contractor shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients 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 transaction is a prerequisite for making or entering to 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.

**DENVER INTERNATIONAL AIRPORT
PARTIAL RELEASE**

DEPARTMENT OF AVIATION

**FINAL/PARTIAL RELEASE AND CERTIFICATE OF PAYMENT
(SUBCONTRACTOR/SUPPLIER)**

(CITY PROJECT NAME AND NUMBER)	Date: _____, 200__ .
(NAME OF CONTRACTOR)	Subcontract #: _____ .
	Subcontract Value: \$ _____ .
(NAME OF SUBCONTRACTOR/SUPPLIER)	Last Progress Payment: \$ _____ . Date: _____ .
Check Applicable Box: <input type="checkbox"/> DBE <input type="checkbox"/> SBE	Total Paid to Date: \$ _____ . Date of Last Work: _____ .

The Undersigned hereby certifies that all costs, charges or expenses incurred by the undersigned or on behalf of the undersigned for any work, labor or services performed and for any materials, supplies or equipment provided on the above referenced Project or used in connection with the above referenced Subcontract (the "Work Effort") have been duly paid in full.

The Undersigned further certifies that each of the undersigned's subcontractors and suppliers that incurred or caused to be incurred, on their behalf, costs, charges or expenses in connection with the undersigned's Work Effort on the above referenced Project have been duly paid in full.

In consideration of \$_____ representing the Last Progress Payment referenced above and in further consideration of the Total Paid to Date, also referenced above, and other good and valuable consideration received and accepted by the undersigned this ____ day of _____, 200__, the Undersigned hereby releases and discharges the City and County of Denver (the "City"), the above referenced City Project, the City's premises and property and the above referenced Contractor from all claims, liens, rights, liabilities, demands and obligations, whether known or unknown, of every nature arising out of or in connection with the performance of the work effort.

As additional consideration for the payments referenced above, the undersigned agrees to defend, indemnify and hold harmless the City, its officers, employees, agents and assigns and the above-referenced Contractor from and against all costs, losses, damages, causes of action, judgments under the subcontract and expenses arising out of or in connection with any claim or claims against the City or the Contractor which arise out of the Undersigned's performance of the Work Effort and which may be asserted by the Undersigned or any of its suppliers or subcontractors of any tier or any of their representatives, officers, agents, or employees.

It is acknowledged that this release is for the benefit of and may be relied upon by the City and the referenced Contractor.

The foregoing shall not relieve the undersigned of any obligation under the provisions of the Undersigned's subcontract, as the subcontract may have been amended, which by their nature survive completion of the Undersigned's work effort including, without limitation, warranties,

guarantees, insurance requirements and indemnities.

STATE OF COLORADO) ss. CITY OF _____)	_____ (Name of Subcontractor)
Signed and sworn before me this day of _____, 200 .	By:
Notary Public/Commissioner of Oaths My Commission Expires _____ .	Title:

INSURANCE CERTIFICATE

**CITY AND COUNTY OF DENVER
CERTIFICATE OF INSURANCE FOR DEPARTMENT OF AVIATION**

Original COI

Advice of Renewal

Change

Party to Whom this Certificate is Issued:

Name and Address of Insured:

CITY AND COUNTY OF DENVER
Attn: Risk Management, Suite 8810
Manager of Aviation
Denver International Airport
8500 Peña Boulevard, Room 8810
Denver CO 80249

CONTRACT NAME & NUMBER TO WHICH THIS INSURANCE APPLIES: 201204726 – Annual Airfield Pavement Rehabilitation

I. MANDATORY COVERAGE

Colorado Workers' Compensation and Employer Liability Coverage

Coverage: COLORADO Workers' Compensation

Minimum Limits of Liability (In Thousands)

WC Limits: \$100, \$500, \$100

And Employer's Liability Limits:

Any Policy issued under this section must contain, include or provide for the following:

1. All States Coverage or Colorado listed as a covered state for the Workers' Compensation
2. Waiver of Subrogation and Rights of Recovery against the City and County of Denver (the "City"), its officers, officials and employees.

Commercial General Liability Coverage

Coverage: Commercial General Liability (coverage at least as broad as that provided by ISO form CG0001 or equivalent)

Minimum Limits of Liability (In Thousands):

Each Occurrence:	\$1,000
General Aggregate Limit:	\$2,000
Products-Completed Operations Aggregate Limit:	\$2,000
Personal & Advertising Injury:	\$1,000
Fire Damage Legal - Any one fire	\$1,000

Any Policy issued under this section must contain, include or provide for the following:

1. City, its officers, officials and employees as additional insureds, per ISO form CG2010 and CG 2037 or equivalents.
2. Coverage for defense costs of additional insureds outside the limits of insurance, per CG0001.
3. Liability assumed under an Insured Contract (Contractual Liability).
4. The full limits of coverage must be dedicated to apply to this project/location, per ISO form CG2503 or equivalent.
5. Waiver of Subrogation and Rights of Recovery, per ISO form CG2404 or equivalent.
6. Separation of Insureds Provision required
7. General Aggregate Limit Applies Per: Policy ___ Project ___ Location ___, if applicable

Business Automobile Liability Coverage

Coverage: Business Automobile Liability (coverage at least as broad as ISO form CA0001)

Minimum Limits of Liability (In Thousands): Combined Single Limit \$1,000

Any Policy issued under this section must contain, include or provide for the following:

1. Symbol 1, coverage for any auto. If no autos are owned, Symbols 8 & 9, (Hired and Non-owned) auto liability.
2. If this contract involves the transport of hazardous cargo such as fuel, solvents or other hazardous materials may occur, then Broadened Pollution Endorsement, per ISO form CA 9948 or equivalent and MCS 90 are required.

II. ADDITIONAL COVERAGE

Umbrella Liability

Coverage:

Umbrella Liability, Unescorted airside access		
Minimum Limits of Liability (In Thousands)	Each Occurrence and aggregate	\$9,000

Any Policy issued under this section must contain, include or provide for the following:

1. City, its officers, officials and employees as additional insureds.
2. Coverage in excess of, and at least as broad as, the primary policies in sections WC-1, CGL-1, and BAL-1.
3. **If operations include unescorted airside access at DIA, then a \$9 million Umbrella Limit is required.**

III. ADDITIONAL CONDITIONS

It is understood and agreed, for the benefit of the City, that the following additional conditions shall apply to all coverage specified herein

- All coverage provided herein shall be primary and any insurance maintained by the City shall be considered excess.
- With the exception of professional liability and auto liability, a Waiver of Subrogation and Rights of Recovery against the City, its officers, officials and employees is required for each coverage period.
- The City shall have the right to verify or confirm, at any time, all coverage, information or representations contained herein, and the insured and its undersigned agent shall promptly and fully cooperate in any such audit the City may elect to undertake.
- Advice of renewal is required.
- All insurance companies issuing policies hereunder must carry at least an A -VI rating from A.M. Best Company or obtain a written waiver of this requirement from the City's Risk Administrator.
- Compliance with coverage requirement by equivalent herein must be approved in writing by the City's Risk Administrator prior to contract execution.
- No changes, modifications or interlineations on this Certificate of Insurance shall be allowed without the review and approval of the Risk Administrator prior to contract execution.

NOTICE OF CANCELLATION

It is understood and agreed that should any Policy issued hereunder be cancelled or non-renewed before the expiration date thereof, or sustain a material change in coverage adverse to the City, the issuing company or its authorized Agent shall give notice to the Department of Aviation in accordance with policy provisions.



DENVER
INTERNATIONAL
AIRPORT

PROJECT MANUAL

2012 ANNUAL AIRFIELD
PAVEMENT
REHABILITATION

CONTRACT NUMBER: 201204726

TECHNICAL SPECIFICATIONS

PART II

DIVISIONS 1 & 2

ISSUED FOR BID
February 2012

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION

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2012 ANNUAL AIRFIELD JOINT REHABILITATION

TECHNICAL SPECIFICATIONS

DIVISION 01 - GENERAL REQUIREMENTS

01010 - Summary of Work
01012 - Referenced Material
01014 - Work Sequence and Constraints
01015 - Security Requirements
01016 - Vehicle and Equipment Permitting
01020 - Utilities Interface
01025 - Measurement for Payment
01050 - Layout of Work and Surveys
01051 - Project Coordination
01060 - Regulatory Requirements
01070 - Abbreviations and Symbols
01091 - Reference Standards
01095 - Definitions and Conventions
01110 - Construction Safety
01111 - Construction Safety - Airside
01200 - Project Meetings
01300 - Submittals
01310 - Schedule (LP)
01340 - Shop and Working Drawings, Product Data and Samples
01370 - Schedule of Values
01400 - Contractor Quality Control
01401 – Independent Testing Agency
01403 – Contractor Quality Control Program
01404 - DIA Quality Assurance for FAA Funded Projects
01410 – Cutting and Patching
01500 - Temporary Facilities
01505 - Mobilization
01566 - Environmental Controls
01575 – Electrical Phasing
01576 - Traffic Control
01580 - Temporary Signs
01620 - Storage and Protection
01630 – Substitutions
01650 – System Startup, Testing and Training
01700 - Contract Closeout
01710 - Cleaning
01720 - Contract Record Documents
01730 – Operation and Maintenance Data
01740 - Warranties and Bonds
01999 - Standard Forms
CSPP - Construction Safety and Phasing Plan with Appendixes

DIVISION 02 – TECHNICAL SPECIFICATIONS

GP-110 Method of Estimating Percentage of Material Within Specification Limits (PWL)
GP-120 Nuclear Gages
P-150 Demolition

P-151 Clearing and Grubbing
P-152 Excavation and Embankment
P-153 Watering
P-161 Geotextile
P-162 Controlled Low-Strength Material (CLSM)
P-301 Soil-Cement Base Course
P-304 Cement-Treated Base Course
P-401 Plant Mix Bituminous Pavement
P-403 Asphalt-Treated Permeable Base
P-501 Portland Cement Concrete Pavement
P-603 Bituminous Tack Coat
P-604A Preformed Expansion Joint Seals
P-605 Joint Sealing Filler
P-606 Adhesive Compounds
P-610 Structural Portland Cement Concrete
P-620 Runway and Taxiway Painting and Signage
D-751 Manholes, Catch Basins, Inlets, and Inspection Holes
L-100 Lighting and Electrical Work
L-108 Airport Underground Cable
L-110 Airport Underground Duct
L-125 Airport Lighting System
606 Tensioned Cable Barrier

APPENDIX

Appendix A – Measurement and Payment

Exhibit E – DIA Recycle Yard Pricing

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this contract consists of furnishing all management, supervision, labor, materials, tools, equipment, services, testing and incidentals for the construction of the Work indicated in the contract documents including lump sum items and unit price items.

1.02 WORK BY OTHERS

- A. The Contractor is hereby notified that there may be other construction activities now and in the future within the project areas and adjacent to the worksites throughout the duration of this contract. The Contractor is responsible for keeping apprised of other projects and worksites and how they may affect the work.
- B. The Contractor shall maintain contact with the City and with other contractors to schedule work to minimize the effect of such construction activities on other site activities. The Contractor shall also maintain, at the direction of the Project Manager, contact with tenants to ensure minimal disruption to tenant operations.

1.03 FUTURE WORK

- A. . The Contractor is hereby notified that there may be other future construction activities within the project and adjacent to the worksites that are scheduled after completion of this contract. It is the Contractor's responsibility to keep apprised of such projects and how they may affect the Work.

1.04 SITE CONDITIONS

- A. The Contractor acknowledges satisfaction as to the nature and location of the Work, all of the general and local conditions, particularly those bearing upon availability of transportation, access to the site, disposal, handling and storage of materials, availability of labor, water, power, roads, and uncertainties of weather, or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during work, and all other matters that can in any way affect the work or the cost thereof under this contract.
- B. The Contractor further acknowledges, by submission of a bid and on each Work Request bid, satisfaction as to the character, quality and quantity of all surface and subsurface materials and all features on top of the surface or at worksites that would be encountered from his inspection of the site and from reviewing available records of exploratory work furnished by the City. Failure by the Contractor to become acquainted with the physical conditions of the sites and all the available information will not relieve the Contractor from responsibility for properly estimating the difficulty or cost of performing the Work.
- C. The Contractor warrants that as a result of examination and investigation of all the aforesaid

data and the site, that the Contractor can perform the Work in a good and workmanlike manner and to the satisfaction of the City. The City assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this contract unless such representation is expressly stated in the contract.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONTRACTOR'S DUTIES

- A. Except as otherwise specified, furnish the following to the full extent required by the contract:
 - 1. Labor, superintendence, supervision and products.
 - 2. Construction equipment, tools, machinery and materials.
 - 3. Utilities required for construction and related activities.
 - 4. Other facilities and services necessary to properly execute and complete the Work, including security for worksite, testing and storage and protection of all materials awaiting incorporation into the Work, providing a safe working environment for workers, City and County of Denver representatives, and the public in accordance with all local, state and federal requirements.
- B. Prosecute the Work as specified and in a timely manner. Submit a schedule of Work that will be performed at times other than during the eight-hour working day of Monday through Friday, daylight hours. Submit this schedule five working days prior to the beginning of Work to the Project Manager for review and acceptance. Approval to work at night may be obtained after Contractor presents a written program outlining special precautions to be taken to control the extraordinary hazards presented by night work. That program shall include, but not limited to, supplementary lighting of work areas, availability of medical facilities, security precautions and noise limitations.

3.02 COORDINATION

- A. Coordinate prosecution of the Work with those public utilities, governmental bodies, private utilities and other contractors performing work on and adjacent to the worksites. Eliminate or minimize delays in the Work and conflicts with those utilities, bodies and contractors. Schedule governmental, private utility and public utility work that relies upon survey points, lines and grades established by the Contractor to occur immediately after those points, lines and grades have been established. Confirm coordination measures for each individual case with the City in writing.
- B. In the coordination effort of work by others, the Contractor shall obtain and refer to equipment locations and other layouts, as available, to avoid interface problems.
- C. The City reserves the right to permit access to the site of the Work for the performance of work by other contractors and persons at such times that the City deems proper. The exercise of such reserved right shall in no way or to any extent relieve the Contractor from liability for loss and damage to the work due to or resulting from its operations or from responsibility for complete execution of the Contract. The Contractor shall cooperate with other contractors and persons in all matters requiring common effort.

3.03 CONTRACTOR USE OF WORKSITE

- A. Confine worksite operations to areas permitted by law, ordinances, permits and the contract.
- B. Consider the safety of the Work and that of the people and property on and adjacent to the worksite when determining amount, location, movement and use of materials and equipment on worksite.
- C. Do not load worksite with equipment and products that would interfere with the Work. Only equipment, tools or materials required for this Work may be stored at the worksite.
- D. Protect products, equipment and materials stored on worksite.
- E. Relocate stored products, equipment and materials which interfere with operations of City, government bodies, public and private utilities, and other contractors.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this section including any and all necessary relocations requested by the City. The cost of the work described in this section shall be included in the applicable multiplier or bid items contract price.

END OF SECTION 01010

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SECTION 01012

REFERENCED MATERIAL

PART 1 - GENERAL

1.01 REFERENCED MATERIAL

- A. The following documents may be available for examination at the Owner's offices unless otherwise noted. The referenced material and documents are not part of the contract documents unless otherwise specified. For further information, contact Robert Brent Nichols, telephone (303) 342-2656, at least ten calendar days prior to the scheduled bid opening or after Notice to Apparent Low Bidder. Unless otherwise noted, copies of referenced material may be purchased.
1. Environmental Impact Statement (EIS)
 2. Geotechnical Reports
 - a. Borings, other field and laboratory explorations and investigations have been made to indicate subsurface materials at particular locations. Explorations and investigations conducted by designers and their subconsultants are solely for the purpose of study and design.
 - b. The subsurface exploration and investigation information is presented or made available to indicate some of the conditions that may be encountered during construction and is offered as supplementary information only. Geotechnical information presented in the referenced material represents the opinion of soils consultants as to the character of the materials encountered. Subsurface information was directly obtained only at the specified location and necessarily indicates subsurface conditions only at the respective plan location, depths penetrated and only at the time of the exploration.
 - c. Neither the City nor the Designers assume any responsibility whatever in respect to the sufficiency or accuracy of borings made, or of the logs of test borings, or of other investigations, or of the interpretations made thereof, and there is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations are representative of those existing throughout such area, or any part thereof, or that unforeseen developments may not occur. It is expressly understood that the making of deductions, interpretations and conclusions from all of the accessible factual information, including the nature of the materials to be excavated, the difficulties of doing other work affected by the geology, groundwater elevations and other subsurface conditions at the site of the Work are the Contractor's sole responsibility.
 - d. Information derived from inspection of logs of borings, topographic maps, technical memorandum, reports or plans showing information of the subsurface of site conditions will not relieve the Contractor from any risk or from properly examining the site and making such additional investigations as he may elect or from properly fulfilling all the terms of the contract documents.
 3. Available Geotechnical Reports: None

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01012

SECTION 01014

WORK SEQUENCE AND CONSTRAINTS

PART 1 - GENERAL

1.01 OTHER WORK

- A. Other concurrent construction contracts with which the Contractor must interface are described elsewhere in the Contract Documents. Refer to Technical Specifications Section 01310 and the Special Conditions for specific work constraints and milestones.

1.02 WORK SEQUENCE

- A. The work sequence shall be in compliance with Phasing, Sequencing and Milestones as indicated in the Contract Documents and in accordance with the approved Construction Schedule developed by the Contractor. The schedule shall be in compliance with requirements indicated in the Special Conditions and Technical Specifications Section 01014 Work Sequence and Constraints. The Construction Schedule is described in Technical Specifications Section 01310 Schedule.

1.03 WORK CONSTRAINTS

A. Site Constraints

1. Access to the project shall be generally as indicated in the Contract Documents. Access shall be organized and planned by the Contractor to ensure no disruption of airline or DIA operations.
2. Access to work sites will be strictly monitored and must comply with DIA Airport Operations and FAA Regulations. The Contractor shall provide monitoring and escorts as required by DIA Operations in the area of the work.
3. The Contractor's staging area will be as indicated in the Construction Documents.
4. Contractor employee parking will not be allowed within the existing revenue control system. To access the Terminal building, Contractor employees may use the DIA Landside Employee Parking Lot located on 78th Avenue at a cost of \$30.00 per month per employee. A free DIA shuttle to the Terminal is available from this Lot. Material for work in the Terminal may be brought in through the Terminal Loading Dock accessed via Gate 1. Employee and material access to the Concourses will be via Gate 5.
5. The Contractor shall use the haul routes specified in the plans.
6. If required, the Contractor shall provide a bus and driver to transport the Contractor's employees between the designated employee parking area and the work sites. No separate payment will be made for this bus and driver. The cost shall be included in the bid item "Mobilization". The bus driver shall be provided at all times when Contractor employees are working on the project.

B. System Interruptions

1. The Contractor shall submit on approved forms through the Project Manager to DIA Maintenance Control any written requests for system interruptions such as fire alarm, HVAC, electrical, water systems or other systems. System interruptions shall not be

considered if the interruptions interfere with airport operations or tenant operations. Interruptions or system shut down shall be limited to between the hours of 11:00 p.m. and 5:30 a.m. Baggage system shutdown shall be limited to between the hours of 10:00 p.m. and 4:00 a.m. and in accordance with Technical Specifications Section 01014, paragraph 1.03.F. Roadway shutdown times are to be coordinated with Airport Operations and the DIA Project Manager prior to submitting a request for approval to shutdown a roadway.

2. The request forms shall be submitted only during the normal work week (Monday through Friday) between 8:00 a.m. and 4:00 p.m.
3. Upon approval of a system shutdown, the Contractor representatives and the individuals performing the work shall remain at the worksite and shall remain in contact with Maintenance Control until such time as the system is restored to working condition. The requesting party shall assume liability for the system until the system is restored to proper working order.
4. Fire Systems, HVAC, and Plumbing: Submit requests five working days prior to the time of requested interruption.
5. Electrical System Interruptions: Submit requests five working days prior to the time of requested interruption.

C. Airfield Operations at Denver International Airport

1. Full airport and aircraft operations are underway adjacent to this project. Contractors are required to obtain a Contractor Participant Manual from the Security Manager and must follow the guidelines in the manual. Copies of the Contractor section of the manual are available for review at the Denver International Airport Access Services Office.
 - a. If any Work contains requirements for Work activities or access through or in the restricted area, reference Technical Specifications Section 01015 and 01016 for requirements.
 - b. If not in a restricted area, the Contractor personnel still must be badged; reference Technical Specifications Section 01015.

D. CONDUCT OF PERSONS USING THE DENVER MUNICIPAL AIRPORT SYSTEM

1. Contractor activities shall comply with Airport Operations and Regulation 130 TRAFFIC and 20 CONDUCT OF PERSONS USING THE DENVER MUNICIPAL AIRPORT SYSTEM shall be followed. These regulations are available from Airport Operations at Denver International Airport.

E. OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION

1. All work shall be accomplished in accordance with FAA Advisory Circular AC150/5370-2F, "Operational Safety on Airports During Construction", FAR Part 139 and FAR Part 107 except as herein modified.

F. BAGGAGE SYSTEM SHUTDOWN AND LOCKOUT: Prior to and during work in any area that requires access adjacent to, under, or above baggage systems, the Contractor shall coordinate with baggage system representatives of United Airlines and DIA:

1. Work in these areas shall be limited to between the hours of 10:00 p.m. and 4:00 a.m. The Contractor shall schedule and plan activities within these areas during the shutdown to ensure removal of personnel and equipment within the time frame as indicated in this Technical Specifications Section. The Contractor shall not have access

to the work areas requiring shutdown and lockout during a limited number of selected days. The Contractor shall coordinate with the Project Manager and United Airlines representatives to develop detail scheduling on a day-to-day basis.

2. Scheduling for Shutdown and Lockout: The Contractor shall maintain an on-going one week look-ahead schedule of shutdown/lockout requests including areas identified on plan diagrams. This look-ahead schedule shall be provided daily to the Project Manager and United Airlines representative.
3. Sequence of Shutdown and Lockout
 - a. 10:00 p.m. Shutdown and Lockout. Prior to 10:00 p.m., the Contractor's Superintendent and the Contractor's Safety Representative shall meet with United Airlines baggage system representatives and DIA representatives to review the areas or zones to be inactivated to allow the Contractor to proceed with work.
 - 1) Baggage Mechanical Systems Lockout. United Airlines representatives in conjunction with the Contractor representatives shall install barriers provided by United Airlines on baggage system tracks to isolate the zone of the Contractor's work. The barriers are to ensure no baggage system cart intrusion into the area. Protection of equipment and other barriers are to be provided by the Contractor.
 - 2) Baggage Electrical Systems Lockout. A representative from United Airlines, in conjunction with Contractor representatives, shall place locks on power cabinets supporting baggage equipment for the identified contractor work zone. Each party shall provide a lock.
 - 3) The Contractor may begin work in baggage system zones after the Contractor's Safety Representative has confirmed lockdown and lockout have been completed. The Contractor shall begin work by first providing covers and protection of baggage system and building systems to preclude damage during the Contractor activities. DIA and/or United Airlines representatives prior to the Contractor beginning work shall review all protection systems for acceptance.
 - b. System Activation: The system shall be activated at 4:00 a.m. Before 4:00 a.m. the Contractor shall begin clearance and removal of equipment, materials, barriers, and personnel in areas and envelopes of the baggage system. The Contractor shall take all steps to ensure that all baggage systems envelopes are clear of personnel, protective coverings, and equipment prior to 4:00 a.m. The Contractor's safety representative shall contact the United Airlines representative and shall inspect areas of work to ensure removal by the Contractor of all personnel, materials and equipment between 3:30 a.m. and 4:00 a.m. At 4:00 a.m. the baggage system will be activated. After this time until the next shift (10:00 p.m.), Contractor personnel or equipment shall not be mobilized in the area of the baggage system (generally in the envelope above 8'0" in the basements).

G. Welding Equipment, Procedures and Constraints

1. Natural gas-powered portable welders or "Powcon Inverter" welders are the only acceptable welding equipment to be used inside of building basement or tunnel areas. Acceptability of equipment other than the equipment noted above shall be at the sole discretion of the Project Manager. If the Contractor proposes other types of inverter welding equipment, testing of equipment for harmonics by the Contractor must be completed prior to the request by the Contractor for use of the equipment.
2. Welding activities inside buildings require submittal of a System Interruption Request (See paragraph 1.03.B of this Specifications Section). Prior to welding in any area, the Contractor shall locate smoke detectors and shall request interruption of the fire alarm

system. Subsequent to the interruption of the fire alarm system and prior to welding activities, the Contractor shall cover and protect smoke detectors until work is complete. Prior to expiration of each interruption of the system, the Contractor shall uncover the smoke detectors.

3. Electrical Service: The Contractor shall be responsible for verifying with the DIA Project Manager or representatives locations acceptable for accessing electrical power for welders and other electrical equipment feeders. The Contractor shall be responsible for all work and equipment required to install temporary or permanent electrical modifications for construction power and lighting.
 - a. Temporary Hook-up: Pigtails wired into electrical panels - temporary only: Permanent installation shall require conduit, labeling, and all requirements of Division 16 Technical Specifications. Comply with the following:
 - 1) Provide 20 amp, 3 pole plugs.
 - 2) Wire shall be (4) #10 copper
 - 3) 480V, 3 phase, 3 pole, 4 wire twist lock ground line
 - 4) NEMA L16-20 or ANSI C73.87
 - b. The Contractor may not begin operation of the equipment prior to request for inspection by DIA representatives and acceptance of the installation.
 4. Welding Practices: All standard safe welding practices must be followed, including but not limited to the following:
 - 1) Flash protection for surrounding areas
 - 2) Contractor fire extinguisher in area
 - 3) One person in each welding area solely designated as fire watch for each welder
 - 4) Protect all equipment, cable trays and contents, etc. in area
 - 5) Use fire blankets and other appropriate materials to confine sparks and molten metal from the welding, cutting, and/or grinding activities.
 - 6) All welders shall have been qualified through welding tests in accordance with applicable welding code, such as but not limited to AWS, ASME, API, within one year prior to welding taking place. Evidence of qualification shall be through Welding Performance Qualification Records (WPQR).
 - 7) All welder qualifications test shall be or shall have been administered and witnessed by an Independent Testing Agency (ITA), AWS Certified Welding Inspector (CWI).
 - 8) If re-certification of welders is required, delay costs and retesting costs shall be borne by the Contractor.
 5. Grounding: Review with DIA representative's area of work prior to beginning work to ensure ground procedures do not induce undesirable charges in steel building system or other systems. This review should take place subsequent to the pre-work meeting. Do not ground to adjacent building systems, baggage system, hangers, or devices that support mechanical or electrical equipment.
- H. Cleaning Equipment and Spoils
1. Discharge of water, liquids, or chemicals into the building waste, drain systems or storm drainage systems is prohibited. The Contractor shall comply with all Federal, State, and Local requirements for disposal of chemicals. The Contractor shall maintain and service in work areas containers for discharge of water from cleaning of any construction equipment or removal of water from excavations.
- I. Vehicle Permitting for Tunnel and Basement Use
1. Electric carts require permitting. The Contractor shall provide at least one electric cart

for Contractor use during the work in the tunnel and basements of the buildings. Only CNG powered trucks are allowed in the tunnel and basements of the buildings. CNG/gasoline trucks may be used and shall not be parked overnight or for long terms within the tunnel or basements. All vehicles require permitting. Permits may be acquired at the DIA Airport Security Office for a fee of \$5.00 each (non refundable) with a \$100.00 deposit (refundable at project completion).

J. Radio and Cell Phone Use

1. The Contractor shall have in place prior to initiation of work in the tunnel or basements communications equipment either by use of cell phone and or radio. Cell phone use is limited to "line of sight" communication. Radio equipment shall be submitted to DIA for approval of use at least 14 days prior to intended use. Radio equipment frequencies shall be submitted. Frequencies shall be subject to DIA approval.

K. Keys

1. The Contractor shall be required to contact DIA Maintenance Control to procure keys for access to all rooms having locks in order to gain access. Keys may be checked out at the beginning of each work shift by the Contractor and shall be returned to DIA Maintenance Control at the end of each work shift.

1.04 COORDINATION

- A. The Contractor will designate a contact person for coordination with the Project Manager and airline tenants. The contact person shall have the authority to make decisions for the Contractor firm and shall have binding signatory power for changes in work. The contact person shall be on site at all times during work activity.
- B. No additional costs shall be considered for coordination activities throughout this project. The Contractor shall include in his bid costs for coordination of all activities.

1.05 LATE COMPLETION

- A. The Contractor will notify the City as soon as possible, but in no case not less than four weeks in advance, of the inability to meet any of the constraints or milestones. Notification shall be consistent with the requirements of Article 5, General Conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 DUST/PROTECTION BARRIERS

- A. Prior to any demolition the Contractor shall construct area containment doors and dust barriers at five feet outside the limits of demolition of the wall and as directed by the DIA Project Manager. Dust barrier at wall demolition shall be constructed of metal studs with ½" painted gyp board from floor to ceiling. At a minimum, any space containing electrical or telecommunications equipment will require dust barriers for the entire space during demolition and construction. Contractor shall install all required modifications to exit/egress signage until temporary barriers are removed. Contractor shall coordinate location of partition with Fire Sprinkler Contractor to ensure adequate sprinkler coverage during construction. Temporary barriers shall be removed only after completion of the work scope within the areas including

final punch list activities. Areas between ceilings and structure above shall be contained to prevent migration of any dust into adjacent areas.

- B. HVAC system containment. The Contractor shall submit to DIA Maintenance HVAC and Fire Alarm shut down requests prior to modifications to the area of work for dust containment. The HVAC system shall be interrupted, re-routed, or blocked off to prevent dust from entering return or supply ducts.
- C. Debris and Protection Barriers: The Contractor shall construct code-approved and DIA-approved dust and debris barriers on both sides of walls and doors that are to be modified. Barriers shall be constructed to allow emergency ingress and egress to and from equipment and spaces. Barriers shall be constructed to allow continual uninterrupted function of building equipment and spaces.
 - 1. Return all removed door hardware to DIA. Label each hardware set correlating the door number of the original hardware set. Coordinate with the DIA Project Manager representatives for storage and return of hardware.

3.02 EQUIPMENT

- A. Equipment: CNG-powered equipment is allowed within the buildings. No other fossil fuel equipment may be used within the buildings unless the equipment is directly vented to the building exterior.
- B. Electric: Electric powered equipment is acceptable in the Work area.

PART 4 -

PART 5 - MEASUREMENT

5.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 6 - PAYMENT

6.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01014

SECTION 01015

SECURITY REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Badges and Permits: DIA requires personnel badging and vehicle permitting administered by the Denver International Airport Security Office. The Contractor shall be required to obtain the proper access authorizations for badges and permits, and the Contractor shall immediately report the presence of unauthorized (unbadged) persons or unauthorized (no permit) vehicles on site to the DIA Project Manager.
- B. Fences: If required, the Contractor shall establish and maintain a secure (fenced) perimeter at its primary operations area to include its field offices, staging and storage areas, and maintenance facilities. The responsibility for security within its operations area shall rest solely with the Contractor. Entrance gates to operations areas shall be equipped with a combination of locks to include a lock provided by the City for its use in accessing emergency equipment, should that need arise. The location, size and other physical characteristics of the Contractor's operations area must be approved by the City prior to its installation.
 - 1. Unless specifically required by the Contract Documents and with the exception of the fenced operations area described above, the Contractor shall install no fences or other physical obstructions on or around the project work area without the written approval of the City.

1.02 VENDORS AND SUPPLIERS

- A. The Contractor shall escort ON A FULL TIME BASIS all unbadged vendors and suppliers requiring access to the restricted areas. Only those vendors and suppliers providing materials and/or supplies shall be allowed on site.

1.03 AIRPORT SECURITY PARTICIPANT MANUAL

- A. Contractors are required to become participants of the Airport Security Program. Access to the Airport Security Participant Manual will be issued from the Airport Security Office and must follow the guidelines in the manual. The Airport Security Participant Manual will be issued after the company has attended a Participant meeting with Airport Security. The Contractor shall comply with the Denver Municipal Airport System Rules and Regulations and TSA regulations.
 - 1. Denver Municipal Airport System Rules and Regulations **Part 130** Movement of Vehicles in the Restricted Area and **Part 20** Security must be adhered to. The Denver Municipal Airport System Rules and Regulations can be found on the flydenver.com website.
 - 2. All work shall be accomplished in accordance with FAA Advisory Circular AC150/5370-2F, "Operational Safety on Airports During Construction", 49 CFR Part 1542 and 14 CFR Part 139 except as modified herein.
 - 3. The following paragraphs supplement, modify, change, delete from or add to FAA AC150/5370-2F. Where any paragraph, subparagraph or clause of the Advisory Circular is modified or deleted by these supplements, the unaltered provisions of that

paragraph, subparagraph or clause shall remain in effect.

4. The Transportation Security Administration requires has the authority to issue civil penalties for failure to adhere to their regulations.
5. It is the responsibility of the Airport to ensure all fences and gates are secure. If a Contractor's operations necessitate the frequent use of a particular gate, the Contractor shall place two contract security guards at the gate that shall have been trained and certified by the Operations, Public Safety and Security Division to facilitate access to its work. The Contractor assumes full responsibility for maintaining security once this is done. If the perimeter gate will be used as a haul route, the contractor must also place Haul Route Monitors as dictated by the TSA approved Temporary Amendment. Any fines levied against the Airport as a result of the failure by the Contractor to provide adequate security shall be passed on to the Contractor.
6. Contractors will be required at all times to have a supervisor or foreman at each work location in both restricted and non-restricted areas.

B. Access to Restricted Area via Vehicles

1. The Contractor shall obtain access to the restricted area via a vehicle only when the vehicle displays a valid Vehicle Permit issued by Airport Security (refer to Technical Specifications Section 01016) and the driver has an Airport ID badge with driver authorization.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SUBMITTAL FOR BADGES

- A. The Contractor may at his own risk submit the required information to DIA Maintenance and Engineering Division and to DIA Airport Security prior to Notice to Proceed in order to expedite the badging and permitting process.
- B. By submitting information for the individual requesting or requiring an Airport Id badge that would permit unescorted access to the Sterile and/or Restricted Areas must be fingerprinted and pass a Criminal History Records Check (CHRC) and Security Threat Assessment. Passing a CHRC means the employee shall not have been convicted, given a deferred sentence, found not guilty by reason of insanity or have been arrested and are awaiting judicial proceedings of any felony charge during the ten (10) years before the date of the individual's application for unescorted access authority. For an individual to obtain driver authorization to drive within the Restricted Area, the individual must have a valid driver license that allows them to drive their contractor vehicle.
- C. An employee requesting an Airport ID Badge must resolve all pending or valid violations before being allowed to proceed in the badging process. If the employee no longer works for the company and is attempting to be employed by a different company, a management representative from the "new" company must attend the Violation Notice Hearing along with the employee.
- D. Airport ID Badges are obtained as follows:
 1. The Contractor shall designate an Authorizing Agent who must attend an annual class with Airport Security. The Authorizing Agent must be an employee of the Contractor,

- have a valid Denver International Airport ID badge. The Authorizing Agent will be authorized to sign for the Contractor on the Fingerprinting and Badge Application Form and will be the primary designation contact for Airport Security related business.
2. The Contractor shall meet with the DIA Project Manager to review the procedures and required access points at DIA. The Contractor and the Project Manager shall visit the site to verify the access points. Access points shall be listed and submitted by the Contractor to the Project Manager for review and comment prior to Contractor's application for badging.
 - 3.
 4. A CHRC and Security Threat Assessment (STA) are required for each employee requesting unescorted access to the restricted areas. The employee will complete the Fingerprinting and Badge Application (two-sided form) and schedule an appointment with the Airport Security Office to have the form reviewed and to be fingerprinted. The Federal Bureau of Investigation will conduct the CHRC and will return the results to the Airport Security Office. For the fee for the Fingerprinting please see the flydenver.com website. The Transportation Security Administration will process the STA and will return the results to the Airport Security Office.
 5. When the Authorizing Agent is notified by Airport Security that the CHRC and STA has cleared, the individual shall call the Airport Security Office, to schedule an appointment to come to the Airport Security Office to receive regulated security and driver training. The appointment will take approximately one hour for security training and approximately two hours for security and driver training.
 6. All applicants will must watch and pass all concepts of a computer based security training module for a SIDA Airport ID badge. All individuals requesting driver authorization in the non movement area must also view an interactive computer based driver training module and complete a test by passing all concepts. In addition the individual must receive non movement driver orientation training by the Contractor's driver representative before being allowed to drive on the airfield. Non Movement Orientation training should be conducted annually.
 7. **ALL EMPLOYEES ARE REQUIRED TO HAVE AN AIRPORT ID BADGE.** The Contractor is advised that there is a \$10 dollar processing fee for every issued Airport ID badge. Rebadging fee is \$10.00.
 8. The Airport ID badges must be returned to the Airport Security Office prior to final payment. All Airport ID badges are issued with an annual expiration date. The expiration date is determined by either the end of the estimated project date or the expiration of the vehicle insurance, whichever ever date is closer. Contractors shall notify the Project Manager as soon as possible but in no case less than four weeks in advance of any requirement to extend the duration of badge validations.
 9. Total fees for startup:
\$ 40 Criminal History Records Check (per employee) for Unescorted access.
\$ 10.00 Badge (per employee)

3.02 DUMPSTERS

- A. Security Requirements: The following procedures must be followed to provide maximum security with all construction projects in public areas:
 1. Roll-off dumpsters must have the ability to be covered (hard side) and locked when not in use.

2. When unlocked and in use, the Contractor shall provide an employee, or a subcontractor's employee, to stand by the dumpster to prevent unauthorized placement of prohibited items.
3. If the Contractor is not able to have a roll-off dumpster with the ability to be locked, the dumpster shall be removed from the public area when the construction site is inactive.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01015

SECTION 01016

VEHICLE AND EQUIPMENT PERMITTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall comply with the Airport Security Program. Vehicle permits are required for all vehicles operating in the Restricted Area. Two types of permits are required. The DIA vehicle permit is required for vehicles operating in the Restricted Area but limited to above grade, outdoor activity. Vehicles or machinery operating within buildings shall be required to acquire a DIA emissions permit as well as a DIA vehicle permit.
- B. Contractors performing work in or through Restricted Areas are required to become Participants in the Airport Security Program. Contractors shall comply with all Denver Municipal Airport System Rules and Regulations.
1. Denver Municipal Airport System Rules and Regulations Part **130 Movement of Vehicles in the Restricted Area** and Part **20 Security** shall be followed. These regulations are available through the flydenver.com website.
 2. All work shall be accomplished in accordance with FAA Advisory Circular AC150/5370-2F, "Operational Safety on Airports During Construction", 49 CFR Part 1542 and 14 CFR Part 139, except as herein modified.
 3. The following paragraphs supplement, modify, change, delete from or add to FAA AC150/5370-2F. Where any paragraph, subparagraph or clause of the AC is modified or deleted by these supplements, the unaltered provisions of that paragraph, subparagraph or clause shall remain in effect.
 4. Special care shall be exercised by the Contractor when operating within clear zones, under approach and departure zones of runways and in the apron area. The clearance zones shall be considered as extending to a distance of 750 feet laterally from the centerline of runways and to a distance of 193 feet laterally from the centerline of taxiways. Where these zones overlap, the greater distance shall apply. Vertical clearance in the approach and departure zones shall be considered as starting at grade 200 feet beyond the ends of runways and rising at the rate of 50 feet horizontal to one foot vertical.
 5. Access to the runways, taxiways and aprons shall be gained by the Contractor after establishing radio communications with Airport Operations. No personnel or equipment will be allowed on the runways until radio contact has been made with Airport Operations and permission given.
 6. Access to airport operations areas will be limited in order to allow the maximum efficient movement of aircraft. As part of this limitation the Contractor may be required to only use these areas late at night when there is less aircraft traffic.
 7. Once admitted into the Restricted Area, the Contractor shall proceed directly to the Work location by way of a route assigned by Airport Security. At no time shall a Contractor or any of its personnel enter onto a taxiway, runway or ramp without proper clearance from the Aviation Operations Manager or Assistant Aviation Operations Manager. Contractors or individuals violating these requirements for driving in the Restricted Area may be subject to fines, suspension or permanent revocation of the

Airport ID badge and driver authorization.

8. The Transportation Security Administration requires that all operating airports be secured from the general public and has the authority to issue citations for violations of these requirements. It is the responsibility of the Airport to ensure all fences and gates are secure. If a Contractor's operations necessitate the frequent use of a particular gate, the Contractor shall place two guards at the gate, which shall be trained and certified by the Airport Operations, to facilitate access to its work. If a Temporary Amendment is required, then the Contractor must also adhere to all requirements within the TSA approved Temporary Amendment and ensure Haul Route Monitors are trained. The Contractor assumes full responsibility for maintaining security once this is done. Any fines levied against the Airport as a result of the failure by the Contractor to provide adequate security shall be passed on to the Contractor.
 9. Cranes and Construction Equipment: The Contractor shall provide the necessary drawings and specifications to indicate all information needed by the FAA and the City including but not limited to location of construction activities and height of objects including cranes, construction equipment and vehicles. Drawings shall be scaleable site plans indicating northing and eastings of proposed equipment locations, air space northing and eastings of activity and elevations of equipment based on DIA datum. Specifications shall include standard sheets on equipment specifications and any non-standard modifications to the equipment.
 10. The above information shall be submitted to the Project Manager for approval five days prior to mobilization. Changes to information submitted shall be re-submitted for approval at least five days prior to mobilization of any change.
 11. If required by DIA, standard DIA-approved warning lights and flagging will be required on any temporary equipment or structures.
 12. Lighting of the work area is subject to approval by DIA Operations and DIA Planning and Development. The Contractor shall include in item (9) above information on any site lighting proposed by the Contractor. The locations, heights and types of luminaries shall be submitted. The Contractor shall conduct his activities, especially lighting, so as not to interfere with Airport and FAA operations.
- C. General safety regulations when in aircraft operations areas may include the following:
1. At all times, the Contractor shall coordinate its work with the requirements of the Airport site and operations. All work, movement of men, materials, supplies and equipment in areas used by aircraft shall be subject to regulations and restrictions established by the City. The Contractor shall take special precautions and be fully responsible for the prevention of damage to materials and equipment in the areas affected by the jet blast of taxiing aircraft. No work shall proceed until necessary protective devices are placed as required to protect the public, airport operations, property and personnel from the hazards of the Work. The Contractor shall proceed with his work, including temporary work and storage of tools, machinery and materials, to cause no interference with or hazards to the operation of the Airport.
 2. Landings, takeoffs and taxiing shall take precedence over all Contractor's operations. In the event that the Contractor is notified that an emergency landing or a takeoff is imminent, the Contractor shall stop all operations immediately, regardless of the sequence of events in progress and shall immediately evacuate his personnel and equipment from the runway and taxiway areas as directed.
 3. The Contractor shall remove its personnel and equipment to the distance specified below for the prevailing conditions:

- a. For emergencies the Contractor shall move all personnel and equipment as directed by Airport Operations or the Project Manager.
 - b. At the end of a work day in areas where aircraft are operating, all equipment shall be moved to a location that is not less than 750 lineal feet measured from the near edge of the runway, taxiway or ramp area or to the location designated by the City.
4. If the Contractor is asked to leave part of its worksite to allow aircraft operation, the Contractor shall clean the area to allow safe aircraft movement. Cleaning may include sweeping the area to prevent damage to aircraft.

D. Vehicle Permitting

1. Vehicle permits are limited to those vehicles and or equipment required for completion of the work. Employee vehicles will not be issued permits. Employee parking is addressed in Technical Specification Section 01014 or as indicated in the Contract Documents. No Contractor employee parking will be acceptable in the Restricted Area.
2. The Contractor shall obtain access to the Restricted Area only when the vehicle displays a vehicle permit, has the vehicle permit application in the vehicle and the driver has an Airport ID badge with a driver authorization. Vehicle permits may be obtained as follows:
 - a. Vehicle permits must be renewed annually and cost \$5.00 dollars. Vehicle permits must be surrendered to Airport Security before final payment will be made for work accomplished. A Vehicle Permit Application must be filled out and approved by the Project Manager prior to the issuance of the permit. The Contractor's Authorizing Agent must file a sponsorship form with the Airport Security Office and accompany any subcontractor requesting a vehicle permit. The approved vehicle application must be presented at Airport Security to obtain the vehicle permit.
 - b. All vehicles that are not permitted by Airport Operations to drive in the Restricted Area are required to be escorted. All vehicles that are escorted must have a minimum of \$1,000,000.00 combined single limit coverage with a 30 day notice of cancellation to Airport Security. All unescorted vehicles must have \$10,000,000.00 combined single limit coverage with a 30-day notice of cancellation to Airport Security prior to any permits being issued.
 - c. Vehicle permits are issued with the expiration date of the project on the permit. A \$5 fee will be charged for a new permit that requires an extension of time.
 - d. The Contractor must have a four-inch letter company logo on each side of the vehicle. All vehicles operating in the Restricted Area must display the logo at all times.
 - e. The Contractor shall obtain a driver authorization for all operators of vehicles in the Restricted Area. Reference Technical Specifications Section 01015.
 - f. Contractors will be required to have a supervisor or foreman at each work location at all times.

E. Equipment Permitting

1. Fossil fuel powered equipment to be used in the interior of buildings and/or in basement/tunnel areas shall require inspection by DIA Maintenance and the Denver Fire Department. **Only CNG fossil fuel powered equipment may be used; gasoline powered, propane powered, or diesel powered equipment will not be acceptable unless identified and operated per Specifications Section 01014.**

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PERMITS

- A. Vehicle permits shall not be issued prior to Notice to Proceed. The Contractor may, at his own risk, submit required information prior to Notice to Proceed to the following:
 - 1. Vehicle permit: DIA Engineering Group or DIA Airport Security
 - 2. Equipment and vehicle emissions permit: DIA Engineering or DIA Maintenance Group.

3.02 SCHEDULE

- A. The Contractor shall allow in his schedule five days for DIA review of submittals for permits. Testing of equipment and review by the Denver Fire Department shall be scheduled by the Contractor. By submitting information for permits, the Contractor certifies that equipment and vehicles comply with all city, state and federal regulations including but not limited to emissions, licensing and safety requirements.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item. All permits shall be returned to the City prior to the Contractor submittal for Final Settlement, Termination, and/or upon written request from the Project Manager.

END OF SECTION 01016

SECTION 01020
UTILITIES INTERFACE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Various utilities are located within the limits of work in the project area. The owners of these utilities hereinafter noted may require that the Contractor is to work around their existing facilities until such alterations, relocation or abandonment have been completed. All known existing utilities are shown; however, the Contractor shall verify and satisfy himself that there are no other existing utilities that may not be shown.
- B. The owners of known utilities within the project area and corresponding representatives are:
- | | | |
|---------------------------------|-------------------|--------------|
| Qwest Telephone | Susan Jensen | 303-391-8373 |
| DIA Telephone | Pat McFadden | 303-342-2200 |
| Xcel Energy Natural Gas | Joanna Gomez | 303-375-3509 |
| Xcel Energy Electrical Services | Joanna Gomez | 303-375-3509 |
| DIA Storm Water | Donald Smith | 303-342-2200 |
| DIA Sanitary Sewer | Donald Smith | 303-342-2200 |
| Denver Water Department | John Bambei | 303-628-6669 |
| Inland Technologies | Brian Stierman | 303-342-6811 |
| Fuel System (ASII) | Gil Patron | 303-342-3552 |
| Premise Wiring System | Kelan Pape | 303-342-2200 |
| FAA Duct Bank | Rick Silva | 303-342-1405 |
| Oil/Gas Wells | Julie Brant | 303-513-6169 |
| DIA Electrical Department | Pat Kelly/Tai Lai | 303-342-2800 |
| Fire Alarm System | Pat Kelly/Tai Lai | 303-342-2800 |
| Paging System | Pat Kelly/Tai Lai | 303-342-2800 |
- C. The location and establishment of each construction vehicle crossing shall be at sites mutually agreed upon in writing by the Contractor and the owner of the utility.
- D. At the locations where the Contractor needs to establish a construction vehicle crossing over any of the operating pipelines, the furnishing and placing of a crossing shall be by the Contractor. The crossing shall allow the normal operation of the pipeline at all times. Each crossing shall be adequately marked and signed for safe passage of vehicles over the crossing. Construction vehicles shall not be allowed to cross over operating pipelines at any place other than an established crossing. The maximum size of any vehicle crossing operating pipelines at any location in the project area shall be limited to no larger than a Caterpillar D6 bulldozer unless noted otherwise.
- E. Coordinates for known utilities located within the project area may be available at the Denver International Airport Office. These utilities locations are based upon information provided by the utility companies or previous construction contractors that were the basis for determining utility coordinates. The City does not warrant their accuracy.
- F. The Contractor shall control his operations in order to avoid creating any obstacles for the utility owner's access for maintaining or operating their equipment.

1.02 REGULATORY REQUIREMENTS

- A. The Contractor shall obtain and pay for all utility company permits, fees, and licenses necessary for the execution of this work. The Contractor shall give all notices and shall comply with all laws, ordinances, rules and regulations of all authorities having jurisdiction.

1.03 QUALITY CONTROL

- A. When the Contractor performs any operations that will impact a utility owner, the Contractor will give timely notice to the utility owner and the DIA Project Manager so that the Contractor's operations may be observed by the utility owner's representative at the discretion of the utility owner's representative and the Project Manager's representative.

1.04 WORK INCLUDED

- A. The work of this section includes furnishing all materials, equipment and labor necessary to provide utility crossings as required and as specified herein and subject to approval by the associated utility owner.
- B. North American Resources requires a minimum of 12 feet of total cover over their pipelines at each crossing. This required cover is to extend a minimum distance of five feet perpendicular on both sides of the pipeline, then slope away from the pipeline at a slope determined by the Contractor as sufficient for his vehicles. The top 12 inches of the cover overall shall be Colorado Department of Highways Class 6 road base.
- C. FAA Underground Duct lines: The FAA has duct lines passing under the site. The Contractor shall contact the FAA prior to beginning earthwork operations to ascertain any special requirements or conditions required to maintain this service during construction activities.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Suitable cover material shall be in accordance with Colorado Department of Highways Standard Specifications. Wet, soft or frozen material, asphalt chunks, or other deleterious substances shall not be used for cover.
- B. Aggregate for road base material shall consist of clean, sound and durable particles of crushed stone, crushed gravel or crushed slag, shall be free from coatings of clay, silt and organic matter, and shall contain no clay balls. Material shall conform to the State of Colorado Standard Specifications for Road and Bridge Construction Class 6 aggregate base.
- C. The materials for the load distribution system on top of the cover shall conform to the specification of the American Institute of Steel Construction, the American Institute of Timber Construction, or the American Concrete Institute, as applicable, depending upon the system agreed upon between the Contractor and utility owner.
- D. Materials for the sleeving of the pipelines shall be purchased by the utility owner at the Contractor's expense.

PART 3 - EXECUTION

3.01 NOTIFICATION OF UTILITIES FOR LOCATING AND POTHOLING

- A. The Contractor shall verify the location of all utilities prior to any operations including physically uncovering the utility to verify location as required by the utility owner or the DIA Project Manager and shall be solely responsible for protection of the utilities during construction. Only manual labor shall be used within five feet of the suspected location of a utility to uncover it. The Contractor shall obtain written permission from each utility owner before constructing crossings or crossing pipelines in service, and provide the Project Manager with a copy of the permission 48 hours prior to commencement of crossing work.
- B. A minimum of three days notice by the Contractor shall be given to the utilities for locating and potholing their lines as needed.
- C. The Contractor shall notify the Utility Notification Center of Colorado (303) 534-6700 as a minimum for location of utilities.
- D. In the event that the Contractor needs to conduct Contractor's operations which will affect an operating utility, the Contractor shall be required to sign a "hold-harmless" agreement with the owner of the utility prior to the Contractor conducting any operations affecting the utility.

3.02 TRENCHING AND SLEEVING

- A. All trenching, excavation, sleeving and shoring needed to cross over or under a utility shall be performed in the manner required by the party owning the utility and in such a manner as to ensure no dislocation of the existing utility. The method used to cross under the utility shall ensure it is fully supported at all times. The Contractor shall accurately locate and record the position of a utility being crossed as soon as it is uncovered and again prior to covering it and report to the Project Manager any change in location greater than 0.5 inch. The crossing shall be protected so that water or construction equipment will not dislocate or undermine unsupported sections of the utilities.

3.03 COVER AND COMPACTION

- A. Backfilling of trenches or adding additional cover shall be conducted at all times in a manner that will prevent damage to the pipe. If the excavated material is not suitable for backfill and cover, as determined by the DIA Project Manager, unsuitable material shall be hauled away and disposed of properly. The owner of the utility will observe at all times the installation of the backfill and cover. Backfill and cover shall be the placement of suitable materials in horizontal, uniform layers and brought up uniformly on the sides and over the pipelines.
- B. The thickness of each layer of backfill shall not exceed eight inches before being compacted to 95 percent relative compaction per ASTM D-698 or to the density required by the utility owner and tested for density by the Contractor.

3.04 ROADBASE COMPACTION

- A. If the required compacted depth of the road base exceeds eight inches, it shall be constructed in two or more layers of approximately equal thickness. The maximum compacted thickness of any layer shall not exceed eight inches before being compacted to 95 percent relative compaction per ASTM D-698 or to the density required by the utility owner.

3.05 REMOVAL

- A. All temporary crossings shall be removed after completion of the work.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable multiplier work request bid item.

END OF SECTION 01020

SECTION 01025

MEASUREMENT FOR PAYMENT

PART 1 - GENERAL

1.01 SCOPE

- A. This Section covers the requirements for measurement of quantities for payment as they apply to this contract.
- B. Measurement methods specified in the individual sections of these specifications shall govern if they differ from methods specified in this Section.
- C. The Contractor will compute all final quantities subject to review and acceptance by the Project Manager. Where necessary, such computations will be based upon surveys performed by the Contractor as specified in Technical Specifications Section 01050.

1.02 MEASUREMENT OF QUANTITIES

- A. Measurement Standards
 - 1. All work to be paid for at a contract price per unit of measurement will be measured by the Contractor in accordance with United States Standard Measures.
 - 2. Measurements are subject to check and review by the Project Manager: if errors are found the Contractor shall correct them. If, in the opinion of the Project Manager, the errors are significant or frequent enough, the Project Manager may make the measurements with his own forces at the Contractor's expense. No payment will be made on that portion of an item containing measurement or calculation errors until the errors are corrected to the satisfaction of the Project Manager.
- B. Measurement by Weight
 - 1. Items to be paid for by weight shall be measured by scale or by handbook weights for the type and quantity of material actually furnished and used. One ton shall consist of 2,000 pounds. Handbook weights will only be allowed if there is one-half of one percent or less difference between the handbook weight and the allowable deviation per manufacturer's specification of a material's finish weight.
 - 2. Material to be measured and paid for by weight shall be weighed on accurate, approved scales, furnished by and at the expense of the Contractor. Platform scales of sufficient size and capacity shall be used to permit the entire vehicle or combination of vehicles to rest on the scale platform while being weighed. Combination vehicles may be weighed as separate units provided they are disconnected while being weighed. All scales shall be inspected and certified as often as the Project Manager may deem necessary to ascertain accuracy. Costs incurred as a result of regulating, adjusting, testing, inspecting and certifying scales shall be borne by the Contractor.
 - a. 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.
 - b. Scales shall be accurate to within one-half of one percent of the correct weight throughout the range of use. The Contractor shall have the scales checked under

- the observation of the Project Manager 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 one percent of the nominal rated capacity of the scale, but not less than one pound. The use of spring balances will not be permitted.
- c. Beams, dials, platforms and other scale equipment shall be so arranged that the operator and the City's inspector can safely and conveniently view them.
 - d. Scale installations shall have suitable weights or devices available for testing the weighing equipment.
 - e. 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.
 - f. Scales "overweighing" (indicating more than correct weight) will not be permitted to operate and all materials received subsequent to the last previous correct weighing-accuracy test will be reduced by the percentage of error in excess of one-half of one percent.
 - g. 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.
3. The Project Manager may be present to witness the weighing and to check and compile the daily record of such scale weights; however, in any case, the Project Manager will require that the Contractor furnish weigh slips and daily summary weigh sheets. In such cases, a duplicate weigh slip or load slip for each vehicle weighed shall be furnished to the Project Manager at the point of delivery of the material.
 - a. As a minimum, the weigh slips shall contain the following information:
 - 1) Contractor's name and contract number
 - 2) Supplier's name and location of material source
 - 3) Type of material
 - 4) Haul unit's unique identification number
 - 5) Empty weight (this should be checked three times per day)
 - 6) Full weight
 - 7) Weight of material hauled
 - 8) Scale operator's signature stating the weights are correct to within one percent of standard weights.
 - b. The loads shall be weighed prior to water being added.
 4. If the material is shipped by rail, the certified car weights will be accepted provided that only actual weight of material will be paid for and not minimum car weight used for assessing freight tariff. Car weights will not be acceptable for material to be passed through mixing plants or material off loaded from rail cars and hauled to the jobsite by trucks from rail cars located off the worksite.
 5. Trucks used to haul material being paid for by weight shall be weighed empty daily and at such additional times as the Project Manager may require. Each truck shall bear a plainly legible identification mark. The Project Manager may require the weight of the material verified by weighing empty and loaded trucks on such other scales as the he may designate.
 6. When requested by the Contractor and approved by the Project Manager 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 Project Manager and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

7. The Contractor shall comply with all legal load restrictions in the hauling of equipment or materials on public roads beyond the limits of the project. A special permit will not relieve the Contractor of liability for damage resulting from the moving of equipment or material.
- a. The operation of equipment or hauling loads that cause damage to structures, the roadway or any other construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited by the Contractor to methods and equipment that will prevent damage to the pavement structure before the expiration of the curing periods. The Contractor shall be responsible for the repair of all damage and related expenses resulting from hauling equipment and construction operations.
 - b. If a vehicle's gross weight exceeds the legal limit, and the material transported by the vehicle is delivered to the project, the material and the scale ticket (certificate of correct weight) will not be accepted, except a 500 pounds tolerance will be allowed for overweight loads.
 - c. If a scale ticket from an overweight vehicle is inadvertently accepted and the material incorporated into the project, the Project Manager will adjust the price for the overweight load as follows:
 - 1) The pay item quantity represented by the amount of material in excess of the legal weight plus 500 pounds tolerance will not be paid for.
 - 2) A price reduction will be assessed for the overweight portion of the load based on the following schedule:

<u>Overweight (pounds)</u>	<u>Price Reduction (dollars)</u>
0 - 500	0
501 - 3,000	20
3,001 - 4,000	40
4,001 - 5,000	82
5,001 - 6,000	130
6,001 - 7,000	226
7,001 - 8,000	376
8,001 - 9,000	582
9,001 - 10,000	842
Over 10,000	870 plus \$164 for each 1,000 lbs., or fraction thereof, or 10,000 lbs.

8. Bituminous materials will be measured by the gallon or ton. Unless noted otherwise volume will be measured at 60 degrees Fahrenheit or will be corrected to the volume at 60 degrees Fahrenheit using ASTM D 1250 for asphalt 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 or volume subject to correction for loss or foaming will be used for computing quantities.

C. Measurement by Volumes

1. Measurement by in-place volume will be by the cubic dimension listed or indicated in the Schedule of Prices and Quantities. Volume measurements will be neat line as shown on contract documents, or if actual field measurements show that the volume is less than neat line, the actual volume will be used. Method of volume measurement shall be

by average end area method, with end areas taken at no greater than 100 feet apart or every major change in the cross section area, which ever occurs first, unless noted otherwise. The Contractor may request alternate methods subject to the approval of the Project Manager.

2. Material indicated 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 Project Manager provided that the body is of such shape that the actual contents may be readily and accurately determined and is water tight so that the volume can be measured by filling with water. 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.

D. Measurement of Areas

1. Measurement of areas will be by the square dimension listed or indicated in the Schedule of Prices and Quantities and or Unit Price Items. Area measurements will be neat line as shown on contract documents or, if actual field measurements show that the area is less than neat line, the actual area will be used. All longitudinal measurements shall be horizontal unless noted otherwise. Method of square measurement will be as determined by the Project Manager.

E. Measurement of Linear Items

1. Linear measurement will be by the linear dimension listed or indicated in the Schedule of Prices and Quantities and/or Unit Price Items. Linear measurements will be neat line as shown on contract documents, or if actual field measurements show that the linear measurement is less than neat line, the actual linear measurement will be used. Method of linear measurement will be as determined by the Project Manager. Generally, items, components or work to be measured will be measured at the centerline of the item in place.

1.03 FIELD MEASUREMENT FOR PAYMENT

- A. The Contractor will compute all quantities of Work performed by the Contractor, including quantities of materials and equipment delivered to the site, for final payment purposes. Computed quantities are subject to check and review by the Project Manager. If errors are found, the Contractor shall correct them. If, in the opinion of the Project Manager, the errors are significant or frequent enough, the Project Manager may make the calculations with his own forces at the Contractor's expense. No payment will be made on that portion of an item containing calculation errors until the errors are corrected to the satisfaction of the Project Manager.
 1. The Contractor will show the actual measurements that are used to compute the quantities along with the formulas used. As requested by the Project Manager, the Contractor shall supply the Project Manager with computations and sketches indicating where measurements were taken and their relationship to the finished product.
- B. The Contractor will supply the Project Manager with an electronic copy and instruction manual of any computer programs used to calculate quantities. Any computer program used shall be executable on an IBM compatible computer with a 286, 386, 486 or Pentium processor. The Contractor shall also provide an electronic copy of the data files used to determine quantities.
- C. The Contractor shall take all measurements for payment purpose in the presence of the Project Manager in accordance with the provisions for measurement specified herein and in

Technical Specifications Section 01050.

1.04 REJECTED MATERIALS

- A. Quantities of material wasted or disposed of in a manner not called for under the contract, rejected loads of material including material rejected after it has been placed by reasons of the failure of the Contractor to conform to the provisions of the contract, material not unloaded from the transporting vehicles, material placed outside the lines indicated on the contract drawings or established by the Project Manager, or material remaining on hand after completion of the Work will not be paid for and such quantities shall not be included in the final total quantities. No compensation will be permitted for loading, hauling and disposing of rejected material.

1.05 PAYMENT CONSIDERATIONS

- A. Payment will be full compensation for furnishing all labor, materials, tools, equipment, transportation, services and incidentals as specified in the General Conditions, technical specifications, and contract drawings, and for performing all work necessary for completing the item or work classification including all incidental work.
- B. Full compensation for all expenses involved in conforming to the requirements for measuring materials shall be considered as included in the unit or lump sum prices paid for the materials being measured and no additional compensation will be permitted.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01025

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SECTION 01050

LAYOUT OF WORK AND SURVEYS

PART 1 - GENERAL

1.01 SCOPE

- A. This Section covers the procedures and accuracy requirements for survey services for layout of work and field measurement of work quantities to be determined by surveys.
- B. Before commencing any layout of work and surveys the Contractor shall give the Project Manager 48 hours written advance notice so that the Project Manager may witness such work.
- C. Reference Contract General Conditions, GC 317 and GC 318.

1.02 SUBMITTAL

- A. Refer to Technical Specifications Sections 01300 and 01340 for the submittal process.
 - 1. Copies of original pages of field notes.
 - 2. Original field notebooks when filled and at end of contract.
 - 3. As-built measurements.

1.03 REFERENCE POINTS, COORDINATE POINTS AND SECTION CORNER MONUMENTS

- A. Protect and preserve reference points, Denver International Airport (DIA) grid control points, benchmarks and section corner monuments. Coordinates shown on the drawings are based upon the DIA coordinate system unless noted otherwise.
- B. Report damaged or destroyed reference points, DIA grid coordinate points and benchmarks to the Project Manager.
 - 1. The Project Manager will reestablish damaged, moved, altered or destroyed reference benchmarks and coordinate points.
 - 2. If section corner monuments are damaged or destroyed during construction activities, such points shall be re-established pursuant to "Laws of the State of Colorado Regulating the Practice of Land Surveying" by a Professional Land Surveyor registered in the State of Colorado.
 - 3. If reference points, coordinate points or bench marks are damaged, moved, altered or destroyed by the Contractor, the City's cost of reestablishing such points shall be borne by the Contractor.
 - 4. The City will not be responsible for any increased costs or delays to the Contractor relating to reference points, DIA grid control points, or bench marks which are damaged, moved, altered or destroyed by the Contractor or its subcontractors, suppliers, agents or employees or other Contractors working on the site.
- C. Report alleged errors in reference points, DIA grid control points, or benchmarks promptly to the Project Manager.

1. Discontinue use of reference points, DIA grid control points, or benchmarks alleged to be in error until the accuracy of points can be verified or as directed.
 2. Claims for extra compensation for alteration or reconstruction allegedly due to errors in reference points, DIA grid control points, or benchmarks will not be allowed unless original reference points, DIA grid points and benchmarks still exist or substantiating evidence proving error is furnished by the Contractor, and unless the Contractor has reported such errors to the Project Manager as specified herein.
- D. The following are limitations and additional information on reference points, DIA grid control points and benchmarks.
1. The use of control monuments for construction surveying other than those shown on the contract drawings or furnished by or approved by the Project Manager is prohibited. Use of other monuments is at the Contractor's sole risk.
 2. Elevations are based upon mean sea level datum from NOAA-NGS, benchmark "R392", elevation 5271.518 feet.
 3. The DIA bench mark and coordinate point data as listed on the contract drawings or listed in the specifications are the only approved coordinate points and benchmarks for construction surveying.
 4. The basis of bearing of the grid system is NGS control points "Adams" and "King" per the North American Datum of 1927.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION LINES AND GRADES

- A. The reference DIA coordinate points and benchmarks to be provided by the City are those shown on the drawings. Other control points and benchmarks may be provided to the Contractor at the discretion of the Project Manager.
1. The Contractor shall carefully preserve such points and shall be held responsible therefore. If it becomes necessary for the Contractor to remove or disturb a reference or DIA grid coordinate point or benchmark he shall notify the Project Manager before removing or disturbing said point. If, in the opinion of the Project Manager, stakes, monuments, marks or points are carelessly or willfully disturbed by the Contractor, the cost of replacing such stakes, monuments, marks or points shall be charged against the Contractor and shall be deducted from final payment for the Work.
- B. The Contractor shall make surveys and layouts as necessary to delineate the work. The Contractor shall make the surveys for the proper performance of the Work. As a part of such surveys, the Contractor shall furnish, establish and maintain in good order survey control points that may be required for the completion of the Work subject to the approval of the Project Manager as to their location, sufficiency and adequacy. However, such approval by the Project Manager shall not relieve the Contractor of his responsibility for the accuracy of his survey work.
- C. The Project Manager shall have the right to check surveys and layouts made by the Contractor prior to approving any of the Work. The Contractor shall give advance notice of not less than 48 hours to the Project Manager to enable such checking prior to placing any Work.

The Contractor shall furnish assistance as may be required for checking purposes when so requested by the Project Manager.

- D. The Contractor shall furnish skilled labor, instrument platforms, ladders and such other temporary structures as may be necessary for making and maintaining points and lines in connection with the surveys required.
- E. The City may draw the Contractor's attention to errors or omissions in lines or grades, but the failure to point out such errors or omissions shall not give the Contractor any right or claim nor shall in any way relieve the Contractor of his obligations according to the terms of this contract.
- F. The Contractor's instruments and other survey equipment shall be accurate, suitable for the surveys required in accordance with recognized professional standards and in proper condition and adjustment at all times. Surveys shall be performed under the direct supervision of a Colorado licensed surveyor.
- G. Field Notes
 - 1. The Contractor shall record surveys in field notebooks. Copies of the original pages of such records shall be furnished to the Project Manager at intervals required by the Project Manager. Each field notebook shall be furnished to the Project Manager when filled or completed. Field notes shall be kept in the form and style shown in the book "Surveying Theory and Practice" by Davis, Foote, Anderson and Mikhail. At the option of the Project Manager, electronic data collectors may be used and copies of downloaded data on disk may be furnished. The data shall be in MS DOS ASCII format and may be used to supplement field books.
 - 2. Whichever method of note taking the Contractor starts with, he must use the same method throughout the contract duration. If the Project Manager finds errors in the field notes he will return them to the Contractor for correction and resubmission. This review does not relieve the Contractor from the responsibility of maintaining accurate survey data.
- H. The Project Manager may at any time use line and grade points and markers established by the Contractor. The Contractor's surveys are a part of the Work and may be checked by the Project Manager or his representatives at any time. The Contractor shall be responsible for any lines, grades or measurements that do not comply with specified or proper tolerances or which are otherwise defective and for any resultant defects in the Work. The Contractor will be required to conduct re surveys or check surveys to correct errors indicated by review of the field notebooks.

3.02 SURVEYS FOR MEASUREMENT FOR PAYMENT

- A. When the specifications or the Project Manager require items in the Schedule of Prices and Quantities to be measured by surveying methods, the Contractor shall perform the surveys. All such surveys, including control surveys run for establishing the measurement reference lines, shall be performed in the presence of the Project Manager or his representative who will witness the surveying operation and who will sign the field notes or keep duplicate field notes, at the Project Manager's option. The Contractor will reduce the field notes and calculate final quantities for payment purposes. The note reductions and calculations will be given to the Project Manager upon request.

3.03 SURVEYING ACCURACY AND TOLERANCES IN SETTING SURVEY, LAYOUT AND

QUANTITY CALCULATION STAKES

- A. Control traverse field surveys and computations shall be performed to an accuracy and precision of at least 1:40,000.
- B. The tolerances generally applicable in setting survey stakes shall be as set forth in the CDOT Survey Manual, latest edition. Such tolerances shall not supersede stricter tolerances required by the drawings or specifications, and shall not otherwise relieve the Contractor of responsibility for measurements in compliance therewith.

3.04 AS-BUILT MEASUREMENTS

- A. As-built measurement for items that will be hidden or visible including all civil, mechanical, electrical, control work and all utilities that are placed in concrete, earth or behind walls shall be made by and under the direction of a Colorado licensed surveyor while the work is exposed and the measurements submitted to the Project Manager. Unless noted otherwise the measurements shall show the final location within +/- 3 inches of their actual horizontal and vertical location based upon DIA grid coordinates*. Items located within or five feet beyond a building shall be referenced to building column lines and finish floor elevations. Special attention shall be paid to items requiring service, sensors, items with moving parts, access points and locations of junctions, elevation changes and directional changes. Survey notes must be supplied to the Project Manager prior to covering up the work or the work shall be considered defective.
 - 1. * DIA Vertical Datum (i.e., N6VD 29)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. Layout of Work and Survey shall be measured per lump sum for completed and accepted as satisfactory.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. Payment will be made at the contract unit price for Layout of Work and Survey completed and in place by the Contractor and accepted by the DIA Project Manager. This price shall be full compensation for furnishing all materials and for all preparation, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment shall be made under:

01050a Layout of Work and Surveyper lump sum

END OF SECTION 01050

SECTION 01051

PROJECT COORDINATION

PART 1 - GENERAL

- A. Work specified in this Section includes coordination efforts which must be provided by the Contractor to ensure that work by others in the contract designated work area and adjacent areas does not negatively impact the Work and overall project.
- B. The construction schedule as specified in Technical Specifications Section 01310 shall reflect all interfaces and coordination efforts as specified in General Condition 701, Special Condition SC-6, Technical Specification Sections 01010, 01014, 01051, and 01650, and other related contracts and procurement documents.
- C. The Contractor will establish regular working relations with all contractors, tenants and the Airport Maintenance Department working in the same area and areas adjacent to the construction site. The Contractor will attend construction progress meetings as described in Technical Specification Section 01200 and will coordinate work as described therein.
- D. The Contractor will assign a member of his staff to act as a coordinator, who will work to coordinate the Contractor's work with other parties doing work at the Denver International Airport site.

1.02 WORK INCLUDED

1.03 CONTRACTOR'S RESPONSIBILITIES

1.04 COORDINATION WITH OTHER PROJECTS

1.05 METHOD OF MEASUREMENT

1.06 METHOD OF PAYMENT

- A. Minimum cooperation requirements with other contractors include the following:
 - 1. Regular meeting (weekly or more often)
 - 2. Construction schedule coordination
 - 3. Staging area and access planning (to include employee shuttle routes)
 - 4. Deliveries
 - 5. Traffic control.
- B. When and where required, the Contractor shall develop appropriate coordination drawings for use by interfacing adjacent parties using the Denver International Airport site.
- C. The following is a list that includes, but is not limited to all of the contractors that will be working in the area of the project limits: dia project manager needs to complete list below.
 - 1. Runway 16L/34R may be awarded to a separate contractor at the discretion of DIA. Only one runway will be allowed to be closed at any given time. The contractor will be responsible for coordinating with DIA regarding the exact dates of work.

2. Apron panel replacement work may be awarded to a separate contractor at the discretion of DIA. The contractor will be responsible for coordinating with DIA regarding the exact dates and location of work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01051

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section identifies primary compliance with the State, City and County of Denver's regulatory requirements including:
 - 1. The Department of Aviation
 - 2. Colorado Department of Transportation
 - 3. Department of Public Works (including The Division of Wastewater Management)
 - 4. The standards which govern design and construction projects at Denver International Airport.
- B. Construction shall be based on the latest edition of the referenced codes including additions and revisions thereto that are in effect at the time of project bidding.

1.02 RELATED SECTIONS

- A. 01566 – Environmental Controls: for environmental and related permitting requirements.

1.03 BUILDING CODE

- A. All design and construction work shall be governed by the Building Code for the City and County of Denver, latest edition. This is based upon the International Building Code of the International Code Council with Denver Amendments to this code. Appendix N of the amendments addresses Airport Buildings and Structures.

1.04 DENVER BUILDING DEPARTMENT

- A. For review and approval of all construction documents for compliance to the Denver building code:
 - City and County of Denver
 - Community Planning and Development
 - Building Inspection Division
 - 201 West Colfax Avenue, Dept 205
 - Denver, Colorado 80202
 - Telephone 720-865-2720
 - Fax 720-865-2880

1.05 DENVER FIRE DEPARTMENT

- A. For review and approval of plans for compliance with the Denver Fire Department's requirements as they apply to the Denver International Airport:
 - Denver Fire Department
 - 745 W. Colfax Ave.
 - Denver, Colorado 80204
 - Telephone 720-865-2833

- B. The Contractor is advised that the Denver Fire Department – Fire Prevention Bureau requires permitting for the following activities as they apply to the scope of work. The Contractor is responsible for obtaining the appropriate permits necessary to complete the work. All costs associated with this permitting and policy compliance shall be the responsibility of the Contractor. The policies all reference the International Fire Code (IFC).
1. “Hot work”, which is defined as the operation of any equipment or tool that creates sparks, hot slag, or radiant or convective heat as a result of the work. This includes, but is not limited to, welding, cutting, brazing, or soldering.
 2. Use and storage of compressed gas for both temporary storage and permanent facility installation. This includes, but is not limited to, flammable gas (excluding propane-LPG), oxidizer (including oxygen), and inert and/or simple asphyxiates.
 3. Tank installation, which includes above-ground storage tanks (AST) and underground storage tanks (UST) for both temporary tanks and permanent facility installations.
- C. In addition to the above permits, the Denver Fire Department may require other permits that are associated with the specific work in the Contract Documents. Policies provided by the Denver Fire Department are meant to provide basic information for the most common conditions and situations. In any given occupancy, many other Uniform Fire Code requirements may be enforced. These should be addressed with the Denver Fire Department before construction begins and during construction with premise inspection(s). Any questions can be addressed to the Fire Prevention Bureau between 6:30 AM and 9:00 AM Monday-Friday at 720-913-8242 or -8237.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PERMITS AND CERTIFICATIONS

- A. The Contractor shall maintain records on site of all permits acquired by federal, state, and local agencies. Posting of permits shall conform to requirements of the respective agencies.
- B. At the completion of any inspection by other agencies, the Contractor shall forward copies of the status of the inspection and copies of any approved or "signed-off" inspections by the respective agencies to the Project Manager.
- C. At the time of request for Substantial Completion, the Contractor shall forward to the Project Manager all permits approved by the respective agencies.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work

described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01060

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SECTION 01070

ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 REFERENCE LIST

- A. Documents published by the following agencies may be referenced within these Contract Documents to define the quality of materials, equipment, workmanship and other features of work. Unless otherwise stated, the reference documents shall be of the latest edition as of the date of the Advertisement for Bids.
- B. Wherever used in the Contract Documents, the following abbreviations will have the meanings listed:

ALA	American Association of Laboratory Accreditation
AAN	American Association of Nurserymen
AAO	Affirmative Action Officer
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFI	Air Filter Institute
AGTS	Automated Ground Transportation System
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
APEN	Air Pollution Emission Notes
APWA	American Public Works Association
ARI	Air Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers

ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society for Non-Destructive Testing
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWPA	American Wood Preserver's Association
AWS	American Welding Society
AWWA	American Water Works Association
BID	Building Inspection Division, Department of Public Works
CAR	Corrective Action Report
CCD	City and County of Denver
CCR	Contractor Change Request
CCRL	Cement Concrete Reference Laboratory
CD	Change Directive
CDOH	Colorado Department of Highways or Colorado Department of Health
CDOT	Colorado Department of Transportation
CMEC	Concrete Materials Engineering Council
CN	Change Notice
CO	Change Order
COE	Corps of Engineers
CPM	Critical Path Method
CR	Change Request
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DFD	Denver Fire Department
DIA	Denver International Airport

DOT	United States Department of Transportation
DOR	Designer of Record
DWB	Denver Water Board
EEO	Equal Employment Officer or Equal Employment Opportunity
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FHWA	Federal Highway Administration
FM	Factory Mutual Association
FS	Federal Specifications (U.S. General Services Administration)
GCC	General Contract Conditions
IAPMO	International Association of Plumbing and Mechanical Officials
IBR	Institute of Boiler and Radiator Manufacturer's
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
ISA	Instrument Society of America
ITA	Independent Testing Agency
MIL	Military Specifications (Naval Publications and Forms Center)
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NAAB	National Association of Air Balance
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards (now called National Institute of Standards and Technology)
NCR	Nonconformance Report

NEC	National Electric Code (NFPA 70)
NECA	National Electric Contractors Association
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFC	National Fire Code (as published by NFPA)
NFPA	National Fire Protection Association
NICET	National Institute for the Certification of Engineering Technologies
NIST	National Institute of Standards and Technology
NGS	National Geological Survey
NLMA	National Lumber Manufacturers Association
NOAA	National Oceanic and Atmospheric Administration
NRMCA	National Ready Mix Concrete Association
NTP	Notice to Proceed
NVLAP	National Voluntary Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDM	Precedent Diagram Method
PS	Product Standard of NIST (U.S. Department of Commerce)
PM	Project Manager (DIA)
QA	Quality Assurance
QC	Quality Control
RAR	Remedial Action Request
RFI	Request for Information
SC	Special Contract Condition
SDI	Steel Door Institute
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association

SSPWC	Standard Specifications for Public Works Construction
TCP	Traffic Control Plan
TSA	Transportation Security Administration
UBC	Uniform Building Code (published by ICBO)
UL	Underwriters Laboratories, Inc.
UMC	Uniform Mechanical Code (published by ICBO)
UPC	Uniform Plumbing Code (published by ICBO)
USC	United States Code
WBS	Work Breakdown Structure

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01070

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SECTION 01091

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. This Section contains a summary of industry-accepted and recognized standards published by trade associations, government and institutional organizations which are referred to in the various Sections of these specifications or elsewhere in the contract documents.
- B. Standards listed herein are included in the contract documents by this reference and become a part of the contract documents to the same extent as though included in their entirety unless specific limitations are noted in the individual Specifications sections.
- C. Listings of reference standards include name and address of the organization publishing the standard, plus the full name and designator of each of the standards referenced herein.
- D. If a publication date or edition number is listed with the reference standard, that publication date or edition number shall apply; otherwise, the publication date or edition number in effect at the contract date shall apply.
- E. Inclusion of reference standards herein does not make the Project Manager an agent of the publishing agency, nor does it obligate the Project Manager to perform inspections required by or to enforce rules or regulations contained in the reference standards.

1.02 REFERENCES

- A. RELATED DOCUMENTS: General Conditions, Special Conditions, and applicable provisions of Division 1 sections apply to this Section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SCHEDULE OF REFERENCE STANDARDS

- A. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO), 444 North Capitol Street, NW, Suite 249, Washington, DC 20090
 - AASHTO M 36 Corrugated Metal Pipe
 - AASHTO M216 Standard Specification for Lime for Soil Stabilization
 - AASHTO T26 Standard Method of Test for Water to be Used in Concrete
 - AASHTO T84 Specific Gravity and Absorption of Fine Aggregate
 - AASHTO T85 Specific Gravity and Absorption of Coarse Aggregate

AASHTO T103 Freeze-Thaw

AASHTO T219 Standard Methods of Testing Lime for Chemical Constituents and Particle Sizes

B. AMERICAN CONCRETE INSTITUTE (ACI) P.O. Box 19150, Redford Station, Detroit, MI 48219, (313) 372-9800

ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete

ACI 211.2 Standard Practice for Selecting Proportions for Structural Lightweight Concrete

ACI 301 Specifications for Structural Concrete for Buildings

ACI 304 Recommended Practices for Measuring, Mixing, Transporting and Placing Concrete

ACI 304.2R Placing Concrete by Pumping Methods

ACI 305R Hot Weather Concreting

ACI 306R Cold Weather Concreting

ACI 315 Details and Detailing of Concrete Reinforcement

ACI 318 Building Codes Requirements for Reinforced Concrete

(NOTE: Reference to ACI 318 may be limited to more stringent requirements of local building code)

C. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) 1916 Race Street, Philadelphia, PA 19103, (215) 299-5585

ASTM A 27 Mild to Medium Strength Carbon - Steel Casting for General Application

ASTM A 36 Structural Steel

ASTM A 47 Malleable Iron Castings

ASTM A 82 Specification for Steel Wire, Plain, for Concrete Reinforcement

ASTM A 123 Hot-dip Galvanizing

ASTMA 184 Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement

ASTM A 185 Specifications for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement

ASTM A 283 Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars

ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 706	Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement
ASTM C 25	Method for Chemical Analysis of Limestone, Quicklime and Hydrated Lime
ASTM K 29	Unit Weight of Aggregate
ASTM C 31	Methods of Making and Curing Concrete Test Specimens in the Field
ASTM C 33	Specification for Concrete Aggregates
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 76	Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 94	Specification for Ready Mixed Concrete
ASTM C 109	Mortar Bar Test for Cement
ASTM C 110	Methods for Physical Testing of Quicklime, Hydrated Lime and Limestone
ASTM C 117	Materials Finer than 75 mm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance of Abrasions of Small Size Coarse Aggregate by Use of the Los Angeles Machine
ASTM C 136	Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 138	Unit Weight, Yield and Air Content of Concrete
ASTM C 143	Test Method for Slump of Portland Cement Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 171	Specification for Sheet Materials for Curing Concrete
ASTM C 172	Method of Sampling Fresh Concrete
ASTM C 173	Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C 231	Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	Specification for Air Entraining Admixtures for Concrete
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 443	Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets
ASTM C 494	Specification for Chemical Admixtures for Concrete
ASTM C 595	Blend Hydraulic Cements
ASTM C 618	Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM C 655	Reinforced Concrete D Load Culvert, Storm Drain and Sewer Pipe
ASTM C 789	Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers
ASTM C 803	Test Method for Penetration Resistance of Hardened Concrete
ASTM C 805	Test Method for Rebound Number of Hardened Concrete
ASTM C 977	Specification for Quicklime and Hydrated Lime for Soil Stabilization
ASTM D 75	Sampling Aggregate
ASTM D 422	Test Method for Particle Size Analysis of Soils
ASTM D 516-88	Standard Test Method for Sulfate Ions in Water
ASTM D 693	Crushed Stone, Crushed Slag and Crushed Gravel for Dryer Water-Bound Macadam Base Courses and Bituminous Macadam Base and Surface Courses of Pavements
ASTM D 698	Test Method for Moisture Density Relations of Soils and Soil- Aggregate Mixtures Using 5.5-lb. Hammer and 12-Inch Drop
ASTM D 751	Burst Strength
ASTM D 1556	Test Method for Density of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test Method for Moisture Density Relations of Soils and Soil- Aggregate Mixtures Using 10-lb. Hammer and 18-Inch Drop
ASTM D 1682	Ultraviolet Resistance Grab Tensile Strength Grab Tensile Elongation Toughness
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving

- and Structural Construction
- ASTM D 1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
- ASTM D 2167 Test Method for Density of Soil in Place by the Rubber-Balloon Method
- ASTM D 2216 Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil Aggregate Mixtures
- ASTM D 2363-78 Trapezoid Tear Strength
- ASTM D 2419 Sand Equivalent Value of Soils and Fine Aggregate
- ASTM D 2487 Test Method for Classification of Soils for Engineering Purposes
- ASTM D 2922 Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Method
- ASTM D 3017 Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- ASTM D 3665 Random Sampling of Paving Materials
- ASTM D 4253 Test Method for Maximum Index Density of Soils Using Vibratory Table
- ASTM D 4318 Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
- ASTM D 4397 Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications
- ASTM D 4546 Test Method for One-Dimensional Swell or Settlement Potential of Cohesive Soils
- ASTM E 329 Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction
- ASTM F 477 Elastomerics Seals (Gaskets) for Joining Plastic Pipe
- ASTM F 758 Smooth-Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport and Similar Drainage
- D. D.AMERICAN WELDING SOCIETY (AWS), 550 NW LeJeune Road, Miami, FL 33135AWS Code for Welding in Building Construction (Structural Welding Code).
- E. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)933 N. Plum Grove Road, Schaumburg, IL 60195, (312) 490-1700
- Manual of Standard Practice
- F. COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) Division of Administration, Office of Bid Plans, 4201 E. Arkansas Avenue, Denver, CO 80222

Standard Specifications for Road and Bridge Construction (latest edition) Colorado
Standard Plans, M&S Standards

- G. FEDERAL HIGHWAY ADMINISTRATION (FHWA) Superintendent of Documents, US
Government Printing Office, Washington DC, 20402

Manual of Uniform Traffic Control Devices (latest edition)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 01091

SECTION 01095

DEFINITIONS AND CONVENTIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section contains a list of definitions of words or phrases and grammatical or contextual conventions commonly used in these contract documents.

1.02 REFERENCES

- A. Related Documents: General Conditions, Special Conditions, and applicable provisions of Technical Specifications Division 1 apply to this Section.

1.03 DEFINITIONS

- A. Alphabetical Listing of Definitions
1. **As indicated:** Shown on the drawings by graphic indication, notes or schedules, or written in the specifications or elsewhere in the contract documents.
 2. **As directed, as approved, as requested:** Unless otherwise indicated, these terms imply "by the Project Manager" and require that an instruction be obtained by the Contractor from the Project Manager.
 3. **Concealed:** Embedded in masonry, concrete or other construction; installed in furred spaces; within double partitions or hung ceilings; in trenches; in crawl spaces or in enclosures.
 4. **Ensure:** To make certain in a way that eliminates the possibility of error.
 5. **Exposed:** Not installed underground or "concealed" as defined above.
 6. **Furnish or Provide:** To supply, install and connect complete and ready for safe and regular operation of particular work unless specifically otherwise noted.
 7. **Indicated, Shown, or Noted:** As depicted on drawings or specifications.
 8. **Install:** To erect, mount and connect complete with related accessories.
 9. **Or equal, or approved equal:** Refers to products which, in the opinion of the Project Manager, are similar in all respects to products specified by proprietary brand name. (Refer to Section 01630 for procedures for submittal of proposed substitutions.)
 10. **Rework:** To repair existing items or work required to be removed and replaced in order to accomplish the Work in accordance with the contract documents.
 11. **Related Work:** Includes, but not necessarily limited to, mentioned work associated with, or affected by, the work specified.
 12. Reviewed, Satisfactory, Accepted, or Directed: Assumes by or to the Project Manager.
 13. **Similar, or Equal:** Same in materials, weight, size, design, construction, capacity, performance and efficiency of specified product.
 14. **Supply:** To purchase, procure, acquire and deliver complete with related accessories.

15. **Unless Otherwise Indicated and Unless Otherwise Noted:** General note to perform work as indicated or shown on drawings or in specifications unless specifically directed otherwise elsewhere in the contract documents; may be abbreviated "U.O.N.", "U.O.I.", or "U.N.O."

1.04 CONVENTIONS

A. Specifications Format

1. In order to standardize the location of information in the Contract Documents, the specifications generally are organized in one or more of the following formats:
 - a. The 16-Division "MASTERFORMAT" published by the Construction Specifications Institute.
 - b. The Standard Specifications for Road and Bridge Construction published by CDOT.
 - c. The alpha-numeric system as published by the FAA.

B. Organization of Drawings and Specifications

1. Organization of the specifications into divisions and sections, and arrangement or numbering of drawings is intended solely for the convenience of the Contractor in his responsibilities to divide the Work among subcontractors or to establish the extent of work to be performed by any trade.
2. Neither the Owner nor the Project Manager assume any liability arising out of jurisdictional issues or claims advanced by trade organizations or other interested parties based on the arrangement or organization of drawings or specifications.

C. Gender and Number

1. For convenience and uniformity, parties to the Contract, including the Owner, Contractor, and Project Manager, and their subcontractors, suppliers, installers, consultants or other interested parties are referred to throughout the contract documents as if masculine in gender and singular in number. Such reference is not intended to limit the meaning of the contract documents to the masculine gender or singular number.

D. Singular vs. Plural

1. Materials, products, equipment or other items of work referred to in the singular shall be construed as plural where applicable by the intent of the contract documents and shall not limit quantities to be provided by the Contractor.

E. Imperative Mood

1. Specifications and notes on the drawings or elsewhere in the contract documents are generally written in the imperative mood as instructions to the Contractor, whether the Contractor is specifically addressed or not.

F. References to Subcontractors or Trades

1. References to subcontractors, trades or other entities which are not parties to the contract shall be construed as meaning the Contractor whose responsibility it shall be to divide the Work among subcontractors or trades. Such references are used as a matter of convention, and are not intended to preclude or direct the Contractor's responsibility to divide the Work.

G. Abbreviations

1. A list of abbreviations used in the contract documents is included in Technical Specifications Section 01070; an abridged list of abbreviations used on the drawings is included with the drawings.
2. Abbreviations are believed to be those in general use in the construction industry. Contact the Project Manager for clarification of abbreviations for which the meaning is not clear.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 01095

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SECTION 01110

CONSTRUCTION SAFETY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work specified in this Section includes construction safety precautions and programs by the Contractor and the basis for reviews by the Project Manager.

1.02 RESPONSIBILITY

- A. The General Conditions make it clear that all safety precautions during the construction process are the responsibility of the Contractor. The Contractor is responsible for the health and safety of his employees, agents, subcontractors and their employees, and other persons on the worksite; for the protection and preservation of the work and all materials and equipment to be incorporated therein; and for the worksite and the area surrounding the worksite. The Contractor shall take all necessary and reasonable precautions and actions to protect all such persons and property.
- B. This Section shall be interpreted in its broadest sense for the protection of persons and property by the Contractor and no action or omission by the Project Manager or his authorized representatives shall relieve the Contractor of any of its obligations and duties hereunder.

1.03 SUBMITTAL

- A. Refer to Technical Specifications Section 01300 and 01340 for the process. A safety plan shall be submitted and approved under the general contract prior to commencing any work. If a Task Order is issued where the work is not covered by the approved safety plan then a revision to the plan specific for the work in the task order shall be resubmitted for approval. NOTE: NO PROGRESS PAYMENT SHALL BE APPROVED UNTIL THE SAFETY PLAN HAS BEEN ACCEPTED BY THE PROJECT MANAGER.

1.04 PROJECT MANAGER'S REVIEW

- A. Provide a Contractor's Operational Safety Plan as described below and in Part 1 of this Technical Specifications Section 01111.
- B. The Contractor shall provide six copies of its Operational Safety Program to the DIA Project Manager for review at least ten calendar days before on-site construction begins. The Contractor's program must meet, as a minimum, all applicable federal, state and local government requirements.
 - 1. The Contractor must, as part of the Contractor's safety program, submit six copies of the following information for acceptance by the DIA Project Manager prior to the commencement of construction activities. The Safety Plan must address all aspects listed below. If an item is not applicable, this must be noted in the Safety Plan.
 - a. Name of the Contractor's site safety representative.
 - b. If the Contractor is running multiple shifts or working more than 40 hours per week, the name of an assistant site safety representative who can act in the absence of the site safety representative.
 - c. Twenty-four hours per day emergency phone numbers of Contractor site

- management to be used in case of injury or accident. Provide at least four contacts.
- d. The Contractor's method of ditching and trenching excavation to be used including how slopes will be stabilized with calculations showing the slope stability. The Contractor shall also show how material will be stored beside the excavation. Stored material will include the excavated and backfilled material.
 - e. How injuries or accidents will be handled including samples of the forms used to report injuries or accidents.
 - f. How employees will be handled who are unable to safely perform their duties, including how the Contractor will determine whether an employee is unable to safely perform his duties.
 - g. How and when equipment will be checked to see that it is safe, that all safety guards are in place, and that the equipment is being used for its designed purpose and within its rated capacity.
 - h. How and when all electric devices will be checked for proper grounding and insulation. Describe the methods that will be used to lock out electric systems that should not be energized.
 - i. How trash and human organic waste will be disposed of.
 - j. How snow and ice will be removed by the Contractor in his project area.
 - k. How concrete forms will be anchored to ensure their stability, including calculations showing that the forms will safely hold the maximum construction loads.
 - l. How flammable materials will be stored and handled, and how any spills will be cleaned up and removed for disposal.
 - m. What system will be used to prevent fires and, if fires do occur, who will be trained to fight them. Also, what fire fighting equipment will the Contractor have available and how will this equipment's condition be monitored.
 - n. How materials will be received, unloaded, stored, moved and disposed of.
 - o. How personnel working above ground level will be protected from falling.
 - p. How people working beneath the construction work will be protected.
 - q. What will be done to protect personnel in case of severe weather.
 - r. How adequate lighting will be provided and monitored.
 - s. How air quality will be monitored to ensure that chemical exposures are below established OSHA Permissible Exposure Limits. How employees will be protected if these limits are exceeded.
 - t. How the safety of work platforms, man lifts, material lifts, ladders, shoring, scaffolding, etc. will be ensured relating to load capacity and the protection of personnel using or working around them.
 - u. The type of personal protective equipment that will be used to protect employees from hazards.
 - v. The type of safety training that will be provided to employees to inform them of safe work procedures.
 - w. How audits and inspections will be performed to ensure compliance with the Safety Plan and applicable OSHA regulations.
 - x. Procedures to ensure that welding and other hot work is performed safely.
 - y. How compressed gases will be safely stored, handled and used.
 - z. Methods to ensure that employees safely enter, work in, and exit confined spaces.
 - aa. How the hazards of chemicals will be communicated to workers, including the use of material safety data sheets and chemical labels.

- bb. Methods to ensure that forklifts and other powered industrial trucks are operated in a safe manner.
 - cc. How an effective hearing conservation program will be used to protect employees from high noise levels and prevent hearing loss.
 - dd. How employees will be protected from the effects of jet blast.
- C. Prior to the start of any work by a contractor or subcontractor employee, the Contractor shall provide the Project Manager with a list of its employees, subcontractor's employees and other personnel the Contractor has requested to work at Denver International Airport, who have signified in writing that they have been briefed on, or have read and understand, the Contractor's Safety Plan.

PART 2 - PRODUCTS

2.01 CONTRACTOR'S SAFETY PLAN

- A. Provide a Contractor's Safety Program as described in Part 1 of Technical Specifications Section 01110.

PART 3 - EXECUTION

3.01 IMPLEMENT CONTRACTOR'S SAFETY PLAN

- A. Implement the approved Contractor's Operational Safety Plan as described in Part 1 of this Technical Specifications Section 01110. Technical Specifications Section 01110.
- B. If the Contractor experiences lost time or an injury rate greater than 75 percent of the national average for all construction, the Contractor shall audit its safety procedures and submit a plan to reduce its rates.
- C. If at any time the lost time or injury rates experienced by the Contractor are 150 percent or more of the national average for construction, the Contractor shall immediately hire an independent safety professional who shall audit the Contractor's procedures and operations and make a report of changes that the Contractor should implement to reduce the rate including changing personnel.
 - 1. Six copies of this report shall be submitted to the DIA Project Manager.
 - 2. The Contractor shall immediately begin implementing the recommendations.
 - 3. A weekly report shall be submitted by the Contractor on the status of the implementation of the recommendations.
 - 4. Failure to comply with these requirements is a basis to withhold a portion of progress payments.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work

described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01110

SECTION 01111

CONSTRUCTION SAFETY – AIRSIDE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section includes construction safety precautions and programs by the Contractor and the basis for reviews by the DIA Project Manager.

1.02 RESPONSIBILITY

- A. The General Conditions make it clear that all safety precautions during the construction process are the responsibility of the Contractor. The Contractor is responsible for the health and safety of his employees, agents, subcontractors and their employees, and other persons on the worksite; for the protection and preservation of the work and all materials and equipment to be incorporated therein; and for the worksite and the area surrounding the worksite. The Contractor shall take all necessary and reasonable precautions and actions to protect all such persons and property.
- B. This Section shall be interpreted in its broadest sense for the protection of persons and property by the Contractor and no action or omission by the DIA Project Manager or his authorized representatives shall relieve the Contractor of any of its obligations and duties hereunder.

1.03 REFERENCED TECHNICAL SPECIFICATIONS

- A. The following Technical Specifications sections are referenced in this Section:
 - 1. Section 01015 Security Requirements
 - 2. Section 01016 Vehicle and Equipment Permitting
 - 3. Section 01020 Utilities Interface

1.04 SUBMITTAL

- A. Refer to Technical Specifications Section 01300 and 01340 for the submittal process. A safety plan shall be submitted and approved under the general contract prior to commencing any work. If a Task Order is issued where the work is not covered by the approved safety plan then a revision to the plan specific for the work in the task order shall be resubmitted for approval. NOTE: NO PROGRESS PAYMENT SHALL BE APPROVED UNTIL THE SAFETY PLAN HAS BEEN ACCEPTED BY THE PROJECT MANAGER.

1.05 CONSTRUCTION OPERATIONAL SAFETY PLAN

- A. Scope: The Contractor's Operational Safety Plan covers the actions of not only the construction personnel and equipment, but the actions of inspection personnel and airport staff for the duration of construction activities.
- B. Definitions:
 - 1. Approach Surface: A surface longitudinally centered on the extended runway centerline and extending outward and upward from either a runway threshold or 200 feet behind a

- threshold. This surface is needed to define where unobstructed airspace above the runway begins.
2. Notice To Airmen (NOTAM): A notice to the flying public (airmen) through FAA's NOTAM system. Normally initiated by message to the nearest FAA Flight Service Station. Issuance of the NOTAM will be coordinated through the DIA Project Manager and DIA Operations.
 3. Object Free Area: A two-dimensional ground area surrounding runways, taxiways and taxi lanes which is clear of objects, except for objects whose location is fixed by function.
 4. Safety Area: The surface adjacent to runways, taxiways, and taxi lanes over which aircraft and emergency vehicles should, in dry weather, be able to cross at normal operating speeds without incurring significant damage. A safety area is graded, drained, and compacted. It is free of any holes, trenches, mounds, or other significant surface variations or objects other than those that perform an essential aeronautical function. These objects, such as in-ground lighting fixtures and directional signage, should be of minimum practicable height and mass, and they must break away at ground level. Safety area dimensions are shown on the construction plan sheets.
- C. Policy: Aviation safety is a primary consideration during airport construction. These activities shall be planned and scheduled to minimize disruption of normal aircraft activities. If the clearances and restrictions described in this plan cannot be maintained while construction is underway, action will be taken by the Contractor to perform work at night or during periods of minimal aircraft activity.
- D. Safety Impacts: The Contractor shall take all necessary steps and precautions to mitigate the impact of hazardous conditions as they may relate to the Work. Potentially hazardous conditions which may occur during airport construction include, but are not limited to, the following:
1. Trenches, holes, or excavations on or adjacent to any active runway, taxiway, taxi lane, apron or related safety areas.
 2. Unmarked/unlighted holes or excavations on or adjacent to any active runway, taxiway, taxi lane, apron or related safety areas.
 3. Mounds or piles of earth, construction material, temporary structures, or other objects on or in the vicinity of any active runway, taxiway, taxi lane, apron or related safety, approach, or departure areas.
 4. Pavement drop-offs which would cause, if crossed at normal operating speeds, damage to aircraft that normally use the airport. The maximum drop-off is 3 inches per FAA Advisory Circular 150/5300-13.
 5. Vehicles or equipment (whether operating or idle) on any active runway, taxiway, taxi lane, apron or related safety, approach, or departure areas.
 6. Vehicles, equipment, excavations, stockpiles, or other materials that could impinge upon NAVAID-critical areas and degrade or otherwise interfere with electronic NAVAIDS or interfere with visual NAVAIDS facilities.
 7. Unmarked utility, NAVAIDS, weather service, runway lighting, underground power or signal cables that could be damaged during construction.
 8. Objects or activities anywhere on or in the vicinity of an airport which would be distracting, confusing, or alarming to pilots during aircraft operations.
 9. Unflagged/unlighted low visibility items (such as tall cranes, backhoes, scrapers, dump

trucks, rollers, compactors, dozers and the like) in the vicinity of an active runway, taxiway, taxi lane, apron or related safety, approach, or departure areas.

10. Dirt, debris, or other transient accumulations which temporarily obscure pavement markings or pavement edges, or derogate the visibility of runway or taxiway markings or lighting or of construction and maintenance areas.
11. Trash or other materials with foreign object damage (FOD) potential, whether on runways, taxiways, taxi lanes, aprons or in related safety areas.
12. Failure to control vehicle, human and large animal access to, and nonessential nonaeronautical activities on, open aircraft movement areas.
13. Failure to maintain radio communication between construction vehicles and air traffic control or other on-field communications facilities.
14. Construction activities or material which could hamper Aircraft Rescue and Fire Fighting (ARFF) vehicle access from ARFF stations to all parts of the runway/taxiway system, runway approach and departure areas, or aircraft parking locations.
15. Inadequate fencing or other marking to separate construction areas from open aircraft operating areas.
16. Bird attractions such as edibles (food scraps, etc.), trees, brush, other trash, grass/crop seeding, or ponded water on or near the airport.

E. Safety Requirements

1. General

- a. During performance of this contract, the airport runways, taxiways, taxi lanes, and aircraft parking aprons shall remain in use by aircraft to the maximum extent possible, consistent with continual safety. Aircraft use of areas near the Contractor's work will be controlled to minimize disturbance to the Contractor's operation. However, AIRCRAFT HAVE THE RIGHT OF WAY AT ALL TIMES. The Contractor shall not allow employees, subcontractors, suppliers, or any unauthorized persons to enter or remain in any airport area which would be hazardous to persons or to aircraft operations.
- b. Contractor personnel, airport staff and field inspectors directly involved in on-airport construction shall:
 - 1) Be aware of the types of conditions, safety problems, and/or hazards identified each day at the airport. To insure that all personnel are aware, daily meetings between management and supervisory personnel and their employees shall be scheduled prior to any work commencing on the shift.
 - 2) Inspect daily all work and/or storage areas for which the Contractor is responsible to be aware of current conditions.
 - 3) Promptly take all steps needed to remedy any unsafe or potentially unsafe condition. Coordinate with the DIA Project Manager to insure immediate corrective action is undertaken
- c. Before commencement of construction activity the Contractor, through coordination with the DIA Project Manager and DIA Operations, shall give notice using the NOTAM system of construction on the airfield. In addition, a NOTAM shall be issued for the completion of construction on the airfield.

2. Construction Area Marking: Temporary lighting, barricades, flagging, and flashers are required as shown on the plans. Flag lines, traffic cones, flashers, edge lights, and/or signs shall be used as necessary:

- a. To clearly separate all construction from other parts of an air operations area

- b. To identify isolated hazards, such as open manholes, excavations, areas under repair, stockpiled material, waste areas, etc.
 - c. Vehicle and pedestrian access routes used for airport construction shall be controlled to prevent any unauthorized entry of persons, vehicles or animals
 - d. Vehicle parking areas for Contractor employees shall be designated in advance to minimize traffic in open/active aircraft movement areas.
3. Cables and Utilities
- a. Special attention shall be given to preventing unscheduled interruption of utility services and facilities. The location of all cables and utilities shall be identified prior to construction activities.
 - b. There shall be coordination among the Contractor, the DIA Project Manager, DIA Operations, the FAA, the National Weather Service, utility companies, and any other appropriate entity or organization. NAVAIDS, weather service facilities, electric cables, and other utilities must be fully protected during the entire construction time.
 - c. Power, communication and control cables leading to and from any FAA NAVAIDS, weather service, and other facilities will be marked in the field by the appropriate individuals as identified in contract document Technical Specifications Section 01020, Utilities Interface, for the information of the Contractor before any work in their general vicinity is started. Thereafter, through the entire duration of construction, utilities shall be protected from any possible damage.
 - d. At the intersection of expansion joints and centerline lighting circuits on taxiways and runways, the electrical conduit may be within the 21" portion of the Portland cement concrete pavement. Coordination with the Project Manager's representative and the DIA Electrical Department is of utmost importance for both the scheduling of an outage and the removal of conductors while cutting the joint.
4. Vehicle and Employee Identification
- a. Contractor vehicles and equipment shall be flagged for high daytime visibility and if appropriate, lighted for nighttime operations. Vehicles which are not marked and lighted shall be escorted by a vehicle that is equipped with appropriate marking and lighting devices. Marking and lighting shall be in conformance with FAA AC 150/5210-5, current edition, or as outlined in Technical Specifications Section 01016, Vehicle and Equipment Permitting, of the contract documents.
 - b. The Contractor will be required to conform to the specific requirements as outlined in Technical Specifications Section 01015, Security Requirements, of the contract documents.
5. Radio Communications
- a. The Contractor's construction superintendent and flag personnel shall be required to coordinate directly with the DIA Project Manager or designated Representative. Only the DIA Project Manager or designated Representative shall monitor transceiver radios tuned to the frequency for communications with DIA Operations and B Tower Control. Radios shall be used to obtain the proper clearance in regard to the movement of equipment, trucks, etc., on the airfield. Further, any unusual occurrences in the flight pattern of approaching or departing aircraft shall be acknowledged by all concerned so that operation of the airport and the construction work can be safely carried on at all times.
6. Haul Routes Crossing Active Aircraft Operation Areas
- a. The Contractor shall provide a minimum of one broom truck to continuously clean the surface of the active taxiway, taxi lane or apron of any foreign object damage (FOD) or other objectionable debris that may result from hauling activities.

Additional broom trucks may be required to expedite the cleanup process. Opening the taxiway, taxi lane or apron to aircraft operations shall only be approved after a visual inspection of the pavement surface by the DIA Airfield Operations Manager.

- b. The Contractor shall not work within 250 ft. of the centerline of an active taxiway or 310 ft. of the centerline of an active runway without approval by the DIA Project Manager.
- c. All construction equipment and vehicles shall be flagged for high daytime visibility and if appropriate, lighted for nighttime operations. Vehicles which are not marked and lighted shall be escorted by a vehicle that is equipped with appropriate marking and lighting devices. Marking and lighting shall be in conformance with FAA AC 150/5210-5, current edition.
- d. All construction equipment, vehicles, personnel and supplies must be cleared from the taxiway safety area when directed by the DIA Project Manager or DIA Operations.
- e. All Contractor and Subcontractor employees must be aware of the types of safety problems and hazards associated with aircraft operations and construction activities. Refer to paragraph 1.05.D of this Technical Specifications Section.

PART 2 - PRODUCTS

2.01 CONTRACTOR'S OPERATIONAL SAFETY PLAN

- A. Provide a Contractor's Operational Safety Plan as described below and in Part 1 of this Technical Specifications Section 01111.
- B. The Contractor shall provide six copies of its Operational Safety Program to the DIA Project Manager for review at least ten calendar days before on-site construction begins. The Contractor's program must meet, as a minimum, all applicable federal, state and local government requirements.
 1. The Contractor must, as part of the Contractor's safety program, submit six copies of the following information for acceptance by the DIA Project Manager prior to the commencement of construction activities. The Safety Plan must address all aspects listed below. If an item is not applicable, this must be noted in the Safety Plan.
 - a. Name of the Contractor's site safety representative.
 - b. If the Contractor is running multiple shifts or working more than 40 hours per week, the name of an assistant site safety representative who can act in the absence of the site safety representative.
 - c. Twenty-four hours per day emergency phone numbers of Contractor site management to be used in case of injury or accident. Provide at least four contacts.
 - d. The Contractor's method of ditching and trenching excavation to be used including how slopes will be stabilized with calculations showing the slope stability. The Contractor shall also show how material will be stored beside the excavation. Stored material will include the excavated and backfilled material.
 - e. How injuries or accidents will be handled including samples of the forms used to report injuries or accidents.
 - f. How employees will be handled who are unable to safely perform their duties, including how the Contractor will determine whether an employee is unable to safely perform his duties.
 - g. How and when equipment will be checked to see that it is safe, that all safety

- guards are in place, and that the equipment is being used for its designed purpose and within its rated capacity.
- h. How and when all electric devices will be checked for proper grounding and insulation. Describe the methods that will be used to lock out electric systems that should not be energized.
 - i. How trash and human organic waste will be disposed of.
 - j. How snow and ice will be removed by the Contractor in his project area.
 - k. How concrete forms will be anchored to ensure their stability, including calculations showing that the forms will safely hold the maximum construction loads.
 - l. How flammable materials will be stored and handled, and how any spills will be cleaned up and removed for disposal.
 - m. What system will be used to prevent fires and, if fires do occur, who will be trained to fight them. Also, what fire fighting equipment will the Contractor have available and how will this equipment's condition be monitored.
 - n. How materials will be received, unloaded, stored, moved and disposed of.
 - o. How personnel working above ground level will be protected from falling.
 - p. How people working beneath the construction work will be protected.
 - q. What will be done to protect personnel in case of severe weather.
 - r. How adequate lighting will be provided and monitored.
 - s. How air quality will be monitored to ensure that chemical exposures are below established OSHA Permissible Exposure Limits. How employees will be protected if these limits are exceeded.
 - t. How the safety of work platforms, man lifts, material lifts, ladders, shoring, scaffolding, etc. will be ensured relating to load capacity and the protection of personnel using or working around them.
 - u. The type of personal protective equipment that will be used to protect employees from hazards.
 - v. The type of safety training that will be provided to employees to inform them of safe work procedures.
 - w. How audits and inspections will be performed to ensure compliance with the Safety Plan and applicable OSHA regulations.
 - x. Procedures to ensure that welding and other hot work is performed safely.
 - y. How compressed gases will be safely stored, handled and used.
 - z. Methods to ensure that employees safely enter, work in, and exit confined spaces.
 - aa. How the hazards of chemicals will be communicated to workers, including the use of material safety data sheets and chemical labels.
 - bb. Methods to ensure that forklifts and other powered industrial trucks are operated in a safe manner.
 - cc. How an effective hearing conservation program will be used to protect employees from high noise levels and prevent hearing loss.
 - dd. How employees will be protected from the effects of jet blast.
- C. Prior to the start of any work by a Contractor or Subcontractor employee, the Contractor shall provide the DIA Project Manager with a list of its employees, subcontractor's employees and other personnel the Contractor has requested to work at Denver International Airport, who have signified in writing that they have been briefed on, or have read and understand, the Contractor's Safety Plan.

PART 3 - EXECUTION

3.01 IMPLEMENT CONTRACTOR'S OPERATIONAL SAFETY PLAN

- A. Implement the approved Contractor's Operational Safety Plan as described in Parts 1 and 2 of this Technical Specifications Section 01111.
- B. If the Contractor experiences lost time or an injury rate greater than 75 percent of the national average for all construction, the Contractor shall audit its safety procedures and submit a plan to reduce its rates.
- C. If at any time the lost time or injury rates experienced by the Contractor are 150 percent or more of the national average for construction, the Contractor shall immediately hire an independent safety professional who shall audit the Contractor's procedures and operations and make a report of changes that the Contractor should implement to reduce the rate including changing personnel.
 - 1. Six copies of this report shall be submitted to the DIA Project Manager.
 - 2. The Contractor shall immediately begin implementing the recommendations.
 - 3. A weekly report shall be submitted by the Contractor on the status of the implementation of the recommendations.
 - 4. Failure to comply with these requirements is a basis to withhold a portion of progress payments.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01111

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section requires the Contractor's superintendent and Quality Control representative to attend meetings scheduled by the City for the collection and dissemination of information related to the subject contract.
- B. The Project Manager will prepare the minutes of each meeting and distribute them to each of the participants.

1.02 OTHER MEETINGS

- A. The Contractor will be advised of times, dates and places of contract meetings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. A Preconstruction Meeting will be scheduled by the City after the Contract has been signed by all parties. The purpose of this meeting is to introduce the City's Representatives to their counterparts in the Contractor's organization and to establish lines of communication between these representatives and outline some contract requirements. The Contractor's Superintendent and Quality Control Representative(s) shall attend this meeting.
- B. The Project Manager will distribute a notice of this meeting, along with an agenda of the subjects to be addressed.
- C. The Project Manager will explain and discuss the responsibilities and authorities of the City, the Designer, and the Project Manager's organization.
- D. The Project Manager will provide highlights of the following information at this meeting:
 - 1. Equal Employment Opportunity (EEO), Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) requirements.
 - 2. Insurance, laws, codes, traffic regulations and permit requirements of public agencies and their regulations.
 - 3. Procedures for processing change orders.
 - 4. Procedures for submitting shop and working drawings, product data and samples.
 - 5. Monthly pay estimate cutoff dates.
 - 6. Payment procedures.
 - 7. Request for information procedures.
 - 8. Communication procedures.
 - 9. Contractor-required Daily Report showing the quantitative progress of work, the use of

men, material and equipment, problems, potential delays, weather, shift, down equipment, material and equipment received and information received from the City. Daily reports will be submitted to the Project Manager within 48 hours of start of work. Daily Reports are required every day, including weekends and holidays.

10. Scheduling and coordination requirements.
 11. Quality control/assurance procedures.
 12. Environmental requirements and permits.
 13. As-built documents.
 14. Project closeout requirements.
- E. The Contractor will introduce the Contractor's representatives and briefly describe each person's responsibilities. The Contractor will provide the following:
1. A list of all subcontractors.
 2. Office, storage areas and construction area layouts, along with temporary easements.
 3. Safety, first aid, emergency actions and security procedures including the name of the Contractor's insurance company.
 4. 60 day preliminary schedule.
 5. Sequence of Work.
 6. Construction methods and general worksite layout and haul plan.
 7. Housekeeping procedures. Include a written plan for dealing with and preventing FOD (Foreign Object Damage).
 8. The Contractor's general erosion and sedimentation control plans, noise, hazardous material, air and water pollution control plans and Quality Control Plan.
 9. Coordination and notification for utility work.
 10. The Contractor's procedures to coordinate its work with the work of other contractors and its procedures for sharing access to the worksite.
 11. Deliveries and priorities of major equipment.
 12. Submittal Schedule
- F. Explanations provided by the City will not amend, supersede or alter the terms or meaning of any contract document, and the Contractor shall not claim reliance on such explanations as a defense to any breach or failure by the Contractor to perform as specified in the contract.

3.02 CONSTRUCTION PROGRESS MEETINGS

- A. Progress meetings will be scheduled weekly and more often as necessary by the Project Manager to promote the competent and timely execution of the contract.
- B. The meetings will be held at the worksite or at a location selected by the Project Manager. Meetings will be chaired by the Project Manager or the Project Manager's representative.
- C. The Contractor's personnel, as listed in Technical Specification Section 01200, 3.01.A, shall attend unless otherwise agreed by the Project Manager.
- D. The Project Manager will be responsible for publishing minutes of the meetings.

- E. At a minimum, the following items will be addressed at each meeting. The items addressed in the meeting do not waive notification or submittal requirements as required elsewhere in the contract.
1. Safety: Contractor shall report any safety issues
 2. Quality Control
 - a. The Contractor's Quality Control representative shall present and review all RAR's, CCR's, and NCR's issued and the status of each item.
 - b. The Contractor's Quality Control Representative shall present and discuss the Independent Testing Agency weekly test report and/or testing schedule.
 - c. The Contractor's Quality Control representative shall report on inspections by other agencies and any follow-up activity required.
 - d. The Project Manager will present and discuss issues regarding quality control.
 3. Quality Assurance
 - a. The Project Manager will present and discuss issues regarding quality assurance.
 4. Design activities: open discussion
 5. Shop drawings/submittals
 - a. The Contractor shall provide four copies of and review the Contractor's submittal schedule and provide any updated information and/or changes to the schedule.
 - b. The Contractor shall provide information on the status of submittals requiring re-submittal.
 - c. The Contractor shall review any accepted submittals that the Contractor plans to re-submit with changes.
 6. Construction activities: Open discussion to include coordination items with other Contractors and or agencies.
 7. Schedule
 - a. The Contractor shall provide to the Project Manager four copies of the Contractor's three week look-ahead schedule and review at the meeting the items on the schedule. The schedule shall be in bar chart format based on the approved CPM, and shall include dates of testing activities, anticipated dates of inspection by DIA and other agencies, items in progress, percentage of completion of items, responsible subcontractor for the items.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable multiplier or work request bid item.

END OF SECTION 01200

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SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section summarizes the requirements for the submittal of documents to the City that are defined in these Specifications. It also describes the procedures for "supplemental" submittals.

PART 2 - PRODUCTS

2.01 SUBMITTAL SCHEDULE

- A. The Contractor shall provide a submittal schedule within 14 days after Notice to Proceed. The Submittal Schedule shall be directly related to the CPM schedule, shall identify all the submittals, and shall include the following information for each submittal item:
1. Specification section, contract article, or special condition
 2. Specification Subparagraph
 3. Item description
 4. Date the submittal shall be submitted
 5. Name of subcontractor or supplier
- B. The submittal schedule shall be updated every two weeks by the Contractor and submitted with the progress payment request.
- C. One electronic submittal submitted on a single CD-ROM or DVD-ROM.

2.02 ELECTRONIC SUBMITTALS

- A. All submittals shall be delivered to the DIA Project Manager in electronic format.
1. Acceptable electronic formats
 - a. Adobe Acrobat 8.0 or newer. All files shall be fully compatible with Adobe Acrobat 8.0. File shall have no security and bookmark every applicable submittal. All pages shall be completely legible and oriented to correct reading view.
 2. Formats are acceptable only with written permission of the project manager or required by individual spec sections:
 - a. Microsoft Office 2007 or newer. All files shall be fully compatible with Microsoft Office 2007.
 - b. AutoDesk AutoCAD 2007 or newer. All files shall be fully compatible with AutoDesk AutoCAD 2007.
 - 1) AutoCAD files shall be self contained with no external x-references.
 - c. Other files pre-approved by the DIA Project Manager.
 3. Electronic file names: Each electronic document shall have a unique file name. File name convention shall be as follows: CEXXXXX-AAA-BBBBB-CCCRZ
 - a. XXXXX = DIA contract number

- b. AAA = sequential submittal number starting at 001.
- c. BBBBB = specification section containing submittal requirements
- d. CCC = sequential specification submittal number starting at 001.
- e. RZ = sequential revision number. RZ not required on initial submittals.
- f. Example A: "CE52006-005-01370-002", five submittals have been logged overall with two submittals made to specification section 01370.
- g. Example B: "CE52006-009-01370-002R3, nine submittals made overall and three revisions to submittal 01370-002.

2.03 INITIAL SUBMITTAL

- A. Each submittal document shall include a title block showing the following information:
 - 1. Date of submittal and revision dates.
 - 2. Contract title and number.
 - 3. The names of Contractor, subcontractor, supplier, manufacturer and when applicable, the seal and signature of an engineer registered in the State of Colorado, for the involved discipline.
 - 4. Identification of product by either description, model number, style number or lot number.
 - 5. Subject identification by contract drawing or specification reference.
- B. On each submitted drawing, include a blank space on each sheet, three inches by four inches, in the lower right corner, just above the title block, in which the City or the Designer of Record may indicate the action taken.
- C. Make submissions sufficiently in advance so that the City review may be completed not less than 30 days before Work represented by those submittals is scheduled to be performed.
- D. Allow a minimum cycle of 30 days for review of each submittal by the City.
- E. Accompany submittal documents with DIA transmittal form CM-30 (refer to Technical Specification Section 01999) that shall contain the following information:
 - 1. Contractor's name, address and telephone number.
 - 2. Submittal number and date.
 - 3. Contract title and number.
 - 4. Supplier's, manufacturer's or subcontractor's name, address and telephone number.
 - 5. Identification of variations from contract documents.
 - 6. Contractor's stamp and signature certifying his review.
 - 7. Identification of submittal:
 - a. If the submittal is being made on a General Condition or Special Condition, reference the General or Special Condition number.
 - b. If the submittal is being made under a specification section, reference the specification number, paragraph number and subparagraph number.
 - c. If the submittal is being made under a drawing, reference the drawing(s) number and subnumber.

- F. The Contractor shall at the time of submission describe variations from the contract documents in writing, separate from the submittal document. If the Project Manager approves any such variations, an appropriate contract change order shall be issued except that, if the variation is minor and does not involve a change in price or in time of performance, a modification need not be issued. If a submission contains variations and the variation column is not marked on the transmittal form, it will not be considered for review and acceptance. Along with marking the transmittal as a variation, a description must be included which outlines all the differences including maintenance and utility services along with any cost savings from an item not containing the variation.
- G. Changes in accepted submittal documents will not be permitted unless those changes have been accepted, in writing, by the City.
- H. The form and quality of submittal documents shall comply with Technical Specifications Section 01340.

2.04 SUPPLEMENTAL SUBMITTALS

- A. Supplemental submittal documents initiated by the Contractor for consideration of corrective procedures shall contain sufficient data for review. Make supplemental submittals in the same manner as initial submittals with the appropriate primary transmittal referenced.

PART 3 - EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. The Contractor shall review submittal documents, stamp and sign as reviewed and approved as complying with contract documents prior to submission to the City.

3.02 CITY REVIEW

- A. Submittal documents will be reviewed by the City, the designer and the Project Manager for conformance to requirements of the contract drawings and specifications. Review of a separate item will not constitute review of an assembly in which the item functions. The City will withhold approval of submittals that depend on other submittals not yet submitted. Review and acceptance will not relieve the Contractor from his responsibility for accuracy of submittals, for conformity of submittal document to requirements of contract drawings and specifications, for compatibility of described product with contiguous products and the rest of the system, or for protection and completion of the contract in accordance with the contract drawings and specifications.
- B. The City, the designer, and/or the Project Manager will review the submittal documents for general conformance with the contract documents and mark the Action Code, sign and date the transmittal.
- C. The Action Codes have the following meanings:
 - 1. **A - ACCEPTED** is an approval, and means that the illustration and description appears to conform to the respective requirements of the contract documents.
 - 2. **B - ACCEPTED AS NOTED** is an approval, and means that the illustration and description will conform to the respective requirements of the contract documents after changes in recognition of the reviewer's comments. Submittals so marked need not be resubmitted.

3. **C - REVISE AND RESUBMIT** means that the submittal is unacceptable and must be revised and resubmitted.
4. **E - NOT ACCEPTED** means that the submittal is not approved and that a new submittal in accordance with the contract documents shall be made.
5. **F - RECEIPT ACKNOWLEDGED**, means an item is received by the Project Manager but no review was made. This mark is for use in resubmitting items that were previously Accepted as Noted and the Contractor has incorporated the notes and wants the Project Managers' staff to have the same material that the Contractor's field staff is using.

3.03 CONTRACTOR'S RESPONSIBILITIES

- A. Coordinate each submittal document with the requirements of the Work; place particular emphasis upon ensuring that each submittal of one trade is compatible with other submittals of that trade and submittals of other trades including producing as needed drawings showing the relationship of the work of different trades.
- B. Contractor's responsibility for errors and omissions in submittal documents and associated calculations is not relieved by the City's review, correction and acceptance of submittals.
- C. Contractor's liability to the City, in case of variations in the submittal document from the requirements of the contract documents, is not relieved by the City's review and acceptance of submittals containing variations unless the City expressly approves the deviation in writing, in which the City describes the variation.
- D. The Contractor shall maintain a file of all approved submittal documents at the worksite. The complete file of approved submittal documents shall be turned over to the City with the as-built documents at the end of the job.
- E. Schedule impact due to resubmittal requirements is the responsibility of the Contractor.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01300

SECTION 01310

SCHEDULE (LONG-DURATION PROJECT)

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section specifies the preparation of a preliminary schedule, construction schedule, related narratives and monthly progress reports, all encompassing complete performance of contract requirements.
- B. The Contractor shall schedule and coordinate the work of all of its subcontractors and suppliers including their use of the worksite. The Contractor shall keep the subcontractors and suppliers informed of the project construction schedule to enable the subcontractors and suppliers to plan and perform their work properly.
- C. The Contractor shall, in accordance with the requirements of the technical specifications, submit a construction schedule that shall provide for the expeditious and practicable execution of the Work.
- D. The construction schedule for the performance of the Work shall be a Critical Path Method (CPM) system in bar chart format, unless an alternate system is specifically identified in the technical specifications, with reasonable detail including a time scaled network and computer printout as more fully detailed in the technical specifications.
- E. Float or slack is defined as the amount of time between the early start date and the late start date or the early finish date and the late finish date of any activities in the schedule. Float or slack is not time for the exclusive use or benefit of either the Contractor or the City.
- F. The Contractor shall submit a monthly progress report and schedule update in accordance with the scheduling provisions of the technical specifications.
- G. The Contractor shall complete the Work within the contract time and in accordance with the most recent schedule submittal that has been approved in writing by the Project Manager.

1.02 PLANNING

- A. The schedule shall show the total contract time, including project milestones, as indicated in the Special Conditions or elsewhere in the contract documents.
- B. The Contractor shall prepare a work plan to complete the work within the contract time and complete those portions of work relating to each milestone date and other contract requirements. The Contractor shall generate a computerized Critical Path Method (CPM) schedule for the Work utilizing the Precedence Diagram Method (PDM) in Gantt Chart view. The computerized format shall be compatible with the City's Primavera system (Primavera Contractor, Primavera 3.1 or Primavera P6 or later). The Schedule shall be submitted to the Project Manager electronically in PDF format and on a CD in a dynamic format which will allow review and manipulation of any part of the schedule. The schedule activities shall be resource loaded showing labor man hours, major construction equipment by type, and value of the work. The value of the work shall summarize each pay item shown in the Schedule of Values and balance to their amount.

- C. In addition to the construction activities the schedule shall include activities for furnishing materials and equipment and vendor shop drawing preparation. The construction schedule, a supporting narrative, and overall progress curve shall be submitted for approval within 30 days after Notice to Proceed. The overall progress curve will indicate planned progress monthly from start to finish of the project. The progress curve will be updated monthly with actual progress. Within 30 days the City will respond with approval or direction to revise and resubmit within ten days. Failure of the Contractor to have a construction schedule approved by the City will be considered cause for withholding progress payment(s).
- D. To the extent that the construction schedule or any revisions thereof contains anything not jointly agreed upon in writing, or fails to show anything jointly agreed upon in writing, it shall not be considered to have the approval of the City. Failure to include any work item required for performance of this contract shall not excuse the Contractor from completing all work within applicable completion dates, regardless of the City's approval of the schedule.
- E. Failure of the Contractor to comply with this Section will be considered cause for withholding progress payment(s) or termination for default.

1.03 SUBMITTALS

- A. Refer to Technical Specifications Section 01300 for submittal procedures. Submit the following as indicated:
 - 1. Preliminary schedule (with narrative) at Preconstruction Meeting
 - 2. Construction schedule (with narrative and progress curve)
 - 3. Monthly progress report (with narrative and updated progress curve)
 - 4. Construction schedule change request (as needed)
 - 5. As built construction schedule.

PART 2 - PRODUCT

2.01 PLOT AND REPORT FORMAT

- A. Preliminary and Construction Schedule formats shall contain a title block with a minimum 18-point font showing:
 - 1. Contractor's name
 - 2. Contract number and title
 - 3. Data date
 - 4. Symbol definitions
- B. Schedules shall contain a time line at the top.
- C. The Activity Table (Layout) shall include at a minimum the following columns:
 - 1. Activity ID
 - 2. Activity Name
 - 3. Original Duration
 - 4. Schedule % Complete
 - 5. Start

6. Finish
 7. Total Float
- D. A report shall accompany all schedules containing a list of all approved changes to the original approved (baseline) schedule.
- E. Reports shall be submitted electronically in PDF format, or as directed by the Project Manager.

PART 3 - EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. The Contractor shall prepare a preliminary schedule covering the first 60 calendar days of the contract. This preliminary schedule shall be submitted at the Preconstruction Meeting and shall be accompanied by a narrative description of the work plan. Within 14 days, the City will respond with acceptance or direction to revise and resubmit within ten days.
- B. The preliminary schedule shall show all significant work tasks that occur in the first 60 days, including planning, mobilization, shop submittals and approval time, procurement, fabrication and construction. It shall identify work items or milestones that affect or are affected by the City, other Contractor's work, utilities and other third parties and it shall list major data submittals required by the contract.
- C. The preliminary schedule shall be accompanied by a narrative describing the Contractor's approach to mobilization, procurement and construction during the first 60 days. The narrative shall elaborate on the basis of durations, production rates, and major equipment to be used, and shall identify all major assumptions used to develop the schedule.
- D. In lieu of the Preliminary Schedule the Contractor may at his own discretion submit the Construction Schedule at the Preconstruction Meeting. If the Construction Schedule is submitted in lieu of the Preliminary Schedule, the City will respond within 30 days with acceptance or direction to revise and resubmit within 10 days.

3.02 CONSTRUCTION SCHEDULE

- A. The construction schedule shall be a computerized CPM schedule utilizing the PDM formatted in Gantt Chart View that includes:
1. Work items identified in a Work Breakdown Structure (WBS) format that corresponds with the technical specifications.
 2. The order, sequence and interdependence of all significant work items including construction procurement, fabrication, testing, startup and inspection, and delivery of critical or special materials and equipment, submittals and approvals of critical samples, shop drawings, procedures or other documents that could have a schedule impact.
 3. Work items by the City, other Contractors, utilities and other third parties that may affect or be affected by Contractor's activities.
 4. Proper referencing of all work items to identify applicable subcontractors or other performing parties.
 5. Work item durations shall not exceed 20 working days. No more than 25 percent of the work item may be on the critical path.

6. Work items shall be resource loaded to show the direct craft manhours estimated to perform the work including work by subcontractors and the value of the work.
 7. A narrative that explains the basis for the Contractor's determination of construction logic. It shall include estimated quantities and production rates, hours per shift, work days per week, and types, number and capacities of major construction equipment to be used and whether the Contractor plans to work weekends or holidays.
- B. The construction schedule shall be prepared to include the data for the total contract duration and the critical path shall be identified, including critical paths for interim completion dates. Scheduled start or completion dates imposed on the schedule by the Contractor shall be consistent with contract milestone dates. Milestone events shall be the schedule dates specified in the Special Conditions and shall be prominently identified and connected to the appropriate work item, denoting its start or completion. Work items related to any interim milestone shall be coded for that milestone.
- C. The Contractor shall submit the following documents to the City upon completion of preparation of the construction schedule:
1. A time phased CPM schedule utilizing the PDM showing all logic ties and the Gantt Chart view on a CD and an electronic copy in PDF format.
 2. A physical progress curve showing either manpower or other appropriate key contract items derived from the construction schedule approved by the project manager and against which physical progress performance will be measured for schedule and payment purposes. The physical progress curve will indicate planned progress monthly from start to finish of the project.
 3. The narrative described in Technical Specifications Section 01310-3.02.A.7.

3.03 PROGRESS REPORTING

- A. The Contractor shall submit a monthly progress report at the end of each month following the Notice to Proceed. At the end of each month, the Contractor and Project Manager shall agree on the progress of the work and the Contractor shall update the construction schedule accordingly. The updated construction schedule is a prerequisite to the submittal of the Contractor's application for progress payment. The schedule shall be made in accordance with Technical Specifications Section 01310-3.02. This review does not constitute an approval of the construction schedule and shall not be used for the purposes of modifying the initially approved construction schedule.
- B. The Contractor shall submit the monthly progress report consisting of a written narrative, an updated schedule and a physical progress curve. This report will be reviewed in a meeting between the Contractor and Project Manager.
1. The narrative report shall describe overall progress of the work, provide a critical path analysis, discuss significant problems with proposed corrective action, and show the status of major changes and any other changes in sequence of the work.
 2. A Gantt chart schedule shall be provided showing the Contractor's completion status (progress) on each work item along with logic ties and formats described in Technical Specifications Section 01310-3.02.C.1.
 3. The physical progress curve shall be updated to show actual progress.
- C. If the latest completion time for any work item does not fall within the time allowed by the construction schedule, the sequence of work and/or duration shall be revised by the

Contractor through concurrent operations, additional manpower, additional shifts or overtime, additional equipment, or alternative construction methods until the schedule produced indicates that all significant contract completion dates, occupancy dates and milestones will be met. No additional costs will be allowed if such expediting measures are necessary to meet the agreed completion date or dates except as provided elsewhere in the contract documents.

3.04 SCHEDULE CHANGES

- A. The Contractor's request for construction schedule changes shall be made on the latest approved construction schedule and shall be accompanied by a narrative description and justification for the change and shall be submitted in accordance with the General Conditions Title 1105 on changes in time. Minor revisions submitted at monthly progress review meetings are not considered as changes in this context.
- B. The construction schedule may be changed when one or more of the following occur:
 - 1. When a change order significantly affects the contract completion date or sequence of work items.
 - 2. When the Contractor elects to change the sequence or duration of work items affecting the critical path.
 - 3. When the City directs a change that affects a milestone date(s) specified in the Special Conditions or alters the length of a critical path.
- C. If, after submitting a request for change to the construction schedule, the Project Manager does not agree with the request, the Project Manager will schedule a meeting with the Contractor to discuss the differences. If a settlement cannot be reached on the change in the construction schedule or if the Contractor has failed to submit revisions to the network, the Project Manager has the option of providing suggested logic and/or duration times in all subsequent updating reports. The suggested logic and/or duration times will remain in effect until the change in the construction schedule is settled or until the logic and duration are superseded.
 - 1. If the Contractor has any objections to the data furnished by the Project Manager, he shall advise the Project Manager within ten days in writing, fully supporting the objections with a counterplan. The revisions suggested by the Project Manager shall be used for updating reports until the Project Manager approves the counterplan.
 - 2. If the Contractor does not submit a counterplan and data within ten days after the date of the Project Manager's suggested logic, the Contractor is deemed to have concurred with the Project Manager's suggested logic/duration time changes. The Project Manager's plan will be the basis of negotiations for any adjustment of the time and cost for performance of the Work.

3.05 CONTRACT EXTENSIONS

- A. If the Contractor is granted an extension of time for completion of any milestone or contract completion date under the provisions of the contract, the determination of the total number of extended days will be based upon the current analysis of the schedule and upon all data relevant to the extension. Such data shall be incorporated in the next monthly update of the schedule.
- B. The Contractor acknowledges and agrees that delays in work items which, according to schedule analysis, do not affect any milestone dates or the contract completion date shown

on the CPM network at the time of the delay will not be the basis for a contract extension.

3.06 AS-BUILT CONSTRUCTION SCHEDULE

- A. After all contract work items are complete, the Contractor shall submit an as built construction schedule showing actual start and finish dates for all work items and milestones.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01310 (LP)

SECTION 01340

SHOP AND WORKING DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of preparing and submitting shop and working drawings, product data, samples and record documents required by other technical specifications sections.
 - 1. The Contractor shall submit all shop drawings, working drawings, product data and samples, as defined in Title 1 of the General Conditions, to the Project Manager in accordance with the requirements in the technical specifications. The Project Manager will return one copy of the shop drawings, working drawings and product data to the Contractor with a written transmittal within the time periods noted in the technical specifications.
- B. The Contractor shall not submit as shop drawings copies or reproductions of drawings issued to the Contractor by DIA.

1.02 SUBMITTALS

- A. Refer to Technical Specifications Section 01300 for submittal procedures.
- B. All submittals shall be delivered to the DIA Project Manager in electronic format. All submittals must be of a consistent format (all Acrobat or all Word, etc). No combination of electronic file types will be allowed unless required by a specific specification section..
 - 1. Acceptable electronic formats
 - a. Adobe Acrobat 8.0 or newer. All files shall be fully compatible with Adobe Acrobat 8.0
 - b. Microsoft Office 2007 or newer. All files shall be fully compatible with Microsoft Office 2007.
 - c. AutoDesk AutoCAD 2007 or newer. All files shall be fully compatible with AutoDesk AutoCAD 2007.
 - 1) AutoCAD files shall be self contained with no external x-references.
 - d. Other files pre-approved by the DIA Project Manager
 - 2. Adobe Acrobat Requirements:
 - a. Drawings shall have security set to "No Security". Commenting, printing, adding photos, form fields and document signing must be allowed.
 - b. PDF submittals shall be one continuous file. No external links are allowed.
 - c. All individual components of submittals shall be bookmarked inside the PDF file.
 - d. All original documents shall be directly converted from the original electronic format to PDF. Scanning of files shall only be allowed by the DIA Project Manager when the original electronic information is not obtainable.
 - e. Failure to comply with these requirements will result in a return of file to the Contractor for immediate revision.
 - 3. Electronic files submitted shall correspond with DIA File Control Numbering System available from the DIA Project Manager. All files shall contain the prefix

CEXXXX.14.02.submittalnumber.specsection.item.revision.

- a. SUBMITTALNUMBER attribute shall be obtained from the DIA Project Manager.
- b. SPECSECTION attribute shall be a five digit number corresponding to the specification section requiring submitted data.
- c. ITEM attribute will be a two digit number designating the corresponding submittal item number.
- d. REVISION attribute will be for revised and resubmitted submittals, an "R" followed by a number (IE: R3).

C. Quantities

1. One DVD-ROM or CD-ROM containing electronic files of each shop or working drawing.
2. One DVD-ROM or CD-ROM containing electronic files of manufacturer's standard schematic drawings.
3. One DVD-ROM or CD-ROM containing electronic files of manufacturer's calculations and manufacturer's standard data.
4. One DVD-ROM or CD-ROM containing electronic files of manufacturer's printed installation, erection, application and placing instructions.
5. Nine samples of each item specified in the various specification sections, unless otherwise specified.
6. One DVD-ROM or CD-ROM containing electronic files of inspection, test reports and certificates of compliance.
7. Note: If manufacturer's printed information is in color, all copies of submittals must be in color.

D. Review

1. Submittal review comments by the City will be in electronic form and incorporated into the electronic submittal file.
2. Resubmittals of electronic documents shall modify the original electronic file with new information and include the City's comments with appropriate responses and additional information.

1.03 CHANGES

- A. Changes in products for which shop or working drawings, product data or samples have been submitted will not be permitted unless those changes have been accepted and approved in writing by the Deputy Manager of Aviation as provided in Technical Specifications Section 01630.

1.04 QUALITY CONTROL

- A. Shop drawings and record documents shall be prepared to a high standard of quality such as that set forth in MIL STD 100, ANSI Standard Drafting Manual Y14 or other equivalent specification defining equal drafting quality for microfilming.

PART 2 - PRODUCTS

2.01 SHOP AND WORKING DRAWINGS

- A. Prepare shop and working drawings on a reproducible sepia sheet size of 24 x 36 inches to a

scale large enough to easily depict and annotate each of the various items.

- B. Include the following as they apply to the subject:
1. Contract title, work order and number.
 2. Respective contract drawing numbers.
 3. Applicable specification section numbers.
 4. Relation to adjacent structure or materials.
 5. Field dimensions clearly identified as such.
 6. Applicable standards such as ASTM or Federal Specification number, FAA, AASHTO and pertinent authority specifications or standards.
 7. Identification of deviations from the contract drawings and specifications.
 8. Drawing name, number and revision.
 9. Contractor's stamp, initialed or signed, certifying:
 - a. Verification of field measurements.
 - b. Review of submittals for compliance with contract requirements.
 - c. Compatibility of the Work shown thereon with that of affected trades.
 10. Blank space on each sheet per Technical Specifications Section 01300, paragraph 2.02.B.
- C. Drawings of equipment and other items that contain multiple parts shall include exploded views showing the relationship of parts and the description of the parts into the smallest units that may be purchased or serviced.

2.02 PRODUCT DATA

- A. Modify manufacturer's standard and/or schematic drawings to delete information which is not applicable to the contract. Supplement standard information with additional information applicable to this contract.
- B. Modify manufacturer's standard(s), diagrams, schedules, performance charts, illustrations, calculations and other descriptive data to delete information which is not applicable to the contract. Indicate dimensions, clearances, performance characteristics and capacities. Include with the submittal electrical, plumbing, HVAC and any other diagrams, as applicable.
- C. Modify erection, application and placing instructions to delete information that is not applicable to the contract or work order.
- D. Include the following:
1. Contract title, work order and number
 2. Respective contract drawing numbers
 3. Applicable contract technical specification section numbers
 4. Applicable standards such as ASTM or Federal Specification number, FAA, AASHTO and pertinent authority specification or standards
 5. Identification of deviations from the contract drawings and specifications
 6. Contractor's stamp, initialed or signed, certifying:

- a. Dimensional compatibility of the product with the space in which it is intended to be used
 - b. Review of submittals for compliance with contract requirements
 - c. Compatibility of the product with other products with which it is to perform or which will be next to it.
 - d. The products electrical, plumbing, control and HVAC requirements conform to contract documents and the necessary utilities are provided for in the contract documents.
- E. Certificates of compliance shall be submitted for all products, assemblies, and bulk materials.
1. Exceptions: Certified Airport Lighting Equipment listed in FAA Advisory Circular No. 150/5345-53, latest version, Airport Lighting Equipment Certification Program
 2. The certificate shall:
 - a. State that the product complies with the respective specification and contract drawing requirements
 - b. Be accompanied by a certified copy of test results pertaining to the product
 - c. Show the submittals date, Contractor's name and address, contract title and number, product represented and its location in the contract, producer's name, product trade name and catalog number, place of product origin, test date, testing organization's name and address, quantity of the product to be furnished and related contract drawing and specification section numbers
 - d. Be signed by an officer or another authorized representative of the producer and notarized
 - e. Submit one electronic copy
 - f. Be received by the City not later than 30 days before the acceptance is needed of the products for ordering

2.03 SAMPLES

- A. Submit samples of sizes and quantities to clearly illustrate full color range and functional characteristics of products and materials including attachment devices.
- B. Erect field samples and mock ups at the worksite as specified in the several technical specifications sections and at locations acceptable to the Project Manager. All field samples shall be erected in a location that will be readily visible throughout the life of the contract to allow comparison of the work as it progresses to the field sample.
- C. The Contractor shall verify, through appropriate inspections and tests, that the samples submitted meet the specifications and shall provide inspection and test data with the samples. The review and comments on the sample shall not relieve the Contractor of his responsibility for completion of the contract.
- D. Show the following information:
 1. Contract title and number
 2. Respective contract drawing numbers
 3. Applicable technical specification section numbers
 4. Applicable standards such as ASTM or Federal Specification number
 5. Identification of deviations from the contract drawings and specifications

6. Contractor's stamp, initialed or signed, certifying:
 - a. Dimensional compatibility of the product with the space in which it is intended to be used
 - b. Review of submittals for compliance with contract requirements
 - c. Compatibility of the product with other products with which it is to perform or which will be next to it
7. If multiple samples are submitted and the Project Manager is requested to make a choice, each sample shall have a unique identification number attached to it so the returned transmittal can state the identification number of the accepted sample and the Contractor will know which one it is.

PART 3 - EXECUTION

3.01 CONTRACTOR RESPONSIBILITIES

- A. Reference requirements of General Conditions Article 405.
- B. Verify field measurements, catalog numbers and similar data.
- C. The Contractor shall not start work for which submittals are required until a transmittal has been received by the Contractor showing acceptance or acceptance as noted by the Project Manager.
- D. Before making submittals ensure that products will be available in the quantities and at the times required by the contract.
- E. Submit final, corrected, reproducible sepias of contract and shop and working drawings showing the Work as actually installed, placed, erected and applied. Refer to Technical Specification Section 01700, Contract Closeout.

3.02 REVIEW BY THE CITY

- A. One electronic copy of the marked-up shop and working drawing and one electronic copy of the product data will be returned to the Contractor by the Project Manager. Only the transmittal form, appropriately marked, will be returned on sample submittals.
- B. Contractor's responsibility for errors and omissions in submittals for compatibility will not be reduced, waived or otherwise limited by the review and acceptance of submittals by the City.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable multiplier for the division under which the work falls.

END OF SECTION 01340

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SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of preparing and submitting the Schedule of Values (“Schedule”) as referenced in the General Conditions. The Schedule will be built upon a breakdown of the Work using specification sections and milestones. The Work also includes the preparing and submitting of updated copies of the Schedule if the Schedule is affected by change orders.
- B. A Schedule of Stored Material is a detailed cost breakdown for permanent materials that will be temporarily stored prior to their being installed and for which the Contractor seeks partial payments. The Schedule of Stored Material will be incorporated as a part of the Schedule of Values.
- C. Within 14 calendar days of issuance of the Notice to Proceed, the Contractor shall submit the Schedule of Values including the Schedule of Stored Material if applicable. The Schedule of Values and Schedule of Stored Material used to prepare the work/cost breakdown for the Schedule will be used for the Contractor's billings.
- D. Any contract allowances shall be included in the Schedule. Expenditure of allowances shall be done through the use of the Allowance Authorization form. Use of this form does not increase or decrease the contract value.

1.02 RELATED DOCUMENTS

- A. General Contract Conditions, Title 9 Compensation
- B. Technical Specifications Section 01300 Submittals
- C. Technical Specifications Section 01340 Shop and Working Drawings, Product Data and Samples
- D. Technical Specifications Section 01999 Standard Forms

1.03 SUBMITTAL

- A. The Schedule shall be submitted in a format approved by the Project Manager.
- B. The Schedule shall identify each item of work. Work items in the Schedule shall represent all work and shall be referenced with the Technical Specifications section numbers, specification subparagraph, specification section title and the bid item number used for the Schedule of Prices and Quantities when applicable. The Schedule shall address the subcontractor, fabricator or supplier furnishing the materials and or labor for each work item.
- C. Upon request by the City, the Contractor shall support values given with the data which will substantiate the correctness of the values.
- D. The Schedule will be utilized only as a basis for review of the Contractor's application for

progress payment.

1.04 REVIEW AND RESUBMITTAL

- A. If review by the City indicates that changes to the Schedule are required, the Contractor shall revise and resubmit the Schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PREPARING SCHEDULE OF VALUES

- A. Breakdown of the items used in the Schedule shall include costs as follows:
 - 1. Delivered cost of product with applicable taxes paid
 - 2. Total installation cost with overhead and profit
 - 3. Breakdown costs of each lump sum item with a list of products and major operations for which the Contractor seeks to receive progress payments to recover his costs for that bid item
 - 4. Each unit price item as listed in the bid Schedule of Prices and Quantities shall list products and major operations for which the Contractor seeks to receive progress payments for that bid item.

3.02 PREPARING SCHEDULE OF STORED MATERIAL

- A. The Contractor shall submit with the Schedule an indication of whether products will be stored on or off the worksite. The Schedule of Stored Material shall show quantities and types of products that will be stored.
- B. Material allowances consist of only the net cost of the product, the cost of delivery and unloading at the storage site, the cost of applicable sales taxes and all discounts.
- C. In no case will the cost paid for a permanent material be greater than 90 percent of the contract price for the work in which they are included.

3.03 PAYMENT FOR STORED MATERIALS

- A. Only materials that are described in the specifications and on the drawings will be considered permanent materials. Permanent materials are materials that will be left in the work after the contract is completed.
- B. Nothing in these specifications shall be interpreted as requiring the City to pay for stored materials. The Project Manager shall decide on a case-by-case basis whether stored materials shall be paid for. No payment will be made for stored materials which have not been submitted and accepted.
- C. The Contractor must, at all times, store permanent materials in accordance with manufacturer's recommendations. Any material not properly stored will not be paid for. Amounts will be deducted from payments for any stored permanent material previously paid for and subsequently found to be improperly stored or not present, based upon a physical inventory of stored permanent material.

- D. Only the neat line quantity of material needed for the finished product may be paid for.
- E. All requests for stored permanent material payment must be accompanied by paid invoices clearly showing the quantity of permanent material, the type of permanent material and discounts or rebates and the net amount paid to the supplier along with a certificate stating that the permanent material is free of any liens or judgments preventing its use by the City.
- F. If the permanent material is stored outside the Denver area the Contractor must pay for the City representative's transportation and lodging to see the stored material as needed. Acceptable lodgings must, as a minimum, have a Mobil Travel Guide Rating Criteria® rating of Two-Star or the American Automobile Association Lodging Listing Requirements & Diamond Rating Guidelines® rating of Two Diamonds. The minimum transportation shall be by regularly scheduled commercial air carrier at coach rates. The Project Manager will determine if an overnight stay is required.
- G. All permanent material stored off site, for which payment is being requested must be insured and stored in bonded, insured warehouses.
- H. Any permanent material on which payment is requested must be in such a form that it cannot be used on work other than this contract, or stored in a manner acceptable to the Project Manager to ensure that the permanent material cannot be used on work other than this contract.

3.04 ALLOWANCE AUTHORIZATION AND PAYMENT

- A. Contractor shall request written approval for expenditure of any contract allowances PRIOR TO performing the Work involved. List work to be performed and estimated cost in the requesting correspondence.
- B. Original copies of all invoices and receipts must be submitted with the Allowance Authorization as part of the request for payment.
- C. Using the format provided by the City, the Contractor's request for payment of all contract allowances shall be included in the Schedule of Values.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01370

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SECTION 01400

CONTRACTOR QUALITY CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section identifies the Quality Control activities to be performed during all phases of the contract by the Contractor.
- B. The Contractor shall have in place his Quality Control Program as necessary to ensure that all materials and work are completed in compliance with contract documents. The Contractor is solely responsible for Quality Control and shall provide the necessary quality control personnel to assure that all materials, workmanship, and tests are in conformance with the project documents with the exception of those tests and/or audits that may be conducted by the City as defined in the contract documents.
- C. Test schedules and/or testing requirements for materials used on this project are included in the technical specifications. Laboratory and field testing identified in the technical specifications shall be conducted by an Independent Testing Agency (ITA) retained by the Contractor.

1.02 SUBMITTALS

- A. Refer to Technical Specification Section 01300 and Technical Specifications Section 01340, for submittal requirements.
- B. Quality Control Plan: Within 10 days after Notice to Proceed, the Contractor shall submit a Quality Control Plan for review and acceptance. The Quality Control Plan shall be accepted by the DIA Project Manager prior to any work or materials remaining in place. Acceptance by the DIA Project Manager does not relieve the Contractor of compliance with the contract requirements. The Contractor Quality Control Plan shall address the following as a minimum:
 - 1. A general description of Quality Control monitoring to be performed until final acceptance by DIA. Include monitoring activities of Work and the worksite during times that no construction activity is scheduled to take place.
 - 2. An individual designated by the Contractor whose sole responsibility is Quality Control Management. This individual shall be highly qualified in all phases of construction as it relates to this project and shall have the authority to direct work changes required to bring the Work into conformance with contract requirements, including stopping non-conforming work in progress. A resume of the proposed Quality Control Manager including applicable education, experience and certifications shall be included in the Quality Control Plan.
 - 3. Quality Control inspection staff as needed to assist the Quality Control Manager with implementation of the Quality Control Program. Duties of the Quality Control Inspectors shall be limited strictly to inspection of the ongoing work. Sampling and testing of materials shall be performed by Quality Control personnel other than Quality Control Inspectors. Quality Control Inspectors shall inspect only those work elements for which they are qualified. Resumes of the proposed Quality Control Inspectors including applicable education, experience and certifications shall be included in the Quality Control Plan.

4. An Organization Chart identifying all Quality Control staff by name and function. The chart 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 Quality Control staff can be utilized for specific inspection and testing functions for different items of work. The chart shall show that the Quality Control Manager, Quality Control Inspectors, and Quality Control testing personnel are outside of the production staff with clear lines of authority for Quality Control.
 5. Each technical specification division's requirements for quality control identifying each item requiring submittal and approval/acceptance prior to installation of work, all inspections to be performed during work and prior to acceptance of work, each item of work requiring testing by the independent testing agency, and the testing frequency.
 6. Establish controls and documentation format to ensure that items or materials that have been accepted through receiving inspection are used or installed. Identification and traceability shall be provided throughout all inspections, test activities and records. For stored items, provisions shall be made for the control of item/material identification, consistent with the expected duration and type of storage.
 7. A methodology of monitoring, testing and exercising of all equipment, valves and/or assemblies to ensure the Work installed is in proper working order.
 8. A list of suppliers and subcontractors. This list shall include items to be supplied by each supplier and/or subcontractor and shall identify work to be performed by each subcontractor. The list shall be updated and resubmitted as required.
 9. Emergency contact information including name, company, title, work phone number, home phone number and other means of contact. The Emergency Contact list shall include at least four individuals. The Emergency Contact list shall be maintained on a daily basis. In the event there is any change in any of the information, the Contractor shall forward the updated list to the Project Manager and to DIA Maintenance Control (303-342-2800). The Emergency Contact list shall include the project number, project title and date of issue.
- C. Contractor's Daily Foreman Report:
1. A Contractor's Daily Foreman report shall be completed on form included in Technical Specifications Section 01999. The Foreman may add sheets of information to this form as needed. The report shall address as a minimum the following: daily activities, quantities of material placed and completed, weather, safety issues, personnel by trade, equipment on site with time used, equipment under repair, work delays, possible delays, and materials delivered.
 2. The Contractor's Daily Foreman Reports reporting shall be computerized or typed and may contain an electronic signature. Reports shall be transmitted to the DIA Project Manager electronically on the following work day.
- D. Contractor's Daily Quality Control Inspection Report:
1. Contractor's Daily Quality Control Inspection Reports shall be completed on the form included in Technical Specifications Section 01999. The reports shall be written by the Quality Control Manager and all Inspectors. The Quality Control Manager and Inspectors may add sheets of information to this form as required. The report shall address as a minimum the following: the work requiring inspection identified by the technical item number and description, results of the inspections, material compliance with approved submittals, proper storage of materials and equipment, adherence to plans and technical specifications, review and description of quality control tests,

compliance of testing frequencies, location and nature of defects or deviations found, causes for rejection, and corrections required to bring the Work into conformance with the contract.

2. Contractor's Daily Quality Control Inspection Reports shall be computerized or typed and may contain an electronic signature of the author. Reports shall be transmitted to the DIA Project Manager electronically on the following work day.
- E. Corrective Action Report (CAR)
1. Conditions adverse to quality will be reviewed by the Contractor to determine the cause and to recommend a corrective action that will preclude recurrence. The condition, its cause and the corrective action planned shall be reported to the Project Manager prior to implementation. Follow-up action shall be taken to verify implementation of the corrective action. The Contractor will document the corrective action and a copy of the Corrective Action Report (CAR) will be transmitted to the DIA Project Manager.

1.03 DOCUMENTATION

- A. The Contractor shall not change or alter approved submittals, procedures, specifications, drawings or other pertinent documentation without the Project Manager's written authorization.
- B. All records and documents that are quality related shall be prepared, identified and maintained by the Contractor and shall be made available to DIA upon request. Records shall be protected from damage, deterioration or loss. A copy of the records and documents shall be maintained at the Work site at all times unless the Project Manager has approved other locations in writing. Retention time for all quality records shall be not less than three years from date of Final Acceptance of the contract.
- C. The Contractor shall maintain records at the actual worksite and at Contractor's office to show the inspection status of materials and items installed in order to ensure that the required inspections and tests have been performed in a timely and correct manner.

1.04 INSPECTIONS AND TESTS

- A. Inspections, tests and system shut down requests, conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and the referenced standards. The Contractor's designated Quality Control Representative shall inspect the work and shall ensure the work complies with the contract requirements prior to any requests for inspection or testing.
- B. When the specifications, laws, ordinances, rules, regulations or orders of any public agency having jurisdiction require the Project Manager's surveillance of inspections or tests, the Contractor shall notify the Project Manager of the place, date and time 48 hours prior to the inspection and/or test. The Contractor shall be responsible for notifying and requesting inspection by other agencies including but not limited to the Denver Building Inspection Division, Denver Fire Department and Denver Water Department. Prior to request for other agency inspections, the Contractor shall meet and plan inspection times with the Project Manager and or the Project Manager's designated representative.
- C. Special inspections or tests may be required by the technical specifications, City, State and/or Federal Agencies in addition to those tests already performed. The Contractor shall notify the Project Manager at least 48 hours in advance of the additional inspections or tests.

- D. Quantities will be verified as defined in the Pre-Work Meetings.

1.05 INSPECTION PLAN

- A. The Contractor shall utilize the following six-point inspection plan to ensure the conformance of the Work performed by the Contractor meets the requirements of the contract drawings and specifications, the referenced codes and standards and the approved submittals:
1. **Pework Coordination:** Prior to the start of construction work on the contract and prior to the start of work under each separate specification section and prior to the start of work where a change in a construction operation is contemplated by the Contractor and prior to a new subcontractor starting work, a coordination meeting will be held with the Contractor's superintendent, Quality Control and Safety representative(s), the ITA representative, the DIA Project Manager and DIA inspectors. Supervisory, Safety and Quality Control, representatives of all applicable subcontractors will also attend. Prior to the meeting, the Contractor's Quality Control Manager shall provide the DIA Project Manager with a meeting agenda for review. The Contractor's Quality Control Manager shall conduct the meeting and distribute the approved agenda. The Quality Control Manager shall develop and electronically distribute finalized meeting minutes within 24 hours upon completion of the meeting.
 2. The purpose of the meeting is to ensure that the Contractor's personnel have no misunderstandings regarding their safety and quality procedures as well as the technical requirements of the contract. The following items shall be presented and reviewed by the Contractor:
 - a. Contract requirements and specifications
 - b. Shop drawings, certifications, submittals and as-built drawings
 - c. Testing and inspection program and procedures
 - d. Contractor's Quality Control program
 - e. Familiarity and proficiency of the Contractor's and subcontractor's workforce to perform the operation to required workmanship standards including certifications of installers
 - f. Safety, security and environmental precautions to be observed
 - g. Any other preparatory steps dependent upon the particular operation
 - h. The Contractor's means and methods for performing the Work.
 3. **Initial Inspection:** Upon completion of a representative sample of a given feature of the Work and no later than two weeks after the start of a new or changed operation, the Project Manager and/or the Project Manager's designated representatives will meet with the Contractor's Quality Control representative and applicable subcontractor's supervisor and their Quality Control representatives to check the following items, as a minimum:
 - a. Workmanship to established quality standards
 - b. Conformance to contract drawings, specifications and the accepted shop drawings
 - c. Adequacy of materials and articles utilized
 - d. Results of inspection and testing methods
 - e. Adequacy of as-built drawings maintained daily.
 4. Once accepted, the representative sample will become the physical baseline by which ongoing work is compared for quality and acceptability. To the maximum practical extent, approved representative samples of work elements shall remain visible until all work in the appropriate category is complete. Acceptance of a sample does not waive or alter any contract requirements or show acceptance of any deviation from the contract

not approved in writing by the Project Manager.

5. Follow-up Inspection: The Contractor's Quality Control representative will monitor the work to review the continuing conformance of the work to the workmanship standards established during the preparatory and initial inspections.
6. Completion Inspection: Forty-eight hours prior to the completion of an item or segment of work and prior to covering up any work, the Contractor will notify the Project Manager who will verify that the segment of work is substantially complete, all inspections and tests have been completed and the results are acceptable. The purpose of this inspection is to allow further corrective work upon, or integral to, the completed segment of work. **THIS IS NOT AN ACCEPTANCE INSPECTION.** If any items are determined to be deficient, need correction or are non-conforming, a Deficiency List will be prepared and issued to the respective Contractor for correction, repair or replacement of any deficient or non-conforming items. The Project Manager and Contractor's Quality Control representative will verify the correction of the deficient and/or non-conforming items prior to the start of the next operation.
7. Pre-Final Acceptance Inspection: Prior to requesting a Pre-Final Acceptance Inspection by DIA, all work and operational systems to be inspected shall be satisfactorily completed and tested by the Contractor. The Contractor's written request for this inspection shall be made 72 hours in advance. With the request shall come a list of any known deficiencies and when they will be corrected. If the list is too large or contains too many significant items, in the opinion of the Project Manager, no inspection will be held because of the incompleteness of the work.
8. The Project Manager will schedule the Pre-Final Acceptance Inspection and will prepare a list of deficient items (punch list) discovered during the inspection. If during the inspection the list becomes too large or too many significant items are on the list, the inspection will be canceled. After the inspection is completed, the Deficiency List will be transmitted to the Contractor for correction of the deficient items.
9. Final Acceptance Inspection: After the Contractor has completed all items on the Deficiency List (generated from the Pre-Final Acceptance Inspection) he shall request a Final Acceptance Inspection. The request shall be made in writing at least 72 hours in advance of the inspection. All areas must be cleaned and ready for turnover prior to this inspection. The Project Manager, the design consultant, a representative of the funding agency (if applicable) and other interested parties will inspect the subject Work to ensure that all deficiencies have been satisfactorily attended to and that no new deficiencies have appeared and that all systems are completely functional. Any outstanding or additional deficient items will be noted and handled per the requirements of the Pre-Final Acceptance Inspection noted above until the Work is acceptable to the Project Manager.

1.06 SAMPLES

- A. The Contractor shall maintain at the worksite a copy of all samples submitted and accepted by DIA. Samples shall be made available to the designer or the Project Manager's designated representatives for review and comparison in the field. The Project Manager prior to use on the project must accept all items and materials.
- B. The installed work will be compared to the samples and if any of the work is not of the same quality, material, finish, color, texture or appearance as the sample, that portion that is not the same will be considered defective and in nonconformance.
- C. Contractor selection of samples will only be considered if taken at random. The Contractor

shall permit representatives of DIA to witness the selection of samples. Inspection or tests of items or materials that fail shall be sufficient cause to terminate further inspections/tests of the same brand, make or source of that product.

- D. The Contractor is obligated to correct any item deemed deficient.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 REQUIREMENTS

- A. All materials required for the contract shall be new except where specified otherwise. The Project Manager may elect to perform additional inspections and/or tests at the place of the manufacture, the shipping point or at the destination to verify conformance to applicable specifications. Inspections and tests performed by DIA shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be considered a guarantee for acceptance of materials that will be delivered at a later time.
- B. The Contractor is obligated to correct or remove non-conforming materials, whether in place or not. If necessary, the Project Manager will send written notification to the Contractor to correct or remove the defective materials from the project. If the Contractor fails to respond, the Project Manager may order correction, removal and/or replacement of defective materials by others, in which case the Contractor shall bear all costs incurred by such actions.
- C. Materials accepted on the basis of a Certificate of Compliance may be sampled and inspected/tested by DIA or its designer at any time. The fact that the materials were accepted on the basis of such certification shall not relieve the Contractor of his responsibility to use materials that conform to the specifications.
- D. The Contractor shall impose upon his suppliers the same quality control requirements, including inspection and test procedures, as imposed upon him by the specifications and referenced standards. The Contractor shall apply appropriate controls, designed to ensure that all materials supplied meet the requirements and specifications.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable multiplier for the division under which the work falls. If the City is required to re-inspect work or conduct a special test because a previous inspection, requested by the Contractor, showed that the work was defective or not in conformance, the Deputy Manager or his authorized representative may deduct from the contract value the cost of re-inspection at the rate of \$100.00 per man-hour.

END OF SECTION 01400

SECTION 01401

INDEPENDENT TESTING AGENCY

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall employ the services of an Independent Testing Agency (ITA). This Section identifies the requirements for the Contractor to employ an Independent Testing Agency and identifies the required activities of the Independent Testing Agency.
- B. Laboratory and field testing requirements to be conducted by the ITA for materials and construction on this project are included in the appropriate technical specifications. Where the technical specifications reference the CDOT Standard Specifications for Road and Bridge Construction, the references shall also mean CDOT Field Materials Manual for schedule of tests unless otherwise stated. As a minimum the ITA described in this section shall perform all applicable tests listed in the manual including the independent assurance sampling and testing. In the event of such a conflict between the schedule and a specification in these technical provisions, the more comprehensive testing shall govern unless otherwise noted.
- C. Inspections and tests conducted by the ITA shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and referenced standards. Employment of the ITA does not relieve the Contractor of providing the required Quality Control program.
- D. When inspections or tests by the ITA prove that the item or material does not meet all applicable specifications and requirements, the cost incurred for the re-testing or re-inspection shall be borne by the Contractor (see paragraph 5.01 of this Technical Specifications Section).
- E. Samples will only be considered if taken at random. The Contractor shall permit representatives of the City to witness the selection of samples. Inspection or tests of items or materials that fail shall be sufficient cause to terminate further inspections/tests of the same brand, make or source of that product.
- F. The Contractor is obligated to correct any item deemed deficient at no additional cost to DIA.

1.02 RELATED DOCUMENTS

- A. ASTM C 1077 - Standard Practices for Laboratory Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
- B. ASTM D 3666 – Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
- C. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D. ASTM E 329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing
- E. ASTM E 543 - Specification for Agencies Performing Nondestructive Testing.

- F. Standard testing practices for other disciplines.

1.03 SUBMITTALS

- A. All submittals shall comply with requirements of Technical Specifications Sections 01300 and 01340 for submittal requirements.

1.04 CONTRACTOR SUBMITTAL OF PROPOSED TESTING AGENCIES

- A. The Contractor shall employ the services of an Independent Testing Agency (ITA) that has been accredited by AASHTO or CCRL or an approved equal to perform the test(s) required in the contract. The ITA may also provide technicians to perform the required inspections. However, inspection and testing cannot be performed simultaneously by the same technician. The Contractor shall receive written acceptance from the Project Manager of the Independent Testing Agency prior to any permanent work being installed or tested.
- B. The Contractor shall not submit for acceptance to the DIA Project Manager any testing agency or laboratory utilized in the design or construction document preparation or presently employed by DIA as part of DIA Quality Assurance.
- C. For consideration of acceptance, the Contractor shall submit to the DIA Project Manager the following items received from the ITA:
 - 1. Affidavit of current accreditation from a national certification and/or accreditation program.
 - 2. Evidence that the ITA Laboratory is accredited to perform the testing required in the Technical Specifications.
 - 3. Resumes and evidence of professional engineer registration and licensing in the State of Colorado for the personnel reviewing and signing test reports.
 - 4. Resumes and current certifications verifying that ITA management and supervisory personnel, laboratory staff, field testing technicians, and inspecting technicians are qualified in accordance with ASTM C 1077, D 3666, D 3740, and E 329 requirements to perform the work. NICET, ACI, WAQTC, LabCAT, CDOT, NRMCA, PCA, AWS, ASNT certifications or a degree in a related engineering field with construction field experience can demonstrate qualifications. A list summarizing all management, supervisory, laboratory, field testing, and inspection personnel assigned to the project including the testing and/or inspection each individual will be performing, certifications held by each individual, and the expiration date of each certification.
 - 5. A matrix indicating each technical specification section, paragraph, quantity and type of sampling and/or testing required.
 - 6. Copies of all laboratory, field testing, and inspection report forms.

1.05 SUBMITTAL OF REPORTS

- A. Test results shall be submitted by the Contractor to the DIA Project Manager after completion of inspections/tests by the ITA and prior to incorporation of the item(s) into the Work unless the test or inspection must be done during or after installation.

All field test results including but not limited to fresh concrete properties and in-place moisture-density shall be reported in legible draft form to the DIA Inspection immediately at the test site. Any failing test shall be reported separately to the DIA Inspector or DIA Project

Manager within 2 hours after the discovery. The draft test results shall also be attached to the Daily Quality Control Inspection Report (reference Technical Specifications Section 01400, paragraph 1.02.D) and transmitted to the DIA Project Manager on the next work day.

- B. Typed test reports shall be provided to the DIA Project Manager as specified in paragraph 1.06 Weekly Reports. The test reports shall be numbered sequentially in chronological order. Individual tests shall be numbered sequentially. The reports and tests shall also be organized per specification section. All test results must be reviewed and signed by a registered licensed engineer in the State of Colorado. The signature represents that the test procedures used are in strict conformance with the applicable testing standard, the calculated data are true and accurate, the tools and equipment used were in calibration, the sample was not contaminated and the persons running the test were qualified.
- C. Reports of inspections and test activities are record documents and shall be maintained in a manner that provides integrity of item identification, acceptability and traceability. Reports shall identify the following:
1. Contractor's name
 2. DIA Contract number and title
 3. Independent Testing Agency name
 4. Name of item(s) inspected/tested including a physical description and, as applicable, model and make
 5. Quantity of items
 6. Inspection/test procedure used. If national standards are used, any deviation from these standards
 7. Date the sample was taken and the date the test was made
 8. Location (by coordinates, building grid or station number) of where tests and/or samplings were performed including environmental condition where applicable. Include plan drawing indicating location of test and work item sampled or tested
 9. Name of inspector/tester
 10. In the event the testing or sampling is a re-test or re-sampling, reference the previous respective testing or sampling report
 11. Specified requirements in the contract that the item must meet. Include reference to technical specification section and paragraphs
 12. Acceptability
 13. Deviations/nonconformance
 14. Corrective action
 15. Evaluation of results
 16. All information required for the specific test as specified in the applicable ASTM standard
 17. Signature of authorized evaluator.

1.06 WEEKLY SUMMARY REPORTS

- A. The ITA and Quality Control Manager shall prepare and submit to the DIA Project Manager a weekly summary report each week which summarizes by specification section all work

activities and results for the quality control tests and inspections conducted during that period.

The weekly summary report shall be submitted within two (2) weeks from the end of the reporting period. At a minimum, the weekly summary report shall identify all inspections, test types, test locations, testers, test results, specifications, whether the test passed or failed, quantity of materials placed and the number of tests performed for each material, and the material supplier, installer and Contractor. Re-tests shall be identified in a fashion that easily correlates to the failing test. Any failed tests that have not been corrected when the report is published shall be highlighted and noted in the cover letter of the report. The ITA shall identify costs of re-testing or additional site visits required due to scheduling changes by the Contractor. A current Corrective Action Report log (CAR) shall also be included in the weekly summary report.

- B. The weekly report shall be submitted per Technical Specifications Sections 01300 and 01340 requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 REMOVAL OF NONCONFORMING MATERIAL

- A. The Contractor is obligated to correct or remove nonconforming materials, whether in place or not. If necessary, the DIA Project Manager will send written notification to the Contractor to correct or remove the defective materials from the project. If the Contractor fails to respond, the DIA Project Manager may order correction, removal and/or replacement of defective materials by others, in which case the Contractor shall bear all costs incurred by such actions.

3.02 PERFORMANCE

- A. If the DIA Project Manager determines that the ITA or its personnel are not effectively enforcing or performing the testing and documentation requirements specified in the contract, the DIA Project Manager will, in writing, require the Contractor to remove and replace ITA or such personnel at no cost to DIA.

3.03 CONTROL OF MEASURING AND TEST EQUIPMENT

- A. The ITA shall select measuring and test equipment in such a manner as to provide proper type, range, accuracy, calibration and tolerance for determining compliance with specified requirements. Measuring and test devices shall be calibrated, adjusted and maintained at prescribed intervals prior to use based upon equipment stability and other conditions affecting measurement. Provisions shall be made for the proper handling and storage of equipment. Calibration shall be accomplished using certified standards that have a known traceable relationship to the National Institute of Standards and Technology. Every calibrated measuring and test device shall show the current status, date of last calibration and the due date for the next calibration. Calibration records shall be maintained onsite as quality records and shall be made available for inspection upon the Project Manager's request.

PART 4 - METHOD OF MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under the Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item. If the City is required to re-inspect work because the previous inspection showed that the work was defective or not in conformance, the Deputy Manager or his authorized representative may deduct from the contract value the cost of re-inspection at the rate of \$100.00 per man-hour.

END OF SECTION 01401

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SECTION 01403

CONTRACTOR QUALITY CONTROL PROGRAM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall establish, provide and maintain an effective Quality Control Program that details the methods and procedures that will be taken to ensure that all materials and completed construction required by this contract conform to contract plans, technical specifications and any 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.

1.02 LEVEL OF CONTROL

- A. The intent of this section is to enable the Contractor to establish a necessary level of control that will:
1. Adequately provide for the production of acceptable quality materials
 2. Provide sufficient information to ensure both the Contractor and the DIA Project Manager that the specification requirements are being met
 3. Allow the Contractor as much latitude as possible to develop his or her own standards of control.

1.03 REQUIREMENTS

- A. 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 and approved by the DIA Project Manager. No partial payment will be made for materials subject to specific quality control requirements until the Quality Control Program has been reviewed and approved by the DIA Project Manager.
- B. 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 also the responsibility of the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 QUALITY CONTROL 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 which shall be reviewed by the DIA Project Manager prior to the start of any production, construction or off-site fabrication. The written Quality Control Program shall be submitted to the DIA Project Manager for review and approval at least five (5) calendar days before the Preconstruction Conference.
- C. The Quality Control Program shall be organized to address, as a minimum, the following items:
 - 1. Quality control organization
 - 2. Project progress schedule
 - 3. Submittals schedule
 - 4. Inspection requirements
 - 5. Quality control testing plan
 - 6. Documentation of quality control activities
 - 7. Requirements for corrective action when quality control and/or acceptance criteria are not met.
- D. 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.

3.02 QUALITY CONTROL ORGANIZATION

- A. The Contractor's 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.
 - 1. 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 or work. If necessary, different technicians can be utilized for specific inspection and testing functions for different items of work. All personnel used for implementation of all or part of the Quality Control Program shall be subject to the qualification requirements of paragraph 3.02 A and 3.02 B. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.
- B. The quality control organization shall consist of the following minimum personnel:
 - 1. **QUALITY CONTROL MANAGER.** The Quality Control Manager shall be a full-time employee of the Contractor or a consultant engaged by the Contractor. The Quality Control Manager shall have a minimum of 10 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 this contract.
 - 2. Additional qualifications for the Quality Control Manager shall include the following requirements:

- a. Licensed professional engineer with 5 years of airport or highway grading and drainage, field and laboratory testing, and quality control experience acceptable to the DIA Project Manager
 - b. Current resume with P.E. seal affixed thereto
 - c. Four references for work on projects completed within past five (5) years (names, current organization, and telephone number)
 - d. Three years of highway and/or airport paving experience acceptable to the DIA Project Manager with a B.S. degree in Civil Engineering, Civil Engineering Technology or Construction
 - e. Construction Materials Technician certified at Level III by the National Institute for Certification in Engineering Technologies (NICET)
 - f. Highway Materials Technician certified at Level III by NICET
 - g. Highway Construction Technician certified at Level III by NICET
 - h. A NICET Certified Engineering Technician in Civil Engineering Technology with 5 years of highway and/or airport paving experience acceptable to the DIA Project Manager.
 - i. The Quality Control Manager 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 Quality Control Manager shall report directly to a responsible officer of the construction firm. The Quality Control Manager shall be on-site for a minimum of 40 hours per week during all production and shall be released from full-time duties only after written permission from the DIA Project Manager.
3. ELECTRICAL QA/QC MANAGER. In addition to the Quality Control Manager, the Contractor shall provide a dedicated, full-time Electrical Quality Assurance/Quality Control (QA/QC) Manager. The Electrical QA/QC Manager shall have no other responsibilities other than overall electrical QA/QC. The Electrical QA/QC Manager shall be a master electrician with a minimum of 5 years electrical airfield construction experience at a commercial carrier airport. The Electrical QA/QC Manager shall be a Certified Senior Technician—Level IV as recognized by the National Electrical Testing Association (NETA).
4. 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 engineers, engineering technicians, or experienced craftsman with the following qualifications:
- a. Engineer-in-training with 2 years of airport/highway grading experience acceptable to the DIA Project Manager
 - b. An individual with 3 years of highway and/or airport grading experience acceptable to the DIA Project Manager, with a Bachelor of Science degree in Civil Engineering, Civil Engineering Technology or Construction
 - c. Construction Materials Technician certified at Level II by the National Institute for Certification in Engineering Technologies (NICET)
 - d. Highway Materials Technician certified at Level II by NICET
 - e. Highway Construction Technician certified at Level II by NICET
 - f. Electrical Construction Technician at Level III certification by NETA.
 - g. The Quality Control Technicians shall report directly to the Quality Control Manager 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 paragraph 3.05 below

- 2) Performance of all quality control tests as required by the technical specifications and paragraph 3.06 below.
 - h. 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.

3.03 PROJECT PROGRESS SCHEDULE.

- A. 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), 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.
- B. 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.

3.04 SUBMITTALS SCHEDULE.

- A. The Contractor shall submit a detailed listing of all submittals (e.g., mix designs, material certifications, etc.) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:
 1. Specification item number
 2. Item description
 3. Description of submittal
 4. Specification paragraph requiring submittal
 5. Scheduled date of submittal.

3.05 INSPECTION REQUIREMENTS

- A. The Contractor shall utilize the following six-point inspection plan to ensure the conformance of the Work performed by the Contractor meets the requirements of the contract drawings and specifications, the referenced codes and standards and the approved submittals:
 1. **PREWORK COORDINATION.** Prior to the start of construction work on the contract and prior to the start of work under each separate specification section and prior to the start of work where a change in a construction operation is contemplated by the Contractor and prior to a new subcontractor starting work, a coordination meeting will be held with the Contractor's Quality Control Manager, Quality Control and Safety representative(s), the Testing Agency (TA) representative, the DIA Project Manager and DIA inspectors. Supervisory, safety and quality control representatives of all applicable subcontractors will also attend. The DIA Project Manager will chair the meeting. The purpose of the meeting is to ensure the Contractor's personnel have no

- misunderstandings regarding their safety and quality procedures as well as the technical requirements of the contract. The following items shall be presented and reviewed by the Contractor at the meeting:
- a. Contract requirements and specifications
 - b. Shop drawings, certifications, submittals and as-built drawings that apply
 - c. Testing and inspection program and procedures
 - d. Contractor's Quality Control Program
 - e. Familiarity and proficiency of the Contractor's and subcontractor's workforce to perform the operation to required workmanship standards including certifications of installers
 - f. Safety and environmental precautions to be observed
 - g. Any other preparatory steps dependent upon the particular operation
 - h. The Contractor's means and methods for performing the Work.
2. INITIAL INSPECTION. Upon completion of a representative sample of a given feature of the Work and no later than two weeks after the start of a new or changed operation, the DIA Project Manager or his/hers designated representative will meet with the Contractor's Quality Control representative and applicable subcontractor's supervisor and their Quality Control representatives to check the following items, as a minimum:
- a. Workmanship to established quality standards
 - b. Conformance to contract drawings, specifications and the accepted shop drawings
 - c. Adequacy of materials and articles utilized
 - d. Results of inspection and testing methods
 - e. Adequacy of as-built drawings maintained daily.
 - f. Once accepted, the representative sample will become the physical baseline by which ongoing work is compared for quality and acceptability. To the maximum practical extent, approved representative samples of work elements shall remain visible until all work in the appropriate category is complete. Acceptance of a sample does not waive or alter any contract requirements or show acceptance of any deviation from the contract not approved in writing by the DIA Project Manager. The Contractor's Quality Control representative shall chair, prepare and distribute minutes of Quality Control meetings. Meeting minutes shall be distributed within 24 hours of the meeting.
3. FOLLOW-UP INSPECTION. The Contractor's Quality Control representative will monitor the work to review the continuing conformance of the work to the workmanship standards established during the preparatory and initial inspections.
4. COMPLETION INSPECTION. Forty-eight hours prior to the completion of an item or segment of work and prior to covering up any work, the Contractor will notify the DIA Project Manager who will verify that the segment of work is substantially complete, all inspections and tests have been completed and the results are acceptable. The purpose of this inspection is to allow further corrective work upon, or integral to, the completed segment of work. THIS IS NOT AN ACCEPTANCE INSPECTION. If any items are determined to be deficient, need correction or are non-conforming, a deficiency list will be prepared and issued to the respective Contractor for correction, repair or replacement of any deficient or non-conforming items. The DIA Project Manager and Contractor's Quality Control representative will verify the correction of the deficient and/or non-conforming items prior to the start of the next operation.
5. PRE-FINAL ACCEPTANCE INSPECTION. Prior to requesting a Pre-final Acceptance Inspection by DIA, all work and operational systems to be inspected shall be satisfactorily completed and tested by the Contractor. The Contractor's written request

for this inspection shall be made 72 hours in advance. With the request shall come a list of any known deficiencies and when they will be corrected. If the list is too large or contains too many significant items, in the opinion of the DIA Project Manager, no inspection will be held due to the incompleteness of the work.

- a. The DIA Project Manager will schedule the Pre-final Acceptance Inspection and will prepare a list of deficient items (punch list) discovered during the inspection. If during the inspection the list becomes too large or too many significant items are on the list, the inspection will be canceled. After the inspection is completed, the deficiency list will be transmitted to the Contractor for correction of the deficient items.
6. FINAL ACCEPTANCE INSPECTION. After the Contractor has completed all items on the deficiency list (generated from the Pre-final Acceptance Inspection) he shall request a Final Acceptance Inspection. The request shall be made in writing at least 72 hours in advance of the inspection. All areas must be cleaned and ready for turnover prior to this inspection. The DIA Project Manager, the design consultant, a representative of the funding agency (if applicable) and other interested parties will inspect the subject Work to ensure that all deficiencies have been satisfactorily attended to and that no new deficiencies have appeared and that all systems are completely functional. Any outstanding or additional deficient items will be noted and handled per the requirements of the Pre-final Acceptance Inspection noted above until the Work is acceptable to the DIA Project Manager.

3.06 QUALITY CONTROL TESTING PLAN.

- A. 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.
- B. The testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:
 1. Specification item number (e.g., P-401)
 2. Item description (e.g., Plan Mix Bituminous Pavements)
 3. Test type (e.g., gradation, grade, asphalt content)
 4. Test standard (e.g., ASTM or AASHTO test number, as applicable)
 5. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)
 6. Responsibility (e.g., plant technician)
 7. Control requirements (e.g., target, permissible deviations).
- C. The testing plan shall contain a statistically based procedure of random sampling for acquiring test samples in accordance with ASTM D 3665. The DIA Project Manager shall be provided the opportunity to witness quality control sampling and testing.
- D. All quality control test results shall be documented by the Contractor as required by paragraph 3.07 below.

3.07 DOCUMENTATION.

- A. 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.
- B. 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 DIA Project Manager daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the Contractor's Quality Control Manager.
- C. Specific Contractor quality control records required for the contract shall include, but are not necessarily limited to, the following records:
- D. 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 DIA Project Manager. 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
 7. Safety inspection.
 8. 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.
 9. The daily inspection reports shall be signed by the responsible quality control technician and the Quality Control Manager. The DIA Project Manager shall be provided a minimum of one copy of each daily inspection report on the workday following the day of record.
- E. Daily Test Reports. The Contractor shall be responsible for establishing a system which 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. Quality Control Charts

7. Test results
 8. Causes for rejection
 9. Recommended remedial actions
 10. Retests.
 11. Test results from each day's work period shall be submitted to the DIA Project Manager prior to the start of the next day's work period. Any failing test shall be reported separately to a DIA Inspector or the DIA Project Manager within two hours after discovery of the failure. The Contractor shall maintain quality control charts. The daily test reports shall be signed by the responsible quality control technician and the Quality Control Manager. A typed weekly summary shall be submitted to the DIA Project Manager. The number of copies to be provided shall be as directed by the DIA Project Manager.
 12. Field testing/inspection, field density and moisture tests shall be reported in legible draft form immediately at the test site and attached to the daily test report with a summary of test results provided weekly to the DIA Project Manager. If the DIA Inspector is not present for the actual test, the draft results shall be given to the DIA Project Manager at the end of the shift.
 13. Test reports shall include worksheets showing all calculations used to obtain the test results. Certificates of compliance shall be submitted 30 days prior to the product's incorporation into the work. All test results must be reviewed and signed by a registered licensed engineer in the State of Colorado. The signature represents that the test procedures used are in strict conformance with the applicable testing standard, the calculated data are true and accurate, the tools and equipment used were in calibration, the sample was not contaminated and the persons running the test were qualified.
- F. Contractor Daily Reports. The Contractor shall report daily construction activities using the Daily Construction Report form as included in Specification Section 01999. These daily reports shall include the following:
1. Daily activities
 2. Quantities of material placed
 3. Weather
 4. Equipment on site with time used
 5. Work delays
 6. Possible delays
 7. Materials delivered.
 8. The daily construction reports shall be signed by the responsible foreman. The DIA Project Manager shall be provided a minimum of one copy of each daily construction report on the work day following the day of record.

3.08 CORRECTIVE ACTION REQUIREMENTS

- A. 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 under 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.

- B. 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.
- C. 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.

3.09 SURVEILLANCE BY THE DIA PROJECT MANAGER

- A. All items of material and equipment shall be subject to surveillance by the DIA Project Manager 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 DIA Project Manager at the site for the same purpose.
- B. Surveillance by the DIA Project Manager does not relieve the Contractor of performing quality control inspections of either on-site or off-site Contractor's or subcontractor's work.

3.10 NONCOMPLIANCE

- A. The DIA Project Manager 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 DIA Project Manager 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's 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 DIA Project Manager, the DIA Project Manager 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.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01403

SECTION 01404

DIA QUALITY ASSURANCE FOR FAA FUNDED PROJECTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section identifies Denver International Airport (DIA) inspection activities to be performed by inspectors employed by and working under the direction of the Project Manager.
- B. Inspection and tests, conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and the referenced standards.
- C. The inspection and approval of work by other agencies above does not constitute inspection or acceptance of work required by DIA. Technical specifications may contain requirements more stringent than Denver Building Inspection Division or other code agency requirements. The City will perform all acceptance testing.
- D. The City will employ the services of a testing agency (TA) which will perform all acceptance testing.
- E. Laboratory and field testing requirements to be conducted by the TA for materials and construction on this project are included in the appropriate technical specifications. Where the technical specifications reference the CDOT Standard Specifications for Road and Bridge Construction, the references shall also mean CDOT Field Materials Manual for schedule of tests unless otherwise stated. As a minimum the TA described in this section shall perform all applicable tests including the sampling and acceptance testing. In the event of such a conflict between the schedule and a specification in these technical provisions, the more comprehensive testing shall govern unless otherwise noted.
- F. Inspections and tests conducted by the TA shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and referenced standards. Employment of the City's TA does not relieve the Contractor of providing the required Quality Control Program.
- G. When inspections or tests by the TA prove that the item or material does not meet all applicable specifications and requirements, the cost incurred for the re-testing or re-inspection shall be borne by the Contractor.
- H. Samples will only be considered if taken at random.
- I. The Contractor is obligated to correct any item deemed deficient at no additional cost to the City.

1.02 RELATED DOCUMENTS

- A. Technical Specifications Section 01403 – “Contractor Quality Control Program”
- B. General Conditions Title 17, Section 1701 – “Construction Inspection by the City”
- C. General Conditions Title 17, Section 1702 – “Authority of Inspectors”

- D. General Conditions Title 17, Section 1703 – “Defects – Uncovering Work”
- E. General Conditions Title 17, Section 1704 – “Observable Defects”
- F. General Conditions Title 17, Section 1705 – “Latent Defects”
- G. General Conditions Title 17, Section 1706 – “Removal of Defective Materials and Work”.
- H. ASTM C 1077 Standard Practices for Laboratory Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
- I. ASTM D 3740 Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- J. ASTM E 329 Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction
- K. ASTM E 543 Determining the Qualifications of Nondestructive Testing Agencies
- L. ASTM 548 Generic Criteria for Use in Evaluation of Testing and Inspection Agencies.
- M. Standard testing practices for other disciplines.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 MANUFACTURING AND FABRICATION INSPECTIONS

- A. The Project Manager may elect to perform additional inspections and/or tests at the place of the manufacture, the shipping point or at the destination to verify conformance to applicable specifications. Inspections and tests performed by DIA shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be considered to be a guarantee for acceptance of materials that will be delivered at a later time.
- B. The Project Manager or his authorized representative may inspect at its source any 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 for testing and further inspection.

Should the Project Manager conduct plant inspections the following conditions shall exist:

1. The Project Manager shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
 2. The Project Manager shall have full access during scheduled production or warehousing working hours to parts of the plant that are concerned with the manufacture, production, storage or shipping of materials being furnished.
 3. The Contractor shall arrange for adequate office or working space that can reasonably be needed for conducting a plant inspection. Office or working space shall be conveniently located with respect to the plant and/or warehouse as required by the Project Manager.
- C. It is understood and agreed that DIA shall have the right to re-test at DIA’s expense any materials that have been tested and accepted at the source of supply after it has been

delivered to the site.

3.02 PERFORMANCE

- A. If the Project Manager determines that the Contractor's Quality Control Program Administrator or any of his support personnel are not effectively enforcing or performing the requirements specified in the Contract, the Project Manager will issue a Non-Conforming Report (NCR) on the specific issue found to be in non-conformance with the Contract requirements. The Contractor may be required to remove and replace such individuals at no cost to the Owner.

3.03 INSPECTIONS AND TESTS

- A. It is understood and agreed that DIA shall have the right to take samples and perform testing of samples at different intervals or at intervals concurrent to the Contractor's testing program. The Contractor shall be issued a Nonconformance Report or a Remedial Action Request in the event DIA tests fail.
- B. Materials accepted on the basis of a certificate of compliance may be sampled and inspected/tested by DIA or its designer at any time. The fact that the materials were accepted on the basis of such certification shall not relieve the Contractor of his responsibility to use materials that conform to the specifications.
- C. DIA inspection shall include but not be limited to Initial Inspection, Follow-up Inspection, Completion Inspection, Pre-Final Acceptance Inspection, and Final Acceptance Inspection. The Contractor shall comply with the requirements of these inspections as identified in Technical Specifications Section 01403.

3.04 NONCONFORMING WORK AND MATERIALS

- A. Remedial Action Request (RAR)
 - 1. The Project Manager will request the Contractor to take remedial action when nonconforming work is discovered and/or when test results indicate nonconforming work.
 - 2. The Project Manager will document remedial action that cannot be taken immediately (the same day) by issuing a Remedial Action Request form to the Contractor. Remedial Action Requests are appropriate when the affected element of work is in-progress and discrepancies can be rectified as the work proceeds. RAR's shall be written when work can be brought back into conformance with the contract documents.
 - 3. When issued, a Remedial Action Request will preclude payment for elements noted and will remain in effect until corrective actions have been submitted, approved and performed.
 - 4. Upon satisfactory completion of the remedial action, the Contractor shall transmit the RAR form with the Contractor's statement of action taken (including any applicable test results) to the Project Manager. The Project Manager will perform a follow-up inspection to verify the RAR has been satisfactorily completed. The RAR then will be closed.
- B. Nonconformance Report (NCR)
 - 1. The Project Manager will issue a Nonconformance Report to the Contractor whenever there are violations of the terms of the contract that cannot be immediately brought back into conformance, including materials received and/or items of the work found not to be

in conformance with contract requirements. When issued, a Nonconformance Report will preclude payment for elements noted and will remain in effect until corrective actions have been submitted, approved and performed.

2. The Nonconformance Report form will describe the nature and extent of nonconforming elements and will include space for the Contractor's corrective action proposal, the designer's review of the Contractor's proposal, reinspection and/or verification of approved corrective rework and a space for the Project Manager's disposition of the nonconformance matter. Copies of the Nonconformance Report, at each step of its processing (i.e., initial issuance to Contractor through final disposition), will be sent to the Project Manager.
 3. The Project Manager will make the disposition of nonconforming items/materials.
- C. Removal of nonconforming material.
1. The Contractor is obligated to correct or remove nonconforming materials, whether in place or not. If necessary, the Project Manager will send written notification to the Contractor to correct or remove the defective materials from the project. If the Contractor fails to respond, the Project Manager may order correction and removal and/or replacement of defective materials by others, in which case the Contractor shall bear all costs incurred by such actions.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the unit price item, work order or lump sum bid item. If the City is required to re-inspect work because the previous inspection showed that the work was defective or not in conformance, the Deputy Manager or his authorized representative may deduct from the contract value the cost of re-inspection at the rate of \$75.00 per man-hour.

END OF SECTION 01402

SECTION 01410

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Reference General Contract Conditions, GC 315.
- B. Reference Technical Specifications, Section 01411.

1.02 DEFINITIONS

- A. Cutting: Removal of existing construction to permit installation of or to perform other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.03 SUBMITTALS

- A. Refer to Technical Specifications Sections 01300 and 01340 for submittal procedures.
- B. Cutting and Patching Proposal: Submit a proposal describing procedures at least 30 calendar days before the time cutting and patching will be performed, requesting approval to proceed. Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work. The proposal shall include the following information:
 - 1. Identification of the contract and the Contractor's name.
 - 2. Description of proposed work:
 - a. Scope of cutting, patching, alteration or excavation
 - b. The necessity for cutting or alteration
 - c. Drawing showing location of the requested cutting or alteration, along with radar or x-ray report.
 - d. Trades that will execute the work
 - e. Products proposed to be used
 - f. Extent of refinishing to be done
 - g. Alternatives to cutting and patching
 - 3. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
 - 4. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
 - 5. Proposed Dust Control and Noise Control Measures: Submit a statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

6. Effect on the work and other surrounding work or on structural or weatherproof integrity of project
7. Written concurrence of each contractor or entity whose work will be affected.
8. Cost proposal, when applicable

1.04 QUALITY CONTROL

- A. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance, decreased operational life or safety unless approved by the Project Manager:
 1. Primary operational systems and equipment
 2. Air or smoke barriers
 3. Fire protection systems
 4. Control systems
 5. Communication systems
 6. Conveying systems
 7. Electrical wiring systems
 8. Operating systems of special construction as described in Division 13 and 16
 9. HVAC systems.
- B. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or those results in increased maintenance, decreased operational life or safety unless approved by the Project Manager:
 1. Water, moisture or vapor barriers
 2. Membranes and flashings
 3. Exterior curtain wall construction
 4. Equipment supports
 5. Piping, ductwork, vessels and equipment
 6. Noise control and vibration control elements and systems
 7. Stud walls.
- C. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in DIA's sole opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactorily manner.
 1. If possible, retain the original installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage the original installer or fabricator, engage another recognized, experienced and specialized firm as approved by the Project Manager:
 - a. Processed concrete finishes
 - b. Stonework and stone masonry

- c. Ornamental metal
 - d. Matched-veneer woodwork
 - e. Preformed metal panels
 - f. Firestopping
 - g. Window wall systems
 - h. Terrazzo
 - i. Wall coverings
 - j. HVAC enclosures, cabinets or covers,.
- D. Cutting and Patching Conference: Before proceeding, meet at the Project site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.05 WARRANTY

- A. Existing Warranties: Remove, replace, patch and repair materials and surfaces cut or damaged during cutting and patching operations by methods and with materials so as not to void existing warranties.
- 1. If possible, retain the original installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage the original installer or fabricator, engage another recognized, experienced and specialized firm as approved by the Project Manager:
 - a. Ornamental metal
 - b. Preformed metal panels
 - c. Firestopping
 - d. Terrazzo
 - e. ProCoat paint finishes
 - f. Granite flooring
 - g. Wall coverings
 - h. HVAC enclosures, cabinets or covers.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: All patching material shall be of the type specified for the material being patched. Comply with requirements specified in other Sections of these Technical Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
- 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials as approved by the Project Manager.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are

to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Immediately notify the Project Manager, in writing, of unsuitable, unsafe or unsatisfactory conditions.
3. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.
4. Proceed with patching only after construction operations requiring cutting are complete and inspected by the Project Manager.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut to ensure structural value or integrity.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated or abandoned, bypass such services before cutting to avoid (or minimize) interruption of services to occupied areas.

3.03 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions such as ice, flooding and pollution.
 2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosures. Vacuum carpeted areas.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt and debris caused by selective demolition operations. Return adjacent areas to the condition existing before selective demolition operations began.

3.04 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Execute cutting and demolition by methods that will prevent damage to other work and will provide a proper surface to receive patching.
 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

2. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerance and finishes.
 3. Restore work that has been cut or removed; install new products to provide complete work in accordance with requirements of the contract documents.
 4. Fit work airtight and fire safe to pipes, sleeves, ducts, conduit and other penetrations through surfaces as required by the contract documents.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and other similar operations, including excavation, using methods least likely to damage elements retained to adjoining construction. If possible review proposed procedures with original installer and comply with original installer's written recommendations.
1. In general, use ground fault hand or small power tools designed(to short if metal is hit) for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to the size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete: Use a cutting machine such as an abrasive saw or a diamond-core drill.
 4. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Technical Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing. For continuous surfaces, refinish entire unit to the nearest break line. For an assembly, refinish entire unit.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs on a painted surface, apply primer and intermediate paint coats over the patch and apply the final coat over the entire unbroken surface containing the patch. Provide additional coats until the patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
- D. Fire Rated Construction: Where rated elements are cut, reconstruct to approved designs to provide original fire rating.

3.05 CORE DRILLING

- A. The Contractor shall execute a minimum of x-rays or ground penetrating radar at each

location planned for core drilling prior to submittal to the Project Manager and to utility representatives for approval for core drilling. The request for approval shall be submitted seven days in advance of the planned activity. The request for approval shall indicate on the x-ray or radar information regarding alternate locations or core drilling to avoid structural members and any embedded conduit. Embedded conduit may be metallic or plastic. The x-ray or radar system shall be capable of detecting both types of conduit.

- B. Core drilled “cores” and the core-drilled opening shall be inspected by DIA Project Manager representatives prior to installation of any systems in new openings.
- C. X-ray activities may not be performed during hours of activity or occupancy in the area of the x-ray system. The Contractor shall provide all manpower and barriers required to secure the areas affected by x-ray activities.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable multiplier for the division under which the work falls.

END OF SECTION 01410

SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of furnishing, installing, operating, maintaining and removing temporary construction barriers, enclosures and field facilities including the Contractor's construction offices, staging areas, yards, storage areas, electrical power, telephone, water, fire protection and sanitary service. A construction office is at the Contractor's option (Project Manager's option).
- B. Construction Offices, Construction Yards and Storage Areas
1. The Contractor's offices, construction yards laydown and storage areas shall be located as shown on the contract drawings and/or as designated by the Project Manager. All construction offices, staging areas and material storage areas are to occur within these areas.
 2. Any activity that is expected to result in disturbance of the ground surface equal to or greater than one acre or part of a larger project that is expected to disturb equal to or greater than one acre, is required to be identified in the Construction Activities Stormwater Management Plan (CASMP) and/or Stormwater Management Plan (SWMP). These areas include, but are not limited to, laydowns, borrow areas, stockpiles, and storage areas regardless of the location.
 3. All areas of ground disturbance are required to be stabilized in accordance with State, local, and airport rules and regulations prior to permit termination and/or closure of the contract .
 4. The Contractor shall restore any area on DIA property that becomes contaminated as a result of its operations in accordance with Airport Rule and Regulation 180. Restoration shall be either to applicable standards under Federal and State law or to such other levels as may be required by the Manager of Aviation, at the Manager's sole discretion.
 5. All temporary facility sites must be inspected prior to contract closeout. The DIA Project Manager or authorized representative shall conduct an inspection of contractor areas used during the life of the project. These areas include but are not limited to, staging areas, laydown areas, borrow areas, and contractor yards and offices. The DIA PM will ensure these areas have been properly stabilized in accordance with DIA Rules and Regulations and restored to the condition in which the City initially provided to the Contractor. A representative from DIA Environmental Services shall be present during the final walk through.
 6. Contractor materials shall be managed in accordance with applicable Environmental Regulations.
 7. Temporary facilities which the Contractor desires to locate in secondary laydown and staging areas adjacent to the Work or within the project limits are subject to approval by the Project Manager. If approved, these areas must also be included in the CASMP and/or SWMP.
 8. Access to and security of the Contractor's construction offices, yard, temporary facilities and storage areas shall be as shown on the Contract Drawings or as specified in the contract Special Conditions.

9. Contractor Field Office
 - a. The Contractor shall acquire all necessary permits for installation and construction work related to the Contractor's field office and fencing.
 - b. The Contractor shall provide, as part of his on-site field office, a conference room for weekly meetings. Minimum size to accommodate 15 people with the currently approved schedule posted on a wall. The conference room shall have one available telephone.
 - c. Jack the mobile office unit off its wheels and provide support. Enclose the underside of the trailer with weatherproof skirting.
 - d. Install tie downs in compliance with code.
 - e. Provide access to the field office and easily accessible space for parking six full size passenger automobiles as a minimum. Grade the field office site, access roadway and parking area for drainage, and surface with gravel paving or crushed stone.
 - f. Water and sewer lines to the field office, if installed, shall be installed so they will not freeze.

- C. Electrical Service
 1. Provide lighting and power for field offices, storage facilities and other construction facilities and areas.
 2. Provide power centers for electrically operated and controlled construction facilities including tools, equipment, testing equipment, interior construction lighting, heating, cooling and ventilation equipment.
 3. Provide night security lighting at secured areas within construction limits at offices, storage facilities, temporary facilities and excavated areas.
 4. Provide battery operated or equivalent emergency lighting facilities at construction areas where normal light failures would cause employees to be subjected to hazardous conditions. Test such facilities monthly and maintain a record of these tests for the Project Manager's review.
 5. Bear all costs of temporary electric and water service permits, fees and deposits required by the governing authorities, and connection charges and temporary easements including installation, maintenance and removal of equipment.

- D. Telephone Service
 1. The Contractor shall furnish, install and maintain at least two telephones in his main field office. These phones shall be manned at all times by the Contractor's personnel or by an answering machine.
 2. The Contractor shall supply one separate facsimile line for facsimile equipment.

- E. Water Service
 1. The Contractor shall make all connections and extensions required and shall make use of water in direct support of the Work. The Contractor shall install an approved Water Department tap at the City's water source prior to obtaining any water. The Contractor shall arrange and pay for its supply/distribution system from the City's point of connection. The location and alignment of the Contractor's temporary supply/distribution system must be approved by the Project Manager prior to its installation. The Contractor shall leave in place all above ground and underground water distribution facilities unless otherwise directed by the Project Manager.

2. The Contractor shall not use in place fire hydrants or standpipes as sources for construction water or potable water.

F. Fire Protection

1. Furnish, install and maintain temporary portable fire protection equipment throughout the construction period at all buildings (including the project site), maintenance shops, and fuel storage on all large construction equipment and at the location of any flammable materials or construction materials.

G. Sanitary Service

1. Furnish, install and maintain temporary sanitary facilities and services throughout the construction period.
2. Ensure that separate or single user toilets shall be provided to ensure privacy between the sexes.
3. Provide general washing facilities adequate for the number of employees.
4. Provide special washing facilities adequate for the number of employees engaged in the application of paints, coating and other volatile or hazardous materials.

1.02 QUALITY CONTROL

- A. Provide products for, and the execution of, the Work of this Section that will satisfy the requirements of the NEC, OSHA and local codes. Provide products that satisfy requirements of NEMA and are UL listed.

1.03 SUBMITTALS

- A. Refer to Technical Specifications Sections 01300 and 01340 for submittal procedures.
- B. Submit a shop drawing within five days of the Notice to Proceed that shows the following:
 1. Temporary facilities equipment and materials (include manufacturer's literature)
 2. Details and layout of temporary installations including fences, roads, parking, buildings, storage areas and drainage plans.
 3. Lighting plan showing temporary lighting facilities, electrical service panel location, electrical circuit diagram and anticipated light level on the working roadway, pathway or construction surface.
 4. As-built description of any temporary underground utilities referenced to the Airport grid and benchmark system within five days of completion of the installation.

PART 2 - PRODUCTS

2.01 ELECTRICAL SERVICE

- A. Provide temporary power and lighting equipment consisting of fixtures, transformers, panel boards, groundings, lamps, switches, poles, conduits and wiring sized and capable of continuous service and having adequate capacity to ensure a complete operating system. Comply with NEMA.
- B. Provide temporary extension cords to supply tools not longer than 200 feet, except that additional length may be used if equipment will be grounded within 200 feet of tool or power.

- C. Portable power generators shall be grounded.

2.02 TELEPHONE SERVICE

- A. Provide equipment that is compatible with that of Qwest Communications Company and the telephone exchange to which the Contractor connects.

2.03 DRINKING WATER SERVICE

- A. Provide sanitary materials and equipment that satisfies the requirements of codes and regulations pertaining to temporary water systems. Bottled products may be used if those products comply with codes. Clearly label portable containers having a dispensing tap and used only for drinking water. Provide single service disposable cups and a sanitary container for dispensing cups. A trash receptacle shall be provided and maintained beside each portable water supply.

2.04 FIRE PROTECTION

- A. Fire extinguishers shall be UL rated and shall comply with the Uniform Fire Code.

2.05 SANITARY SERVICE

- A. Provide materials and equipment adequate for the intended purposes, which will neither create unsanitary conditions nor violate the codes applicable to temporary sanitary facilities. Enclosures for toilet and washing facilities shall be weatherproof, sight proof, ventilated and sturdy.
- B. Provide portable type toilet facilities that satisfy the requirements of OSHA.
- C. Provide washing facilities as needed. Furnish soap, single-service paper towels, towel dispenser and towel receptacle. If paints, coatings and other volatile or hazardous materials injurious to humans will be applied as part of the contract, provide washing facilities with warm water of approximately 120 degrees F.

PART 3 - EXECUTION

3.01 ELECTRICAL SERVICE

- A. The approximate location of primary power lines is shown on the Construction Drawings. The Contractor shall locate electrical service where it will not interfere with equipment, storage spaces, traffic, and prosecution of the Work or the work of others. Installation shall present a neat and orderly appearance and shall be structurally sound. Maintain service in a manner that will ensure continuous electrical service and safe working conditions.

3.02 TELEPHONE SERVICE

- A. Install temporary telephone service in a neat and orderly manner and make structurally and electrically sound to ensure continuous service. Modify, relocate and extend as work progress requires. Place conduit and cable where those products will not interfere with traffic, work areas, materials, handling equipment, storage areas and the work of other contractors. Service lines may be aerial.

3.03 WATER SERVICE

- A. Install the systems in a neat and orderly manner. Make them structurally and mechanically sound. Provide continuous service. Modify, relocate and extend the systems as the work progresses.
- B. Locate systems where they will be convenient to work stations, sanitary facilities and first aid station but will not interfere with traffic, work areas, materials handling equipment, storage areas or the work of other contractors.
- C. Provide sanitary bubbler drinking fountains if potable water service is available. Disinfect water piping before using for the potable water service.
- D. Install vacuum breakers, backflow preventers and similar devices in a manner and location which will prevent temporary water from returning to the water mains.
- E. Do not incorporate any part of temporary water distribution system into the permanent water distribution system.

3.04 FIRE PROTECTION

- A. Install products in conformance with the requirements of the applicable Denver Fire Department and OSHA regulations.
 - 1. Provide functional fire extinguishers that are clearly identified for fire and an accessible supply of water during the period of construction. These fire extinguishers shall remain in place until permanent fire protection systems are functional.
 - 2. Furnish not less than one 20-pound fire extinguisher, type 2A-20ABC within ten feet of cutting and welding operations.
 - 3. Provide 20-pound fire extinguishers, type 2A-20ABC no further then 100 feet apart in buildings.
 - 4. Provide not less than one 20-pound fire extinguisher, type 2A-20ABC on any equipment of 75 horsepower or more.
- B. Instruct construction personnel as to location and use of temporary fire protection equipment.
- C. Fire extinguishers shall be located for easy access. Their location shall be clearly marked so that they can be seen at least 75 feet away.

3.05 SANITARY SERVICE

- A. Place temporary sanitary (and washing) facilities in a neat and orderly manner within the limits of the work and convenient to the work stations. Make these facilities structurally and mechanically sound. Modify, relocate and extend the facilities as required by progress of the work.
- B. Service toilets at those time intervals which will minimize the accumulation of wastes and prevent creation of unsanitary conditions, but not less than once a week.
- C. The waste from the sanitary and wash facilities shall be disposed of in accordance with all applicable rules, regulations and laws and with the least environmental impact.

3.06 FENCING

- A. Contact all utility service companies prior to planning fence location and post locations for certification of current utilities. Locate pothole posts planned within 5 feet of known utilities. Submit fencing plan and typical details to DIA Project Manager at least seven days before planned execution for review and acceptance.

3.07 SIGNAGE

- A. Contractor shall not provide any signage for temporary facilities without prior approval from the DIA Project Manager.

3.08 TEMPORARY FACILITIES AS-BUILT DRAWINGS

- A. Provide as-built drawings showing vertical and horizontal location. The location of all regulating and shut off devices along with all branches shall be shown. The as-built drawings shall be based upon the DIA grid coordinate system and benchmark. As-built drawings shall be furnished within 48 hours prior to the Contractor's request for turning on services.

3.09 REMOVAL

- A. The Contractor shall locate all temporary facilities including the underground utilities so they can be completely removed without damaging permanent work or the worksite of other contractors.
- B. The Contractor shall remove all temporary facilities, including all underground utilities, and restore the site to the condition in which the City initially provided it to the Contractor.
- C. The Contractor shall stabilize all areas of disturbance in accordance with State, local, and airport rules and regulations.
- D. In accordance with Part 1, an inspection of temporary facilities used by the Contractor is required prior to contract close out.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01500

SECTION 01505

MOBILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the worksite; for the establishment of all offices, buildings and other facilities necessary for work on the project; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items on the worksite.

1.02 SUBMITTALS

- A. Refer to Technical Specifications Sections 01300 and 01340 for submittal procedures.
- B. Submit a Mobilization Schedule 15 days prior to first billing for mobilization.

1.03 DELIVERY

- A. Delivery to the worksite of construction tools, equipment, materials and supplies shall be accomplished in conformance with local governing regulations.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. Provide construction tools, equipment, materials and supplies of the type and quantities that will facilitate the timely execution of the Work.

PART 3 - EXECUTION

3.01 EXECUTION AND REMOVAL

- A. Provide personnel, products, construction materials, equipment, tools and supplies at the worksite at the time they are scheduled to be installed or utilized.
- B. Upon completion of the Work, remove construction tools, apparatus, equipment, unused materials and supplies, plant, and personnel from the jobsite.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. The Contractor shall submit for the Project Manager's approval 15 days prior to the first mobilization billing a detailed breakdown of all items, including subcontractor mobilization items that are proposed to be invoiced under Mobilization as part of the Schedule of Values (reference Technical Specifications Section 01370). This breakdown shall be labeled MOBILIZATION SCHEDULE. This schedule will be reviewed by the Project Manager to inform the Contractor what exact types of costs will be approved and paid under Mobilization.
- B. All requests for payment for mobilization shall include a detailed Mobilization Schedule which

shall identify the nature of each expense item, its delivery date, setup and startup date and the actual invoice amounts inclusive of acquisition, taxes, transportation assembly, and installation less all discounts.

- C. The Contractor shall identify a line item in the Mobilization Schedule as "Demobilization" and shall establish the value for this line item, at a minimum, of fifteen percent (15%) of the pay item for mobilization.
- D. The initial approved Mobilization Schedule shall determine the basis for all future mobilization payments.

PART 5 - PAYMENT

5.01 MOBILIZATION

- A. Payment will be made only for substantiated Mobilization costs in accordance with the approved Mobilization Schedule, and only to the limit of the contract lump sum amount for the pay item Mobilization. In no case will the City pay Mobilization in excess of five percent (5%) of the total Contract amount.
- B. Payment for the Contractor's bonds may be included in the Mobilization Schedule to the limits of the actual amount.
- C. Payment amounts for personnel involved in mobilization and listed on the approved Mobilization Schedule shall be limited to the Contractor's certified payroll amounts.
- D. Payment amounts for materials, supplies and transportation involved in mobilization and listed on the approved Mobilization Schedule shall be for the actual amounts paid as shown on invoices marked paid. No payment will be made under mobilization for the cost of permanent materials to be installed for this contract. See Section 01370 for Stored Materials.
- E. No payment under mobilization will be made for rented or leased equipment other than actual transportation cost.
- F. No separate payment will be made as part of the Mobilization Schedule for the maintenance and/or use of personnel, equipment, supplies and incidentals after project setup except for demobilization. These costs are to be incorporated in the remaining items of work in the Schedule of Values by multiplier or work request.
- G. For any mobilization payment amounts requested by the Contractor that are unsubstantiated or exceed the allowable limit of five percent of the total Contract amount, the Project City, may in its sole discretion reallocate any, all, or none of those amounts to other work items in the Schedule of Values for lump sum contracts or to be disbursed on a prorated basis as determined by the Project Manager for unit price contracts. Any unsubstantiated mobilization payment amounts not reallocated by the Project Manager will not be paid.

Payment shall be made under:

01505a Mobilization.....per lump sum

END OF SECTION 01505

SECTION 01566

ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of avoiding or mitigating adverse environmental impacts caused by construction activities in the areas of air quality, water quality, hazardous and non-hazardous solid waste, natural resources, and noise pollution. Reference the General Contract Conditions 806 (Protection of Drainageways), 807 (Protection of Environment), 808 (Hazardous and Explosive Materials or Substances), and 809 (Archeological and Historical Discoveries).
1. The Contractor, in conducting any activity on airport property or in conducting work for an airport project not on airport property, shall comply with all applicable airport, local, state, and federal rules, regulations, statutes, laws, and orders ("Environmental Requirements"). In addition, these Environmental Requirements include applicable Environmental Guidelines developed for DIA's Environmental Management System (EMS), as summarized in the airport's Rules and Regulations Part 180 (Environmental Management), which can be located on the airport's website at: <http://www.flydenver.com/diabiz/info/research/rules/index.htm>. Information on DIA's EMS as well as current versions of DIA's Environmental Guidelines and Environmental Policy are also located on the airport's website at: <http://www.flydenver.com/diabiz/community/enviro/index.asp>. These Environmental Requirements address, but are not limited to, requirements regarding the management of hazardous materials, petroleum products, solid waste, or any other substance; the National Environmental Policy Act (NEPA); and water quality and air quality regulations. Each entity, including subcontractors and subconsultants providing products, goods, and/or services on behalf of DIA, must be aware of the DIA Environmental Policy, the significant environmental aspects for DIA, and which of these aspects are relevant to the activities conducted by the entity.
 2. The Contractor shall comply with all Environmental Requirements and accept responsibility for compliance with all environmental quality standards, limitations and permit requirements promulgated there under. The Contractor shall obtain all environmental permits required for implementation of the project. Failure of these specifications to specifically mention any Environmental Requirement does not relieve the Contractor from compliance.
 3. If the City, as owner, is determined by any federal, state or local government agency, department, board or commission, or in any judicial proceeding to have violated any such environmental protection rules, laws or regulations as a result of Contractor's acts or omissions, the Contractor agrees to indemnify and hold harmless the City from any and all prosecutions, payment of any and all fines or penalties, and the cost of abatement and remediation, except that the Contractor shall not be required under General Contract Condition 807, to indemnify the City from any amounts which are attributable to the negligence of the City.
 4. Work shall not commence on any project until all FAA approvals have been received, applicable permits have been issued and signed by permittee, and all inspection requirements have been satisfied in accordance with State and local permitting requirements.

1.02 SUBMITTALS

- A. Refer to Technical Specifications Sections 01300 (Submittals) and 01340 (Shop and Working Drawings, Product Data and Samples) for procedures.
- B. Within 10 days after Notice to Proceed on a task order, the Contractor shall submit the following if applicable, unless waived by the DIA Project Manager:
 - 1. Submittals pertaining to water quality management:
 - a. Copy of the application completed for the City and County of Denver Construction Activities Stormwater Discharge Permit (CASDP) and the CASDP issued for the project by the Denver Department of Public Works. This submittal consists of three items: the Authorization to Discharge, the Sewer Use & Drainage Permit, and the approved Construction Activities Stormwater Management Plan (CASMP).
 - 1) Revisions or amendments to the CASMP by the Contractor. At the completion of the project, after final stabilization has been achieved and accepted in accordance with CASDP requirements, the Contractor shall submit a copy of the CASDP Inactivation Request.
 - b. Copy of the certification issued by the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (WQCD) under the Colorado Discharge Permit System (CDPS) for discharges associated with construction activities and/or industrial activities. Before obtaining this permit, the Contractor shall submit a **draft** permit application and the final permit application for DIA review and approval PRIOR to submittal to CDPHE. The Contractor need not submit copies of the general permits or the general permit rationales.
 - 1) At the completion of the project, after final stabilization has been achieved and accepted in accordance with the State of Colorado CDPS requirements, the Contractor shall submit a copy of the CDPS Inactivation Notice or Notice of Termination.
 - c. Copy of the certification issued by the State of Colorado CDPS under its General Permit for Construction Dewatering Activities. Before obtaining this permit, the Contractor shall submit a **draft** permit application and the final permit application for DIA review and approval PRIOR to submittal to CDPHE. The Contractor need not submit a copy of the general permit or the general permit rationale.
 - 1) At the completion of the project, the Contractor shall submit a copy of the CDPS Notice of Termination.
 - d. Copies of any certification issued by the State of Colorado under its Industrial Permitting for minimal discharges of process wastewater. Before obtaining a permit, the Contractor shall submit a **draft** permit application and the final permit application for DIA review and approval PRIOR to submittal to CDPHE. The Contractor need not submit a copy of the issued permit or the permit rationale.
 - 1) The Contractor shall submit copies of Discharge Monitoring Reports (DMRs) and at completion of the project, the CDPS Notice of Termination.
 - e. A copy of the well permit from the state Division of Water Resources for every new well that diverts or for the monitoring of groundwater.
 - f. A copy of the Notice of Intent for any borehole structure filed with the state Division of Water Resources.
 - 2. Submittals pertaining to sewage holding tanks associated with buildings and trailers. For purposes of this Section 01566, the generic term “sewage holding tank” means “individual sewage disposal system (ISDS)”, “privy vault”, “septic tank”, or “septic system”.
 - a. Copy of the permit application for a sewage holding tank.
 - b. Copy of the Sewer Use & Drainage Permit issued by the Denver Department of Public Works.

- c. Copy of the ISDS permit issued by the Denver Department of Environmental Health.
 3. Submittals pertaining to air quality management:
 - a. Copy of any permit issued by the CDPHE Air Pollution Control Division (APCD). Before obtaining a permit, the Contractor shall submit a **draft** permit application and the final permit application for DIA review and approval PRIOR to submittal to CDPHE.
 1. In cases where the City has already obtained a dust control permit, the Contractor shall submit a copy of the paperwork transferring the permit over to the Contractor's company name and a copy of the transferred permit.
 - b. Dust control plan. For projects where the State of Colorado requires a dust control permit, this submittal is waived. This plan must address appropriate control measures that the Contractor will employ to minimize the release of fugitive dust from the site. In addition, the Contractor must comply with the requirements in Section 3.01 below.
 - c. Copies of the Notices of Relocation.
 4. Submittals pertaining to storage tanks and containers:
 - a. Copy of the permit issued by the State of Colorado, Department of Labor and Employment, Division of Oil and Public Safety, for installation of petroleum (or other regulated substances) storage tanks located on airport property and used for the project.
 - b. Copy of permits issued by the Denver Fire Department for storage tank installations, storage tank removals, and hazardous materials use/storage.
 - c. Copy of Spill Prevention, Control, and Countermeasure (SPCC) Plan for petroleum storage tanks and containers with capacity of 55 gallons of oil or greater located on airport property and used for the project.
 5. Waste Management Plan. This submittal may be waived if DIA Environmental Services, upon consultation with the DIA Project Manager, deems it unnecessary to require such plan. When required, this plan must include, at a minimum, waste management measures listed in Paragraph 3.05.I. below. Because this plan may be required at any point during the project, the Contractor should anticipate making this submittal in its contract bid or proposal.
 6. Copies of any other plans, permits, permit applications, correspondence with regulatory agencies (including violations), waste manifests, results of laboratory analyses, or other environmental documentation required for the project not previously identified.

1.03 RELATED DOCUMENTS

- A. Code of Federal Regulations (CFR) Publications (including but not limited to):
 1. 33 CFR 323 - Permits for discharges of dredged or fill materials into waters of the United States
 2. 40 CFR - Protection of Environment
 3. 49 CFR 171-180 Hazardous Material Transportation Regulations
- B. Colorado Revised Statutes (including but not limited to):
 1. Water Quality Control, Title 25, Article 8

2. Air Quality Control, Title 25, Article 7
 3. Hazardous Waste, Title 25, Article 15
 4. Noise Abatement, Title 25, Article 12
 5. Petroleum Storage Tanks, Title 8, Article 20.5
 6. Liquefied Petroleum Gas (LPG) Storage Tanks, Title 8, Article 20
 7. Solid waste regulations
- C. City and County of Denver Executive Orders (including but not limited to)
1. Executive Order No. 115
 2. Executive Order No. 123
- D. Denver Revised Municipal Code, Title II, Sections 48-44 and 48-93
- E. City and County of Denver Construction Sites Program
- F. City and County of Denver Construction Activities Stormwater Management Plans Information Guide
- G. Any other applicable rules, regulations, ordinances, and guidance must be followed as applicable.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. Products required for the work shall meet all Environmental Requirements.
- B. At a minimum, products for erosion and sediment control must conform to the technical requirements contained in the City and County of Denver's Construction Activities Stormwater Management Plan Information Guide and the current version of the Urban Drainage and Flood Control District's Urban Storm Drainage Criteria Manual, Volume 3: Best Management Practices. These documents are posted at <http://www.denvergov.org/Portals/528/documents/DftGuide452007.pdf> and http://www.udfcd.org/downloads/down_critmanual.htm respectively.

PART 3 - EXECUTION

3.01 AIR POLLUTION CONTROLS

- A. The Contractor shall use appropriate control measures to comply with applicable air quality permit requirements. Additionally, the Contractor must be aware of the following procedures and techniques while conducting construction activities on DIA property. NOTE: Application of dust control measures should be discussed in the Dust Control Plan.
1. Apply water as needed to the construction site haul roads, disturbed surface areas and public access roads as needed to suppress dust. The use of chemical stabilizer can be requested by the Contractor. The type of stabilizer to be used and locations of use must be included in the Dust Control Plan, which must be approved by the DIA PM prior to application.

2. The Contractor shall suspend all earthmoving activities if wind speed exceeds 30 mph. For purposes of this Section 01566, the generic term “earthmoving” means clearing, grubbing, excavation, topsoil removal, backfilling, embankment work, grading, trenching, drilling, and installation of borings. Contractors are expected to check wind speeds with the airport’s ramp tower to demonstrate compliance with this requirement. In addition, the project may be shut down if two of three of the Runway Visual Range (RVR) instruments read visibility of 2,400 feet or less. The instruments are used by FAA Control Tower personnel to ensure safe aircraft operations. Costs for shutdowns due to wind velocities or RVR readings shall not be grounds for delay or extra cost claims.

- B. Burning of materials is strictly prohibited on DIA property.

3.02 WATER POLLUTION CONTROLS

- A. The Contractor shall conduct construction activities in accordance with all applicable permit requirements. In addition, the Contractor shall comply with the following procedures and requirements while conducting activities on DIA property.
 1. Water encountered during construction cannot be discharged to the stormwater system or placed onto the ground surface without a permit AND prior written approval by the DIA Project Manager. If groundwater or stormwater is anticipated to be encountered and the Contractor desires to discharge it to the stormwater system or onto the ground surface, then the Contractor must obtain an appropriate CDPS discharge permit in advance of the discharge unless this activity is specifically authorized under the CDPS Construction Stormwater Permit.
 2. If water is encountered and the Contractor desires to discharge these waters to the sanitary sewer system, then the Contractor must obtain approval from DIA Environmental Services in advance of the discharge.
 3. The Contractor shall ensure that stormwater that comes in contact with storage areas does not become impacted and discharged to the stormwater sewer system or to an impervious surface. Furthermore, any materials in storage areas shall not be stored directly on the ground (refer to DIA Technical Specification 16642 for Cathodic Protection Requirements).
 4. The Contractor shall not operate any valves, sluice gates or other drainage appurtenances related to any DIA sewer system without the prior approval of both the DIA Project Manager and DIA Environmental Services. Any violation of this directive may result in the payment of a financial penalty by the Contractor if the State of Colorado assesses such a penalty.

3.03 EROSION CONTROL AND SEDIMENTATION CONTROL

- A. This work consists of constructing, installing, maintaining and removing, if required, temporary and permanent control measures during the life of the contract (and possibly afterward) until the Contractor achieves final stabilization of the site to prevent or minimize erosion, sedimentation, and pollution of any state waters in accordance with all Environmental Requirements.
- B. The Contractor is responsible for compliance with all requirements in accordance with the CASDP, the City and County of Denver Construction Sites Program, the approved CASMP, and CDPS issued permits.

- C. Temporary facilities, including but not limited to, storage areas, laydowns, borrow areas, and contractor offices and work yards shall be managed in accordance with DIA Technical Specification 01500 for Temporary Facilities.
- D. Clean soil fill may be stockpiled in any area that has been previously approved and signed off by the DIA Section Manager of Construction, Design and Planning, and Environmental Services. Soil stockpiles are considered a potential pollutant source and must be addressed in the CASMP and/or SWMP.
- E. Make immediately available, upon the DIA PM's request, all labor, material and equipment judged appropriate by the Project Manager to maintain suitable erosion and sediment control features. These actions requested by the DIA PM take precedence over all other aspects of project construction that have need of the same labor, material and equipment, except those aspects required to prevent loss of life or severe property damage.

3.04 CONSTRUCTION OF CONTROL MEASURES FOR EROSION AND SEDIMENTATION

- A. The Contractor must install control measures in accordance with the most recent version of the Urban Drainage and Flood Control District's Urban Storm Drainage Criteria Manual, Volume 3: Best Management Practices and the City and County of Denver's Construction Activities Stormwater Management Plan information Guide. These documents are posted at: http://www.udfcd.org/downloads/down_critmanual.htm and <http://www.denvergov.org/Portals/528/documents/DftGuide452007.pdf> respectively. Deviations from these two documents are allowed with written consent from the City and County of Denver NPDES Inspector.

3.05 SOLID WASTE MANAGEMENT

- A. This paragraph applies to solid waste. Solid waste is defined at 40 CFR 261.2 and includes all putrescible and nonputrescible solid, semisolid and liquid wastes, but does not include hazardous waste which is treated as a separate subset of solid waste. Hazardous waste is defined at 40 CFR 261.3, and 6 CCR 1007-2 as a solid, a liquid, or a contained gaseous material that is no longer used or that no longer serves the purpose for which it was produced and meets the definitions of the regulations. Certain types of non-hazardous solid waste may require special handling; such wastes are sometimes called "special waste."
- B. Hazardous and non-hazardous solid waste may be generated by the actions of the Contractor including, but not limited to, the direct purchase of hazardous materials, demolition, site preparation, grading, excavation, construction, or maintenance of equipment. If questionable material is encountered during construction activities, the Contractor must immediately notify the DIA Communications Center at (303) 342-4200 and the DIA Project Manager. If the Contractor will utilize any chemicals that will result in the generation of a potentially hazardous waste, the Contractor must prepare and submit a Waste Management Plan (Section 3.05.I)
- C. Remove scrap and waste material and dispose of it in accordance with laws, codes, regulations, ordinances, and permits.
- D. The Contractor is responsible for the safe management and disposal of all hazardous and non-hazardous solid waste and shall dispose of such waste in accordance with all environmental requirements. Waste disposal options include reuse on the project (with DIA approval only), sale, use for fuel, donation to other public or private projects, or through disposal in approved public or private disposal sites, either free of charge or for a fee. The method of disposal is restricted according to the classification of the waste. Hazardous and non-hazardous solid waste shall not be abandoned, dumped, buried or in any other way disposed on DIA property.

- E. City and County of Denver Executive Order No. 115 requires all non-hazardous solid waste generated at DIA to be directed to the Denver Arapahoe Disposal Site (DADS) landfill. This includes all non-hazardous solid waste collected or transported in Denver vehicles, Contractor vehicles, or subcontractor vehicles. Through the DIA Project Manager, the Contractor shall establish accounts in advance for the disposal of non-hazardous solid waste generated on the project. Therefore, this bid shall include costs for transportation to the DADS landfill only and the City is responsible for disposal fees and any applicable State surcharges. The Contractor is responsible for any special handling charge imposed by the transporter or the DADS landfill operator.

NOTE: To establish contractor accounts, the DIA Project Manager shall follow procedures outlined in ES-308-06.03: *Municipal and Special Solid Waste Administrative Management Work Instruction*.

1. In the interest of public relations and to maximize the long-term use of the Site, haul routes adjacent to DADS shall be limited to State Highways 30 or 470 unless these routes are impassable (refer to Exhibit A for preferred haul route). Specifically, Gun Club Road between Interstate Highway 70 ("I-70") and Mississippi Avenue shall be avoided.
- F. Some of the naturally occurring material found by the Contractor, especially tar or oil-impregnated soil, may not be obviously hazardous. Physical and chemical analyses and tests may be required to determine if the material meets the criteria set forth in State of Colorado, CDPHE, Hazardous Materials and Waste Management Division (HMWMD) regulations. The Contractor shall pay for such chemical analyses and will coordinate with local authorities to determine the quantity and origin of samples analyzed for any questionable material. The Contractor will provide the classification of the material to the City.
- G. The routes to be followed when transporting solid or hazardous wastes may be subject to the approval of the local agency having jurisdiction.
- H. The Contractor shall not wash down equipment in such a manner as to flush grease and oils into the project site or onto airport property unless the waste is properly contained, treated, and disposed.
- I. Unless waived, the Contractor shall submit a Waste Management Plan that meets these minimum requirements:
1. Contractor's name and contract number;
 2. A list of all materials, products, and wastes for the project; acknowledgment whether any of those materials and products require special handling or storage for environmental, safety, or fire code reasons; and acknowledgment whether any of the wastes will become regulated wastes upon disposal. The list of materials, products, and wastes shall include, at a minimum, trash and unclassified construction debris, asphalt spoils, concrete spoils, pavement sweepings, soils contaminated by chemicals or petroleum products during the project, lime and cement trimmings, scrap metal, and every chemical product used on the project. Reuse of a product on site for its original intended purpose (e.g., cement trimmings from one part of the project used elsewhere on the airport) does not constitute generation of a waste for disposal.
 3. For each material and product listed, the Contractor shall identify the storage method, and identify measures to store hazardous waste separately from non-hazardous waste.
 4. For each waste listed, the Contractor shall identify the handling/transportation method, the disposal method, and the disposal facility utilized.

5. If the Contractor anticipates generation of hazardous waste, the Contractor shall provide its USEPA (generator) identification number.
 6. Recycling measures.
 7. Waste minimization measures.
 8. Pollution prevention measures.
 9. Training measures for management of hazardous materials and hazardous wastes on site.
- J. The Contractor shall maintain copies of MSDSs for any and all materials used at the airport project, at its on-site project office or other designated location. DIA Environmental Services may, at any time, request copies of MSDSs and/or waste manifests for any waste shipments from the project site. Any such request must be fulfilled within 1 business day.
- K. The Contractor shall require all shipments to the worksite to contain documentation that shows whether the material is hazardous or requires special handling, storage, or disposal; what type of material it is; what hazard(s) it poses; how to treat exposure(s); and the quantity of hazardous material in the shipment. This information must be provided to the DIA PM prior to any hazardous material being allowed on site.
- L. Before leaving the site with any hazardous waste or material requiring special handling, disposal, or storage, the Contractor must provide the DIA PM with a detailed description of the material, its source, quantity, who is hauling it off site, and where it is being taken, along with verification that the destination site can legally receive it.
- M. The Contractor shall recycle all construction materials to the extent practicable.

3.06 CONSTRUCTION DEBRIS RECYCLING

- A. The City and County of Denver encourages recycling applicable materials. Scrap metal, wood, and other construction materials may be eligible for recycling. The Contractor is responsible for coordinating all aspects with regard to recycling. The Contractor can contact DIA Purchasing or DIA Environmental Services for information regarding recycling policies and practices.
- B. Dry concrete and asphalt materials are considered solid waste, but may be eligible for recycling. DIA maintains two dry concrete and asphalt recycling yards used for the accumulation and crushing of these materials. The only allowable materials at the recycle yards are dry concrete and asphalt materials derived from construction activities occurring on DIA property. The South Yard is located on 71st Ave just east of Jackson Gap Street. The North Yard is located on the south side of 110th, west of Queensburg Street. The use of these yards must be approved by the DIA Project Manager.
1. Concrete washout activities are prohibited anywhere on DIA property unless a) the activity is specifically authorized under a CDPS permit and included in the SWMP or b) the washwater is collected and hauled offsite for disposal at an appropriately permitted facility. Concrete washout activities authorized by permit are only allowed at a designated concrete washout area as indicated in the approved CASMP and include the washing of the chute and tools ONLY. Concrete washout spoils are eligible for recycling once the washout has been segregated and allowed to dry and harden in accordance with permitted methods.
 2. Rejected loads and/or other wet concrete or asphalt materials are prohibited to be placed ANY WHERE on DIA property unless the Contractor holds a permit that authorizes the placement of such material on the site. Unless specifically authorized

in a CDPS permit issued to the Contractor, these materials must be returned to the facility of origination or other permitted facility for proper disposal.

3. The Contractor shall not place any concrete containing welded wire fabric or deformed steel reinforcing bars installed in a crisscross fashion in either of the airport's two construction spoils recycling yards. The Contractor shall remove reinforced concrete from the project site and haul such waste to the DADS landfill.
4. A Recycle Materials Manifest is required to be filled out by the Contractor for each load of concrete or asphalt placed in these areas and given to the responsible Project Manager. It will be the responsibility of the Project Manager to ensure the accuracy and completeness of the manifests. The Project Manger will also be responsible for instituting controls to ensure that only the manifested materials are placed in the approved site. If two or more Project Managers have material going into a site at the same time, they will need to coordinate their efforts to ensure that only approved and manifested materials are allowed on the site.
5. A copy of all manifests must be turned in on a weekly basis to the Assistant Deputy Manager of the Construction Management Section (Michael Steffens). A copy of the Recycled Materials Manifest form is available from the DIA Project Manager.

NOTE: Concrete and asphalt waste materials are considered a potential pollutant source and must be addressed in the CASMP and/or SWMP.

3.07 STORAGE OF OIL, FUELS, OR HAZARDOUS SUBSTANCES

- A. The Contractor shall prevent oil or other hazardous substances (as defined in federal and state regulations) from entering the ground, drainage or local bodies of water, and shall provide containment, diversionary structures, or equipment to prevent discharged oil from reaching a watercourse and take immediate action to contain and clean up any spill of oily substances, petroleum products, or hazardous substances. The Contractor shall provide one or more of the following preventive systems at each petroleum storage site:
 1. Dikes, berms, or retaining walls capable of containing at least 100% of the volume of the largest single tank and equipped with sufficient freeboard to contain precipitation events. The secondary containment must be "sufficiently impermeable" to prevent a release to the environment.
 2. Culverting, curbing, guttering or other similar structures capable of containing at least 100% of the volume of the largest single tank.
- B. The provision of such preventive systems shall be subject to acceptance by the DIA PM prior to tank installation and shall follow the SPCC regulations (40 CFR Part 112).
- C. Prior to bringing any containers of 55-gallon or above capacity onto DIA property for storage of oil, fuel, or other petroleum substances, the Contractor may be required to prepare an SPCC Plan that conforms to 40 CFR Part 112. The plan must include either a certification from a Professional Engineer or self-certification (if applicable), as well as management approval from the legally responsible Contractor representative.

3.08 SPILL RESPONSE AND NOTIFICATION

- A. The Contractor is responsible for all spills that may result from its activities. For ANY suspected or confirmed release or spill of oil, fuel, solid waste, hazardous waste, unknown materials, lavatory waste, or miscellaneous chemicals, etc. that occurs as the result of the Contractor's activities on DIA property, the Contractor is required to take immediate action to mitigate the release or spill and report it to the DIA Project Manager and to the DIA

Communications Center at (303) 342-4200.

- B. The Contractor is responsible for notifying the appropriate regulatory agency(ies) in the event suspected and/or confirmed releases are identified, in accordance with regulatory requirements.

3.09 SITE REMEDIATION AND RESTORATION

- A. The Contractor shall be required to perform any necessary site assessment and remediation activities required by applicable regulatory agency(ies).
- B. During routine construction activities, the Contractor is required to manage soils using typical construction techniques. The Contractor must differentiate between soils and wastes (including contaminated soils versus clean soils) and determine those materials that can remain on DIA property and those that must be transported offsite for disposal.
- C. During all construction activities that require the management of soils, the Contractor must notify the Project Manager and DIA Environmental Services (ES) that soils being managed may be impacted by industrial activities conducted at the airport. "Process knowledge" pertaining to previous use and/or impact for the location(s) under construction can be used to determine whether impacted soils are probable. Also, common indices such as soil staining and odor can be used as a determination for the probable condition. If probable contamination conditions are suspected, the Contractor will notify the Project Manager and DIA ES immediately. At that time (which may be before the work is initiated where indicative conditions exist), all work will cease until a sampling and analysis approach is determined and implemented by the proper responder.
- D. If the site conditions warrant based on evidence of spillage or contamination, process knowledge, and/or visual or olfactory observations, the Contractor may be required to conduct sampling and analysis to confirm that no remedial action is required. Prior to conducting any removal activities, the Contractor must provide a Scope of Work to the DIA PM describing the proposed site assessment activities.
- E. The impacted project will modify its operation to include a segregation area where probable impacted soils can be placed, stored, and sampled for characterization. Should the soil materials be determined to exceed the applicable standards, the Project Manager in conjunction with DIA ES, will be responsible for the proper disposal of these materials. Materials that are determined to contain contamination levels below the applicable standards can be considered clean soils and placed back into the excavation or reused elsewhere on DIA property. In accordance with Section 3.06, materials removed that are suitable for recycling will be placed within areas designated on DIA to store these materials.
- F. The Contractor shall restore any area on the Airport which becomes contaminated as a result of its operations. Restoration shall be either to applicable standards under federal and state law or to such other levels as may be required by the Manager of Aviation, at the Manager's sole discretion. Such restoration shall be completed at the earliest possible time, and the Contractor's restoration shall be subject to inspection and approval by the Manager of Aviation or her duly authorized representative (see DIA Rules & Regulations – Part 180).

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

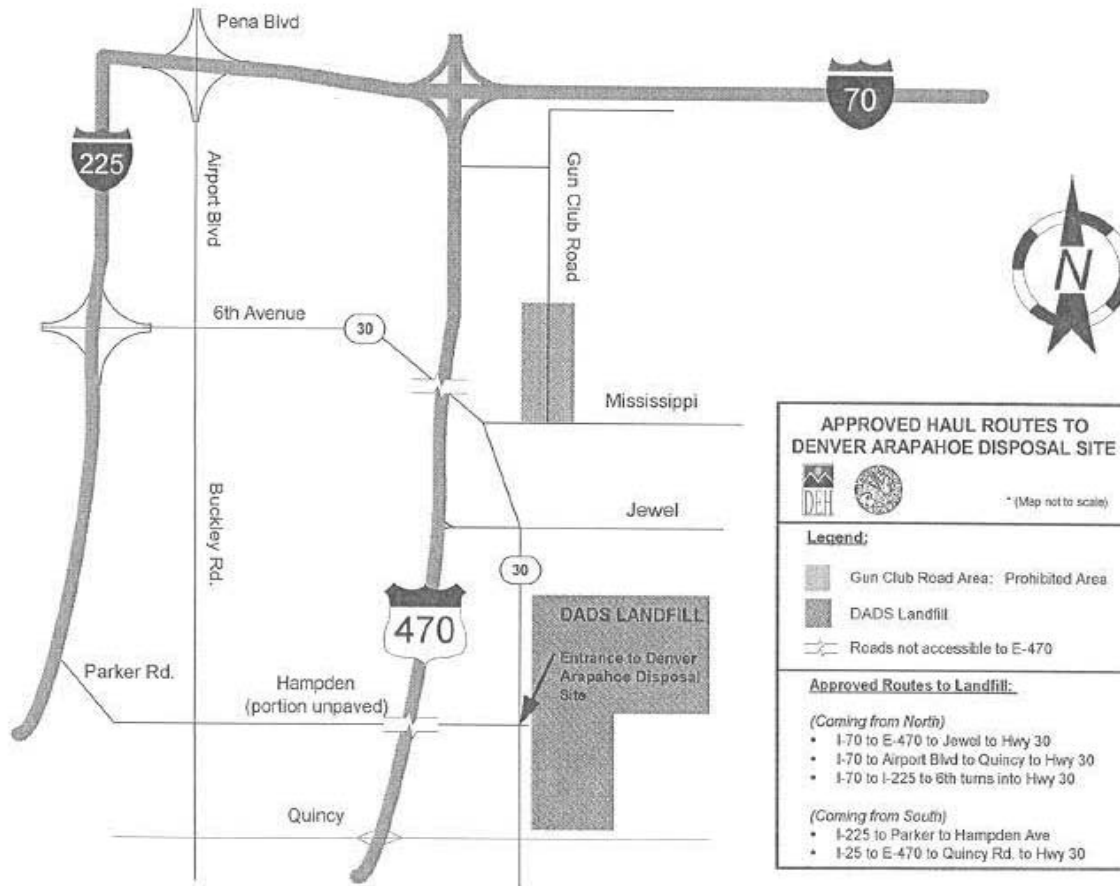
PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid items. The Contractor shall be responsible for payment of all fees associated with review of environmental permit applications and processing of environmental permits.

EXHIBIT A

MAP OF ROUTE TO DADS LANDFILL



END OF SECTION 01566

SECTION 01575

ELECTRICAL PHASING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of furnishing, installing, operating, maintaining, and removing temporary series circuit cable, secondary isolation transformer shorting plugs, sign panel covers, and elevated light covers at locations and in accordance with the design and details shown on the plans and this specification or as directed by the DIA Project Manager. It shall include furnishing all equipment, materials, labor, services, and incidentals necessary to establish the temporary electrical phasing and to establish existing conditions prior to construction.

1.02 QUALITY CONTROL

- A. Provide products for, and the execution of, the Work of this Section that will satisfy the requirements of the NEC, OSHA, and local Codes. Provide products that satisfy requirements of NEMA and are UL listed.

PART 2 - PRODUCTS

2.01 LIGHTING EQUIPMENT

- A. Provide temporary power and lighting equipment consisting of plugs, conduits, and wiring sized and capable of continuous service and having adequate capacity to ensure a complete temporary operating system. Comply with NEMA. The airfield equipment shall meet the following FAA criteria.

<u>Cited FAA Specification</u>	<u>Equipment Name</u>
AC 150/5345-26C	Specification for L-823 Plug and Receptacle, Cable Connectors
AC150/5345-7E	Specification for L-824, Underground Electrical Cables for Lighting Circuits

- B. Rubber and vinyl electrical tapes shall be Scotch Electrical Numbers 130C and Super 88, respectively, or approved equal.

- C. Shorting plugs shall be Style 1, Class A, Type II with a #12 AWG XHHW-2 cable soldered across the conductors on the cable side. Wrap the soldered interface with vinyl electrical tape making sure to half lap until there is 0.25" build up around the solder interface.

- D. Conduit shall be HDPE SDR 11 orange or PVC, schedule 40 impregnated with orange color or marker with orange tape. The conduit shall be in accordance with NEMA TC-2 and/or UL651B.

PART 3 - EXECUTION

3.01 ELECTRICAL PHASING

- A. Prior to start of installing jumper cables, the Contractor shall test the insulation resistance, of the circuits being temporarily disconnected, from the airfield lighting vault with the DIA Project Manager as a witness to record the results. The insulation test shall be performed using a “Megger” with an output of at least 1,000V dc.

Caution: The series lighting circuit must always be complete. Normal circuit voltage is less than 5,000 volts, open circuit voltage can be more than 10,000 volts. All personnel shall be instructed to protect the integrity of the lighting circuit. Turn off the regulator at the vault before opening the circuit.

- B. The Contractor shall bypass semi-flush centerline lights that are located on a closed taxiway. The Contractor shall do one of the following two things as shown on the plans.
1. Remove and disconnect the semi-flush fixture from the secondary of the isolation transformer. Install a shorting plug on the secondary of the isolation transformer and reinstall the fixture. The connection shall be waterproofed by taping the connectors 1 ½ inches on both sides of the joint with rubber tape and a layer of vinyl tape. The fixture plug shall be wrapped with vinyl tape to protect it from moisture.
 2. The Contractor shall remove heat shrink tubing by lightly scoring the surface with a sharp knife and then heating with a torch equipped with a flame spreader. If the Contractor causes any damage to the connector, cable, or transformer, all damaged material shall be replaced at no additional cost to DIA.

Install a #8, 5,000V, L-824 jumper cable above grade routed through orange HDPE or PVC conduit to complete the temporary circuit. The jumper cable can be existing cable removed from an area that is part of demolition. If the existing cable is damaged or of inadequate length, the Contractor shall supply additional cable as part of this item.

Continuity of the circuit shall be checked before the regulator is reconnected and energized. Temporary cable used for bypassing of circuits will not be allowed to be installed as part of the permanent construction.

- C. Elevated taxiway edge lights that remain connected to an energized circuit shall be covered using corrugated PVC full length as shown on the Plans. The globe shall be covered so as to block and light that may be visible to a pilot.
- D. Taxiway exit signs will be modified with a black plastic cover. The cover shall cover the face so that the lettering is not recognizable during daytime or nighttime operations. Once construction is complete, the plastic cover shall be removed and the signs restored to normal operations.
- E. When construction is complete, the Contractor shall turn the regulator off at the airfield lighting vault. The temporary cable and/or shorting plugs shall be removed and all lights reconnected. The connectors shall be waterproofed per Specification L-108. The circuit shall be tested for continuity and the insulation resistance shall be tested and compared to the original value. If the insulation resistance has decreased, the Contractor shall be responsible for correcting the problem. When all work is complete, check continuity, re-energize the regulator, and check for proper operation.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. Installation of shorting plugs on the secondary of the isolation transformers, covering of sign panels, covering elevated edge lights, and installation of tie backs shall be measured per each item completed and accepted as satisfactory.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. Payment will be made at the contract unit price for shorting plugs, sign covers, elevated edge light covers, and tie backs in place by the Contractor and accepted by the DIA Project Manager. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment shall be made under:

01575a Cover Elevated Edge Light.....	per each
01575b Cover Sign Panel.....	per each
01575c Install Shorting Plug on Secondary of Isolation Transformer	per each
01575d Install Tie Back-----	per each

END OF SECTION 01576

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SECTION 01576

TRAFFIC CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of furnishing plans and designs for traffic control and haul routes, implementing these plans with all necessary personnel and equipment. Installation may require but not be limited to signage, cones, flaggers, signal lights, lighting and temporary roads. All work shall be in accordance with Section 0111 – Construction Safety – Airside, CSOP, and FAA Advisory Circular 150/5370-2F (or the latest addition) and these specifications. The Contractor must coordinate his proposed traffic control needs with the needs of other contractors on the airport construction site in writing through the Project Manager.
- B. Reference Contract General Condition, GC 805.

1.02 QUALITY CONTROL

- A. Designate a qualified person to inspect and test traffic control devices daily and to ascertain that those devices are continuously operating, serviceable, in place and clean.
- B. Provide trained personnel who will be responsible for design, implementation and inspection of traffic control needs.

1.03 SUBMITTALS

- A. Refer to Technical Specifications Sections 01300 and 01340 for submittal procedures.
- B. Submit a Traffic Control Plan (TCP) that includes, at a minimum, the following list of items for approval before starting work. Submit an updated TCP when necessary to modify traffic operation or undertake a construction activity that creates a different traffic pattern.
 - 1. Traffic blockade and reductions anticipated to be caused by construction operations.
 - 2. Temporary detours.
 - 3. Show and describe proposed location, dates, hours and duration of detours, vehicular traffic routing and management, traffic control devices for implementing detours and details of barricades.
- C. Submit Haul Route Plan for both on- and off-site hauls. The Haul Route Plan shall be submitted 30 days prior to hauling any permanent material. The plan shall be updated as the contractor's plans change.
- D. Specific Traffic Considerations: The Project Manager may require the Contractor to revise the Traffic Control Plan to address traffic considerations not included in the Contractor's plan.

PART 2 - PRODUCTS

2.01 TRAFFIC CONTROL DEVICES

- A. Contractor shall furnish and maintain the following traffic control devices: low profile

barricades with omni-directional red flashing lights, lighted cones, dunce cones, and signage in accordance with Section 0111 – Construction Safety – Airside, CSOP, and FAA Advisory Circular 150/5370-2F (or the latest addition) and these specifications.

- B. Any additional quantity of traffic control devices needed to complete the work will be the responsibility of the contractor.

PART 3 - EXECUTION

3.01 TEMPORARY TRAFFIC CONTROL DEVICES

- A. Place temporary control devices in those locations that will enable traffic to traverse the area without hazard or abrupt changes in direction. Place traffic cones on not more than 25 foot centers on apron areas. Place traffic cones on not more than 10 foot centers where the closure abuts a roadway. Place 3 low profile barricades, end-to-end, across the centerline of closed taxiways.
- B. Operate warning lights between sunset and sunrise; place control devices so that approaching traffic is alerted to hazards and variances to normal traffic patterns.
- C. All temporary control devices are to be placed prior to beginning each work shift.
- D. All temporary control devices are to be removed prior to ending each work shift.
- E. Clean and repair damaged devices or replace them with new devices as required.
- F. Provide sufficient number of control devices to allow work to be performed in accordance to the phasing plan.

3.02 FLAGGERS

- A. Furnish flaggers where construction equipment may intermittently encroach on traffic lanes, already existing haul routes, and where construction operations would affect public or construction safety and convenience and also where active haul roads cross existing access roads.

3.03 CONSTRUCTION VEHICULAR TRAFFIC

- A. Restrict construction vehicles to approved haul routes.

3.04 CONTROLLING VEHICULAR AND PEDESTRIAN FLOW ADJACENT TO WORKSITE

- A. Ensure that construction operations will not impede normal traffic. Where work is in the area of pedestrian or occupant activity, the Contractor shall erect barriers to prevent pedestrian intrusion into the worksite. The barriers will be a minimum of 42 inches in height and shall not be penetrable from floor or grade to the top of the barrier. Barriers erected in areas where there is a change in grade of over six inches shall meet barrier requirements as defined in the UBC and the DBC.

3.05 SIGNS

- A. Coordinate and pay any expense associated with the furnishing and installation of all regulatory signs, such as "No Stopping Any Time," etc. at the worksite. The Contractor must contact the Project Manager a minimum of five working days in advance of construction for

installation, relocation or removal of regulatory parking signs.

- B. Furnish and install any necessary advance detour or guidance signing.
- C. Authorize, modify and install regulatory parking controls and vehicle turn restrictions.
- D. Implement those traffic control modifications outside of the traffic control zone which are necessary to manage diverted traffic.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. Traffic control shall be measured per lump sum. This lump sum item shall include providing, as well as maintaining all necessary traffic control devices. This includes placement and removal of all traffic control devices for each work shift.
- B. Flaggers shall be measured per hour. This shall include all associated cost with providing the flaggers. Payment will be made only for substantiated Flagger cost in accordance with the approved phasing plan.
- C. Gate Guard shall be measured per hour. This shall include all associated cost with providing the gate guards. Payment will be made only for substantiated gate guards cost in accordance with the approved phasing plan.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. Payment for traffic control shall be made at the contract unit price per lump sum
- B. Payment for flaggers shall be made at the contract unit price per hour.
- C. Payment for Gate Guard shall be made at the contract unit price per hour.

Payment shall be made under:

01576a Traffic Control.....per lump sum
01576b Flagger.....per hour
01576c Gate Guard.....per hour

END OF SECTION 01576

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SECTION 01580

TEMPORARY SIGNS

PART 1 - GENERAL

1.01 CONSTRUCTION SIGNAGE VISIBLE TO THE PUBLIC.

1.02 TEMPORARY DIRECTIONAL, INFORMATIONAL OR REGULATORY SIGNAGE.

1.03 QUALITY CONTROL

- A. Construction and other temporary signage visible to the public must be commercial grade quality, professionally fabricated and installed for the location of the sign. The contractor is responsible to maintain this signage until it is no longer needed.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Interior signs that are visible and not physically accessible to the public may be made of rigid board, such as "Gator Board" with vinyl messages. All edges must be finished and conceal all attachments.
- B. Interior signs that are visible and physically accessible by the public must be vandal-proof. Acceptable examples of vandal-proof signs are messages applied second surface with concealed tamperproof fasteners.
- C. Exterior signs must be vandal-proof and fabricated of weatherproof materials.

PART 3 - EXECUTION

3.01 HARDWARE

- A. Interior Signs: Attach with suitable adhesive and/or tape which may be removed with out damage to finishes.
- B. Exterior Signs: Must be secured to withstand site conditions and varying weather conditions.

3.02 SIGN FINISHES, MATERIALS AND PAINT

- A. Provide temporary signage to reflect permanent sign design and/or as directed by the Signage Design Project Manager. Submit temporary sign finishes, materials and paint, etc., for review and approval prior to any fabrication.

3.03 MAINTENANCE

- A. The Contractor is responsible to maintain temporary signage until it is no longer needed.

3.04 REMOVAL

- A. The contractor is responsible to remove all temporary signs, clean and refurbish affected areas to their original (or intended) condition.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01580

SECTION 01620

STORAGE AND PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of providing storage and protection of the materials, products and supplies which are to be incorporated into the construction and indicating such storage areas on the working drawings with the location and dates when such areas will be available for each purpose.

1.02 SUBMITTALS

- A. Refer to Technical Specifications Sections 01300 and 01340 for submittal procedures. Submit concurrently with submittals required in Section 01050.
- B. Submit working drawings showing locations of storage areas not indicated on the Contract Drawings.
- C. Submit descriptions of proposed methods and locations for storing and protecting products.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials required for the storage and protection of the items specified shall be durable, weatherproof and either factory finished or painted to present an appearance acceptable to the City. Storage facilities shall be uniform in appearance with similar materials used to the maximum extent possible.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS OF EXECUTION

- A. Palletize materials, products and supplies which are to be incorporated into the construction and stored off the ground. Material and equipment shall be stored only in those areas that are indicated as storage areas on the contract drawings and on the reviewed and accepted working drawings. Store these items in a manner which will prevent damage and which will facilitate inspection. Leave seals, tags and labels intact and legible. Maintain access to products to allow inspection. Protect products that would be affected by adverse environmental conditions.
- B. Periodically inspect stored products to ensure that products are being stored as stipulated and that they are free from damage and deterioration.
- C. Do not remove items from storage until they are to be incorporated into the Work.
- D. The Contractor shall ensure that all protective wrappings and coverings are secure and ballasted to prevent any items from deterioration and/or subsequent dislodgment. All items on the worksite that are subject to becoming windborne shall be ballasted or anchored.

3.02 HANDLING AND TRANSPORTATION

- A. Handling
 - 1. Avoid bending, scraping or overstressing products. Protect projecting parts by blocking with wood, by providing bracing or by other approved methods.
 - 2. Protect products from soiling and moisture by wrapping or by other approved means.
 - 3. Package small parts in containers such as boxes, crates or barrels to avoid dispersal and loss. Firmly secure an itemized list and description of contents to each container
- B. Transportation
 - 1. Conduct the loading, transporting, unloading and storage of products so that they are kept clean and free from damage.

3.03 STORAGE

- A. Store items in a manner that shall prevent damage to the owner's property. Do not store hydraulic fluids, gasoline, liquid petroleum, gases, explosives, diesel fuel and other flammables in excavations, except one day's supply of diesel fuel may be stored in open excavations.
- B. Provide sheltered weather-tight or heated weather-tight storage as required for products subject to weather damage.
- C. Provide blocking, platforms or skids for products subject to damage by contact with the ground.
- D. All material shall be stored according to the manufacturer's recommendations. Any material that has to be stored within specified temperature or humidity ranges shall have a 24-hour continuously written recording made of the applicable condition. Should the recording show that the material was not stored within the recommended ranges the material shall be considered defective and in nonconformance. If a certification from the manufacturer's engineering design representative is provided stating that the actual variations are acceptable and will in no way harm the material or affect warranties, then the deficiency will be considered corrected.
- E. Store hazardous material separately, with all material marked with a label showing the hazard and how to treat exposure to the material.

3.04 LABELS

- A. Storage cabinets and sheds that will contain flammable substances and explosive substances shall be labeled FLAMMABLE--KEEP FIRE AWAY and NO SMOKING with conspicuous lettering and conforming to OSHA requirements.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. The cost of the Work described in this Section shall be included in the applicable unit price item, work order, or lump sum bid item. See Technical Specifications Section 01370 for additional requirements for the possible payment of stored material.

END OF SECTION 01620

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SECTION 01630

SUBSTITUTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of submitting for the approval of a different material, equipment or process then is described in the Contract Documents. The Contractor is to use the Request for "Or Equal" Approval form found in the Instructions to Bidders before submitting his bid. The Request for Substitution form, found in Section 01999, is used after the Contractor receives his Notice to Proceed.
- B. If the substitution changes the scope of work, contract cost or contract time, a change order is required. As-built drawings and specifications must include all substitutions even if a change order is not issued.

1.02 QUALITY CONTROL

- A. The substitution must provide the same quality as what it is replacing. The level of quality is defined by:
 - 1. Maintenance and operating cost
 - 2. Reliability
 - 3. Durability
 - 4. Life expectancy
 - 5. Ease of cleaning
 - 6. Ability to be upgraded as needed
 - 7. Ease of interacting with other systems or components
 - 8. Ability to be repaired
 - 9. Availability of replacement parts
 - 10. Established history of use in similar environments
 - 11. Performance equal or superior to that which it is replacing.

1.03 SUBMITTAL

- A. Refer to Technical Specifications Sections 01300 and 01340 for submittal procedures.
- B. A complete Request for Substitution using the form in Section 01999 must be made at least 60 days prior to when an order needs to be placed or a method needs to be changed.
- C. The submittal shall contain, as appropriate, detailed product data sheets for the specified items and the substitution. Samples and shop drawings shall also be submitted of the substitution as applicable. The submittal shall contain all the data required to be submitted for acceptance of the originally specified item or process.
- D. The submittal shall contain all the applicable information required in Technical Specifications Section 01630, paragraph 2.01 below.

- E. A signed statement as outlined in Technical Specifications Section 01630, paragraph 2.03.B below must accompany the Request for Substitution.

PART 2 - EXECUTION

2.01 INFORMATION

- A. Provide the following information as applicable with the Request for Substitution on the item or process that is being requested to be substituted:
1. A complete description of the item or process
 2. Utility connections including electrical, plumbing, HVAC, fire protection and controls
 3. The physical dimensions and clearances
 4. A parts list with prices
 5. Samples of color and texture
 6. Detailed cost comparisons of the substitution and the contract specified item or process
 7. Manufacturer warranties
 8. Energy consumption over a one-year period
 9. What local organization is certified to maintain the item
 10. Performance characteristics and production rates
 11. A list of any license fees or royalties that must be paid
 12. A list of all variations for the item or method specified
 13. A list of at least three other projects of similar nature to this contract where the products or methods have been in use for at least one year including telephone number and name of the person to contact at these other projects
 14. An analysis of the effect of the substitution on the schedule and contract cost and on the overall project as it relates to adjoining work.

2.02 SUBSTITUTION REQUEST

- A. The formal Request for Substitution will be evaluated by the Project Manager and the Designer of Record based on the following criteria:
1. Compatibility with the rest of the project
 2. Reliability, ease of use and maintenance
 3. Both initial and long term cost
 4. Schedule impact
 5. The willingness of the Contractor to share equally in any cost savings
 6. The ability of the item or process to meet all applicable governing regulations, rules and laws along with funding agency requirements
 7. The cost of evaluating the substitution.
- B. Based upon the above evaluation the Deputy Manager of Aviation will make a final determination of what is in the best interest of the City and either approve, disapprove or approve as noted the requested substitution.

2.03 CONDITIONS

- A. As a condition for submitting a Request for Substitution the Contractor waives all rights to claim for extra cost or change in contract time other than those outlined in the request and approved by the Deputy Manager of Aviation. The Contractor, by submitting a Request for Substitution, also accepts all liability for cost and scheduling impact on other contractors or the City due to the substitution.
- B. Included with the Request for Substitution shall be the following statement:
 - 1. "The substitution being submitted is equal to or superior in all respects to the contract-required item or process. All differences between the substitution and the contract-required item or process are described in this request along with all cost and scheduling data."
- C. The statement shall be signed and dated by the Contractor's Superintendent.

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or the lump bid item.

END OF SECTION 01630

SECTION 01650

SYSTEM STARTUP, TESTING AND TRAINING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide complete startup, testing and operator training services to ensure operability of all electrical and electronic equipment supplied.

1.02 SUBMITTAL

- A. Refer to Technical Specifications Sections 01300 and 01340 for submittal procedures.
 - 1. Test procedures
 - 2. Test report
 - 3. Training outline.

1.03 FIELD TESTS AND ADJUSTMENTS

- A. All electrical and mechanical equipment including the interfaces with control systems and the communication system, and all alarm and operating modes for each piece of equipment shall be tested by the Contractor to the satisfaction of the Project Manager before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.
 - 1. At least 30 days before the time allowed in the construction schedule for commencing startup and testing procedures, the Contractor shall submit to the Project Manager six copies of the detailed procedures he proposes for testing and startup of all electrical and mechanical equipment. These procedures are submitted for review and acceptance.
 - 2. The Contractor's startup and testing procedures shall include detailed descriptions of all pre-operational hardware, electrical, mechanical and instrumentation used for testing work. Each control device, item of electrical, mechanical and instrumentation equipment, and all control circuits shall be considered in the testing procedures which shall be designed in a logical sequence to ensure that all equipment has been properly serviced, aligned, connected, wired, calibrated and adjusted prior to operation. Motors shall be tested in accordance with ANSI/IEEE Publication 112. The Contractor is advised that failure to observe these precautions may place the acceptability of the subject equipment in question, and he may either be required to demonstrate that the equipment has not been damaged, or replace it as determined by the Project Manager.
 - 3. Testing procedures shall be designed to duplicate as nearly as possible all conditions of operations and shall be carefully selected to ensure that the equipment is not damaged. All filters shall be in place during startup and testing. Once the Project Manager has accepted the testing procedures, the Contractor shall provide checkout, alignment, adjustment and calibration signoff forms for each item of equipment and each system that will be used. The Contractor and the Project Manager shall use the signoff forms in the field jointly to ensure that each item of electrical, mechanical and instrumentation equipment and each system has been properly installed and tested. The Contractor shall cooperate with project wide systems contractors where startup and testing is to be

conducted concurrently.

4. Any special equipment needed to test equipment shall be provided to the City at no cost for a period of 30 days during startup.
- B. Before starting up the equipment, the Contractor shall properly service it and other items, which normally require service in accordance with the maintenance instructions. The Contractor shall be responsible for lubrication and maintenance of equipment and filters throughout the entire equipment “break-in” period described by the manufacturer.
1. The Contractor shall be responsible for the startup, adjustment, preliminary maintenance and checkout of all equipment and instrumentation. All systems shall be carefully checked for conformance with the design criteria.
 2. If any equipment or system does not operate as specified in the contract, the Contractor shall immediately replace or repair components until it operates properly.
 3. The Contractor shall submit a test report to the Project Manager within 30 days after completion of the system startup period.

1.04 SYSTEMS STARTUP AND TESTING

- A. The Contractor shall be responsible for a 30-day startup period during which time all hardware, electrical and mechanical equipment, communications, alarm systems and associated devices shall be energized and operated under local and automatic controls. The Contractor shall be present during the startup period with adequate labor and support personnel to adjust equipment and troubleshoot system failures that might arise.
- B. When a piece of electrical or mechanical equipment is found to be in conflict with specific criteria, an experienced representative of the manufacturer shall make an adjustment to the item.
- C. If adjustments fail to correct the operation of a piece of equipment or fixture, the Contractor shall remove the equipment or fixture from the project site and replace it with a workable replacement that meets the specification requirements.
- D. The 30-day startup period shall commence 30 days prior to the contract completion date and shall be completed prior to final payment. If, during the startup, any system fails to operate in accordance with contract requirements, the failure shall be corrected and the startup period shall begin again. At the end of the startup period, all filters shall be replaced with new ones. The City may, at its option, provide a Commissioning Representative to observe or participate in the startup and testing of any system. The Contractor shall coordinate with the Commissioning Representative relating to scheduling, reporting, forms, methods and procedures of the startup and testing.

1.05 FINAL INSTRUCTIONS AND OPERATION TRAINING

- A. After startup and testing is completed, the Contractor shall demonstrate to the City's personnel the proper manner of operating the equipment, programming messages, making adjustments, responding to alarms and emergency signals, and maintaining the system.
- B. The Contractor shall provide on-the-job training by a suitably qualified instructor to designated personnel and shall instruct them in the operation and maintenance of the systems. In the event qualified instructors on the Contractor's staff are not available, the Contractor shall arrange with the equipment manufacturer for such instruction at no additional cost to the City.

- C. The Contractor shall provide a minimum of 16 hours of maintenance training to the Airport. Classes shall accommodate up to five people at a time.
- D. The Contractor shall provide a minimum of 8 hours of operator training to the Airport. Classes shall accommodate up to five people at a time with up to two separate courses (one for each shift).
- E. The Contractor shall provide a syllabus to the Project Manager at least seven calendar days prior to the start of each course that outlines topics to be covered, the proposed time allotted to each topic, and the target audience of the training session (technical, casual operator, overview, etc.). The Contractor shall not commence any training courses until the syllabus has been reviewed and approved by the Project Manager.
- F. The Contractor shall videotape all training sessions and provide labeled digital video disks (DVD) to the Project Manager. The Contractor shall provide three copies of the DVD to the Project Manager in DVD+R format. All disks shall be labeled using the LightScribe technology.
- G. The Contractor shall provide an annotated syllabus to the Project Manager that indicates topics contained on each tape.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or the lump bid item. No contractual item requiring startup or testing will be paid until the conditions of this Section are completely satisfied.

END OF SECTION 01650

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SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work specified in this Section includes procedures required prior to Final Acceptance of the Work in addition to those specified in General Conditions Title 20 and Technical Specifications Section 01720.

1.02 PREPARATION FOR FINAL INSPECTION

- A. Before requesting inspection for Final Acceptance of the Work by the City, inspect, clean and repair the Work as required.

1.03 FINAL INSPECTION

- A. When the Contractor considers that the Work is complete, he shall submit written certification that:
 - 1. Work has been inspected by the Contractor for compliance with contract documents.
 - 2. Work has been completed in accordance with contract documents.
 - 3. Work is ready for final inspection by the City.
 - 4. All as-built required documents have been submitted and accepted.
 - 5. All damaged or destroyed real, personal, public or private property has been repaired or replaced.
 - 6. All operation and maintenance manuals have been submitted and accepted and all training has been completed.
 - 7. All personnel badges and vehicle permits have been returned to DIA Airport Security.
- B. The Project Manager will inspect to verify the status of completion with reasonable promptness after receipt of such certifications. The inspection of the work will be done in accordance with the General Conditions.
- C. If the Project Manager finds incomplete or defective work:
 - 1. The Project Manager may, at the Project Manager's sole discretion, either terminate the inspection or prepare a punch list and notify the Contractor in writing, listing incomplete or defective work.
 - 2. The Contractor shall take immediate steps to remedy stated deficiencies and send a second written certification to the Project Manager that Work is complete.
 - 3. The Project Manager will then reinspect the Work.

1.04 REINSPECTION FEES

- A. Should the Project Manager perform reinspection due to failure of the Work to comply with the claims of status of completion made by the Contractor:

1. The Contractor shall compensate the City for such additional services at the rate of \$75.00 per man-hour.
2. The City shall deduct the amount of such compensation from the final payment to the Contractor.

1.05 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a Final Statement of Accounting to the Project Manager.
- B. The Final Statement of Accounting shall reflect all adjustments to the contract amount and shall include the following:
 1. The original contract amount.
 2. Additions and deductions resulting from:
 - a. Previous change orders.
 - b. Allowances.
 - c. Final quantities for unit price items. Along with this statement shall be detailed backup for the quantities.
 - d. Deductions or corrected work.
 - e. Penalties.
 - f. Deductions for liquidated damages.
 - g. Deductions for reinspection payments.
 - h. City resurveys required due to the Contractor.
 - i. Other adjustments.
 3. Total contract amount, as adjusted.
 4. Previous payments.
 5. Sum remaining due.
- C. If required, the Project Manager will prepare a final change order, reflecting approved adjustments to the Contract sum which were not previously made by change orders.

1.06 FINAL APPLICATION FOR PAYMENT

- A. The Contractor shall submit the final application for payment in accordance with the procedures and requirements stated in the General Conditions Title 20.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work

described in this Section shall be included in the applicable unit price item, work order, or lump sum bid item.

END OF SECTION 01700

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SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this section consists of maintaining a clean, orderly, hazard free worksite during construction, and final cleaning for the City's Final Acceptance. Failure to maintain the worksite will be grounds for withholding monthly payments until corrected to the satisfaction of the Project Manager.

1.02 JOB CONDITIONS

A. Safety Requirements

1. Maintain the worksite in a neat, orderly and hazard-free manner in conformance with all federal, state and local rules, codes, regulations and orders, including all OSHA requirements, until Final Acceptance of the Work. Keep catwalks, underground structures, worksite walks, sidewalks, roadways and streets, along with public and private walkways adjacent to the worksite, free from hazards caused by construction activities. Inspect those facilities regularly for hazardous conditions caused by construction activities.

B. Hazards Control

1. Store volatile wastes in covered metal containers and remove those wastes from worksite daily.
2. Do not accumulate wastes which create hazardous conditions.
3. If volatile and noxious substances are being used in spaces that are not naturally ventilated, provide artificial ventilation.
4. Hazard controls shall conform to the applicable federal, state and local rules and regulations.
5. Provide appropriate waste receptacles in all areas in which employees are working. Waste receptacles shall be kept covered at all times. All materials on site shall be anchored and covered to prevent any objects from becoming wind-borne.

C. Access

1. Maintain the worksite to permit access by other City contractors as required and to allow access by emergency personnel.

1.03 SUBMITTALS

- A. Washing Plan. The Contractor shall prepare a plan describing the specific procedures and materials to be utilized for any equipment, vehicle, etc. washing activities. The plan must be submitted to the PM and also approved by the PM and Environmental Services. Outdoor washing at DIA is not allowed unless the materials will be collected or managed in a manner to ensure that they will not enter the municipally-owned separate storm sewer system (MS4). The materials can only be disposed at a location pre-approved by DIA Environmental Services (refer to DIA SWMP). Failure to comply with this requirement would result in the

discharge of non-stormwater. Indoor washing must be conducted in accordance with the Best Management Practices (BMPs) detailed in the DIA SWMP. Refer to Technical Specification 01566. In addition, all indoor washing must be conducted in a manner that ensures that there are no prohibited discharges to the sanitary sewer system.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS

- A. Utilize the type of cleaning materials recommended by the manufacturer for the surfaces to be cleaned.
- B. Maintain current Material Safety Data Sheets (MSDS) on site for all chemicals. DIA Environmental Services must approve the chemicals used prior to discharge to the sanitary sewer system.
- C. Ensure proper disposal of all wastes generated from the use of these materials. Must ensure compliance with all environmental regulations. No wastes can be disposed on DIA property.

PART 3 - EXECUTION

3.01 INTERIM CLEANING

- A. Clean the worksite every shift/workday for the duration of the construction contract. Maintain structures, grounds, storage areas and other areas of worksite, including public and private properties immediately adjacent to worksite, free from accumulations of waste materials caused by construction operations. Place waste materials in covered metal containers. All hard concrete, steel, wood and finished walking surfaces shall be swept clean daily.
- B. Remove or secure loose material on open decks and on other exposed surfaces at the end of each workday or more often in a manner that will maintain the worksite hazard free. Secure material in a manner that will prevent dislodgment by wind and other forces.
- C. Sprinkle waste materials with water or acceptable chemical palliative to prevent blowing of dust.
- D. Promptly empty waste containers when they become full and legally dispose of the contents at dumping areas off the City's property.
- E. Control the handling of waste materials. Do not permit materials to be dropped or thrown from structures.
- F. Immediately remove spillage of construction related materials from haul routes, work site, private property, public rights of way, or on the Denver International Airport site.
- G. Clean only when dust and other contaminants will not precipitate upon newly painted surfaces.
- H. Cleaning shall be done in accordance with manufacturer's recommendation.
- I. Cleaning shall be done in a manner and using such materials as to not damage the Work.
- J. Clean areas prior to painting or applying adhesive.

- K. Clean all heating and cooling systems prior to operations. If the contractor is allowed to use the heating and cooling system it shall be cleaned prior to testing.
- L. Clean all areas that will be concealed prior to concealment.
- M. Dispose of all fluids according to the approved Washing Plan.

3.02 FINAL CLEANING

- A. Inspect interior and exterior surfaces, including concealed spaces, in preparation for completion and acceptance.
- B. Remove dirt, dust, litter, corrosion, solvents, discursive paint, stains and extraneous markings.
- C. Remove surplus materials, except those materials intended for maintenance.
- D. Remove all tools, appliances, equipment and temporary facilities used in the construction.
- E. Remove detachable labels and tags. File them with the manufacturer's specifications for that specific material for the City's records.
- F. Repair damaged materials to the specified finish or remove and replace.
- G. After all trades have completed their work and just before Final Acceptance, all catch basins, manholes, drains, strainers and filters shall be cleaned; roadway, driveways, floors, steps and walks shall be swept. Interior building areas shall be vacuum cleaned and mopped.
- H. Final cleanup applies to all areas, whether previously occupied and operational or not.
- I. Dispose of all fluids according to the approved Washing Plan.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01710

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SECTION 01720

CONTRACT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of maintaining, marking, recording and submitting contract record documents which include shop drawings, warranties, contract documents and contractor records.

1.02 SUBMITTALS

- A. Each submittal of record documents shall contain the following information:
1. Date
 2. Project title and numbers
 3. Contractor's name and address
 4. Title and number of each record document
 5. Certification that each document as submitted is complete and accurate
 6. Signature of the Contractor or his authorized representative.
- B. At the completion of this contract, deliver all record documents including the following:
1. As-built shop drawings, diagrams, illustrations, schedules, charts, brochures and other similar data
 2. Warranties, guarantees and bonds
 3. Contract documents
 4. Contractor records.
- C. As-built contract drawings shall be submitted with each monthly progress payment application, and a complete set shall be submitted prior to final payment.
1. The Contractor shall provide a single electronic copy of each contract drawing sheet which has been used to produce work during the payment period or work that payment is being requested on, which records the current as-built conditions of work, including the posting of any change orders or change directives not shown on the contract documents at the time of contract signing.
 - a. The Contractor must show as-built work completed through the payment application date including but not limited to utilities, empty conduit, conduit for actual electrical lines, plumbing, HVAC, location of anchor bolts and support points for use by others.
 - b. The Contractor shall be liable for any costs incurred by the City or a third party due to errors or lack of information provided on the as-built drawings.
 - c. All markings on drawings shall be legible to identify the portion of work completed.

1.03 QUALITY CONTROL

- A. Record documents shall be prepared to a high standard of quality, such as that set forth in

MIL STD 100, ANSI Standard Drafting Manual Y14 or other relevant lower tier specification defining equal drafting quality for microfilming, except for daily reports.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 MAINTENANCE OF DOCUMENTS

- A. The Contractor shall maintain at the worksite on a current basis one record copy of all drawings, specifications, addenda, change orders, approved shop drawings, working drawings, product data and samples in good order and marked currently to record all changes made during construction.

- B. Maintain at the field office one copy of the following record documents:
 - 1. Contract Documents
 - a. Contract drawings with all clarifications, requests for information, directives, changes and as-built conditions clearly posted.
 - b. Contract specifications with all clarifications, requests for information, changes, directives and record of manufacturer actually used along with product trade name.
 - c. Reference Standards in accordance with Technical Specifications Section 01091.
 - d. Affirmative Action Plan and documents.
 - e. One set of drawings to record the following:
 - 1) Horizontal and vertical location of underground utilities affected by the Work.
 - 2) Location of internal utilities; include valves, controls, conduit, duct work, switches, pressure reducers, size reducers, transitions, crosses, tees, filters, motors, heaters, dampers, regulators, safety devices, sensors, access doors and appurtenances that are concealed in the construction shall be shown with dimensions given from a visible and recognizable reference to the item being located in all three dimensions. The drawing shall also reference the applicable submittal for the item being located.
 - 3) Field changes of dimensions and details including as-built elevations and location (station and offset).
 - 4) Details not on original contract drawings but obtained through requests for information or by other communications with the City.
 - 2. Contractor Records
 - a. Daily QC Reports
 - b. Certificates of compliance for materials used in construction
 - c. Nonconformance Reports (NCRs)
 - d. Remedial Action Requests (RARs)
 - e. Completed inspection list
 - f. Inspection and test reports
 - g. Test procedures
 - h. Qualification of personnel
 - i. Approved submittals
 - j. Material and equipment storage records
 - k. Safety Plan
 - l. Erosion, sediment, hazardous and quality plans
 - m. Hazardous material records

- n. First report of injuries..

3.02 RECORDING

- A. Label each document page or article "PROJECT RECORD" in two inch high letters.
- B. Keep record documents current daily.
- C. Legibly mark copies of the contract drawings to record actual construction.
- D. Legibly mark up each Section of the technical specifications and contract drawings to record:
 - 1. Manufacturer, trade name, catalog number and supplier of each product and item actually installed
 - 2. Changes made by change orders, requests for information, substitutions and variations approved by submittals.

3.03 DOCUMENT MAINTENANCE

- A. Provide files and racks for storage of documents to maintain in clean, dry and legible condition, which shall be turned over to the City prior to final acceptance.
- B. Do not use record documents for construction purposes.
- C. Make documents available for inspection by the Project Manager and any others having jurisdiction.

3.04 MONTHLY REVIEW

- A. Prior to any application for payment, the Project Manager or his designated representative will inspect the record documents to ensure that they are being maintained and contain the most current correct data with particular attention to as-built drawings.
- B. If, during the inspection, the Project Manager determines that the documents are not being maintained and kept current as to as-built conditions, an amount may be withheld from the payment request and deducted from the contract value to cover the City's cost of collecting and recording the as-built contract data. This cost will be determined on the basis of \$75.00 per man-hour of effort.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01720

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SECTION 01730

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of preparing and submitting operation and maintenance data for mechanical, electrical and other specified equipment.

1.02 SUBMITTALS

- A. Refer to Technical Specifications Section 01300 and 01340 for submittal procedures.
- B. Submit one (1) electronic copy and one (1) bound hard copy of the proposed Operation and Maintenance Data Manual format including a table of contents not less than 90 days prior to acceptance tests and final inspection.
- C. Submit one (1) electronic copy and one (1) bound hard copy of the complete Operation and Maintenance Data Manuals in final form 30 days prior to system startup.
- D. Submit one (1) electronic copy and one (1) bound hard copy of Operation and Maintenance Data Manual within ten days after system startup is complete. These copies shall incorporate any comments made on the previous submittals, along with final readings on all settings and gauges taken while the system is in fully satisfactory operation.

1.03 CONTINUOUS UPDATING PROGRAM

- A. Furnish one electronic copy of the Contractor's letter indicating that suppliers have been notified to provide updated operation and maintenance data, service bulletins and other information pertinent to the equipment, as it becomes available.

PART 2 - PRODUCTS

- A. The following products are the requirements of hard copies:
- B. PAPER SIZE 8-½ inches x 11 inches.
- C. PAPER White bond, at least 20 pound weight.
- D. TEXT typewritten.
- E. PRINTED DATA Manufacturer's catalog cuts, brochures, operation and maintenance data. Clear reproductions thereof will be acceptable. If this data is in color, all final manuals must contain color data.
- F. DRAWINGS 8-½ inches x 11 inches, bound with the text. Larger drawings are acceptable provided they are folded to fit into a pocket inside the rear cover of the manual. Reinforce edges of large drawings.
- G. PRINTS OF DRAWINGS black ink on white paper, sharp in detail and suitable for making reproductions.

- H. FLYSHEETS Separate each portion of the manual with colored, neatly prepared flysheets briefly describing the contents of the ensuing portion.
- I. COVERS Provide 40 to 50 mil, clear plastic, front and plain back covers for each manual. The front covers shall contain the information required in paragraph 3.02 below.
- J. BINDINGS Conceal the binding mechanism inside the manual; lockable 3 ring binders shall be provided.

PART 3 - EXECUTION

3.01 GENERAL

- A. Assemble each operation and maintenance manual using the manufacturer's latest standard commercial data.

3.02 COVER

- A. Include the following information on the front cover and on the inside cover sheet:
 - 1. OPERATION AND MAINTENANCE INSTRUCTIONS
 - 2. (TITLE OF STRUCTURE OR FACILITY)
 - 3. (TITLE AND NUMBER OF CONTRACT)
 - 4. (CONTRACTOR'S NAME AND ADDRESS)
 - 5. (GENERAL SUBJECT OF THE MANUAL)
 - 6. (Leave spaces for signatures of the City representatives and acceptance date)

3.03 CONTENTS OF THE MANUAL

- A. An index of all volumes in each volume of multiple volume systems.
- B. An index in front of each volume. List and combine the literature for each system in the sequence of operation.
- C. Name, address and telephone numbers of Contractor, suppliers and installers along with the manufacturer's order number and description of the order.
- D. Name, address and telephone numbers of manufacturer's nearest service representatives.
- E. Name, address and telephone number of nearest parts vendor and service agency.
- F. Copy of guaranties and warranties issued to, and executed in the name of, the City.
- G. Anticipated date City assumes responsibility for maintenance.
- H. Description of system and component parts including theory of operation.
- I. Pre operation check or inspection list.
- J. Procedures for starting, operating and stopping equipment.
- K. Post operation check or shutdown list.

- L. Inspection and adjustment procedures.
- M. Troubleshooting and fault isolation procedures for on-site level of repair.
- N. Emergency operating instructions.
- O. Accepted test data.
- P. Maintenance schedules and procedures.
- Q. Test procedures to verify the adequacy of repairs.
- R. One copy of each wiring diagram.
- S. One copy of each piping diagram.
- T. Location where all measurements are to be made.
- U. One copy of each duct diagram.
- V. One copy of control diagram.
- W. One copy of each accepted shop drawing.
- X. One copy of software programs imputable or changeable on site.
- Y. Manufacturer's parts list with catalog names, numbers and illustrations.
- Z. A list of components which are replaceable by the City.
- AA. An exploded view of each piece of the equipment with part designations.
- BB. List of manufacturer's recommended spare parts, current prices and recommended quantities for two years of operation.
- CC. List of special tools and test equipment required for the operation, maintenance, adjustment, testing and repair of the equipment, instruments and components.
- DD. Scale and corrosion control procedures.
- EE. Disassembly and re-assembly instructions.
- FF. Troubleshooting and repair instructions.
- GG. Calibration procedures.
- HH. Ordering information.
- II. Training course material used to train City staff, including slides and other presentation material.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order, or lump sum bid item.

END OF SECTION 01730

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of preparing and submitting warranties and bonds required by these specifications.

1.02 SUBMITTALS

- A. Refer to Technical Specifications Section 01300 for submittal procedures.
- B. Submit executed warranties and bonds.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 WARRANTIES AND BONDS

- A. Execute the warranties and bonds required by the Contract Documents. Prepare and submit a list of all warranties and bonds on the form provided by the City. Reference Technical Specifications Section 01999.
- B. Provide warranties or bonds for the materials, labor and time period set forth in the sections of these specifications requiring such documents. All warranties shall be for a minimum period of one year unless the technical specifications for a specific item require a greater period of time.
- C. Provide all warranties and bonds that the manufacturer or supplier furnishes at no additional cost in regular commercial trade. All warranties shall be for a minimum period of one year unless the technical specifications for a specific item require a greater period of time.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01740

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SECTION 01999
STANDARD FORMS

PART 1 - GENERAL

1.01 FORMS

- A. The forms listed below and appended to this Section will be used for performance of the Work as indicated. This is not a complete listing of all required forms. The Contractor shall properly complete all forms required by the contract or the Project Manager. The Project Manager shall review and approve all submitted forms. If submitted forms are not acceptable the Contractor shall resubmit forms in an acceptable format.

1.02 APPENDICES

- A. Attached to this Technical Specifications Section are the following forms:
1. Daily Quality Control Report (Form CM-13) (1 Page)
 2. Request for Information (Form CM-17) (1 Page)
 3. Submittal Transmittal Form (Form CM-30) (Page 1 of 2)
 4. Submittal Transmittal Form (Form CM-30) (Page 2 of 2)
 5. Contractor Warranty (Form CM-10) (4 Pages)
 6. Contractor/Subcontractor Warranty (Form CM-11) (4 Pages)
 7. Contractors Certification of Payment (Form CM-19) (this form shall be completed and submitted with each pay application) (1 Page)
 8. Pay Application Form (CM-18) (1 Page)
 9. Certificate of Current Cost or Pricing Data (Form CM-69) (1 Page)
 10. Subcontractor Partial Lien Release Form (Form CM-26) (1 Page)
 11. Subcontractor Final Lien Release Form (Form CM-70) (1 Page)
 12. Request for Substitution (Form CM-09) (5 pages)
 13. System Shutdown Request Forms:
 - a. AGTS and Baggage Systems
 - b. Airfield Systems
 - c. CCTV Security Systems
 - d. Electrical Power and Lighting
 - e. Elevator, Escalator and Autowalk
 - f. Fire Protection Plumbing
 - g. HVAC Systems
 - h. Temperature Control Systems
 - i. Life Safety/ Fire Alarm Systems
 - j. Plumbing
 - k. Roadways

- l. Security
- m. Sterile Public Areas
- n. X-Ray

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 COMPLETING FORMS

- A. All documents are to be filled digitally by the Contractor using the format provided by the Project Manager or using Adobe Acrobat 6 or newer. It is at the discretion of the Project Manager if other forms or formats will be accepted.

3.02 SIGNING FORMS

- A. Original hand written signatures are acceptable for all documents. The Contractor is to fill out the document as indicated above prior to signing the hard copy. If the form is to be submitted digitally to the Project Manager the document shall be scanned and saved as an Adobe Acrobat 6 or newer file.
- B. Digital signatures are acceptable for all documents. The Contractor is to fill out the document digitally in the format provided by the Project Manager or Adobe Acrobat 6 or newer. The file must be signed using Adobe Acrobat 6 or newer and submitted digitally to the Project Manager.
 - 1. Add digital signatures must contain the name of signer in plain text and the time and date the signature is executed.

PART 4 - MEASUREMENT

4.01 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.01 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 01999

CONSTRUCTION SAFETY AND PHASING PLAN (CSPP)

1. COORDINATION

During construction, airport operational safety is of paramount importance. Coordination of project information to all individuals involved with the project is essential for ensuring safe operations are maintained at all times. In order to minimize potential for incidents during construction, it is imperative that all individuals involved with the project and/or airport users be kept informed of any and all changes to operations. Discussions of operational safety will need to take place throughout the entire life of the project, including design, bidding, pre-construction, and construction. Meetings between the Denver International Airport (DIA) Project Manager, Airport Operations Manager, contractor, sub-contractors, and airport users will be required to discuss specific project related impacts to operations. Denver International Airport is ultimately responsible for the safety at the airport. Notice to users of operational changes due to construction will be issued via NOTAMS by the airport. No closures will be permitted without the pertinent NOTAM in place for each specific closure. Emergency access for both airport (ARFF) and off-airport (Police, Fire, and EMT) based emergency service shall be maintained at all times. Routing for such traffic shall be determined and made known to all supervisor personnel involved in the construction project. Coordination of this access will be proposed by the Contractor and approved by the DIA Project Manger and the Airport Operations Manager.

A pre-construction meeting will be held after the project has been awarded and prior to the contractor beginning work. The Airport, the Contractor's on-site supervisory staff shall be present. Safety and this document will be a significant topic on the agenda. Operational safety during construction will be a main topic of discussion at the pre-construction meeting.

A. CONTRACTOR PROGRESS MEETINGS

The Contractor is required to have weekly construction progress meetings to discuss all relevant construction topics including safety reminders, scheduling, and general construction issues. Operational safety will be a standing agenda item for discussion during these progress meetings. A review of the contractor's adherence to the project's Construction Safety and Phasing Plan (CSPP) will be made at each meeting. Any deficiencies or violations will be identified and remedied. In attendance will be the Contractor, the Airport Operations Manager, the DIA Project Manager, and any other pertinent personnel. The location and time of the weekly meetings will be determined during the pre-construction meeting.

B. SCOPE OR SCHEDULE CHANGES

In the case of a scope or schedule change, the Contractor shall notify the Airport Operations Manager, and DIA Project Manager immediately. All parties involved will need to evaluate the impact(s) of the change and will determine what measures will need to be taken to maintain a safe construction site. Change in the scope or duration of the project may necessitate revisions to the Construction Safety and Phase Plan (CSPP).

C. FAA ATO COORDINATION

The FAA ATO will need to be notified immediately of any changes that affect aircraft movement within the airport which include airway facility shutdowns and restarts. The Airport will be responsible for coordinating any changes including NOTAMS to the FAA ATO. It is not anticipated that any shutdown to FAA facilities will be required for this project. All project limits are outside the critical area of any navigational aid (NAVAID).

2. PHASING

A. PHASE ELEMENTS

See Phasing Description, Sheet G4.10 attached at the back of this document.

B. CONSTRUCTION SAFETY DRAWINGS

See sheets G4.00, G4.10, G5.00, G6.00, S1.00, S2.00, S2.10, S3.00 attached at the back of this document.

3. AREAS AND OPERATIONS AFFECTED BY THE CONSTRUCTION ACTIVITY

All work within the Airport Operations Area shall be accomplished in conformance to Advisory Circular 150/5370-2F, *Operational Safety on Airports During Construction*. The contract drawings include information regarding requirements for operational safety on the airport during construction. **The Contractor shall prepare a detailed Safety Plan Compliance Document (SPDC) as stated in the Advisory Circular 150-5370-2F prior to construction.** The Contractor's SPDC shall identify specific methods, sequencing, phasing that he/she intends to use in order to accomplish the project work. The final SPCD shall be the result of a coordinated effort between the Owner/Sponsor, the Engineer and the Contractor.

The Contractor shall adhere to the approved SPCD as agreed upon by the DIA Project manager, Airport Operations Manager, and Contractor. Modifications or deviations from the approved safety plan shall be submitted to the Airport for review and approval prior to implementation.

A. IDENTIFICATION OF AFFECTED AREAS

See Phasing Description, Sheet G4.10 attached at the back of this document, for identification of affected areas. NOTAMS will need to be issued during this project to close specific areas to maintain safety during this project. Section 2 of this document and the attached milestone drawings describe in detail which areas are affected and for what durations.

B. MITIGATION OF EFFECTS

To mitigate the effects of the construction activities associated with the project vehicle/aircraft taxiway movements have been considered and milestone plans have been created. Because the limits for this project is critical to maintaining safety and operations at the airport during construction, adhering to the requirements as laid out in the attached milestone sheets is imperative. To help assist all individuals with this process, it is important that all airport personnel, contractor personnel, and engineering personnel discuss current and upcoming phases during the required weekly construction progress meetings as mentioned in Section 1 of this document.

4. PROTECTION OF NAVIGATION AIDS (NAVAIDS)

NAVAID protection does not apply, since project work areas are not located near any NAVAIDS.

5. CONTRACTOR ACCESS

All individuals employed at the Airport with Restricted Area access, or working in the Terminal, Concourses, or Parking and Ground Transportation facilities, must obtain an Airport Identification (ID) Badge. Airport ID Badges will be issued by Airport Security and if deemed necessary by Airport Security, may require a deposit. All such identification badges shall be and remain the property of the Airport. The Airport ID Badge must be surrendered on demand to Airport Operations and/or a Contract Security Guard. An individual employed by more than one company, or changing employers, must obtain an Airport ID Badge for each company. Badge Color indicates general areas of authorization in relationship with direct support of an individual's job function. The respective classes of Airport ID Badges, indicated by badge color and associated driving privilege icon, describe driving privileges in direct correlation with their job function.

The individual must complete a Denver International Airport Fingerprinting and Badge Application, on a form prepared and currently approved by Airport Security. Two valid forms of identification must be presented with the application, one of which must be government issued photo identification. The second form of identification must verify proof of citizenship (i.e., birth certificate or legal residency

with work authorization). All information regarding the individual's name, age, gender, and other vital statistics on both forms of identification must be consistent and verifiable.

A Denver International Airport Fingerprinting and Badge Application, Security Threat Assessment (STA) and Criminal History Record Check (CHRC) must be completed for each individual requesting an Airport Identification Badge. Denver International Airport Fingerprinting and Badge Application are available from the Airport Security Offices.

The individual must view a training film on Denver Municipal Airport System Rules and Regulations, as they pertain to overall security, and pass a corresponding test to assure understanding of the Rules and Regulations.

A. LOCATION OF STOCKPILED CONSTRUCTION MATERIALS

The location of the Contractor's stockpile for construction materials will be off-site.

B. VEHICLE AND PEDESTRIAN OPERATIONS

1. Construction Site Parking

Construction site parking will be outside of the AOA at DIA and will be at the approved locations as discussed in the pre-construction meeting.

2. Construction Equipment Parking

Construction equipment parking will be allowed at the approved locations as discussed in the pre-construction meeting. If the equipment must be parked in an Airport Operations Area (AOA), the equipment must be lighted with a beacon per AC 150/5370-2F. No equipment or material shall be parked or stored in any runway or taxiway safety area or object free area.

3. Access and Haul Roads

The Contractor shall obtain approval from the Airport Operations Manager and DIA Project Manager prior to utilizing any haul roads within the airport property. The haul roads shall be utilized for all equipment traffic, and the equipment shall not be allowed to stray or wander away from the established routes. The haul roads shall be the responsibility of the Contractor and shall be maintained and kept in good order at all times. Since construction operations will be within active airport operation areas, the airport will require additional dust control measures be used on haul roads and the work area in order not to interfere with airport operations. Haul roads that cross any active taxiway or movement areas shall be kept clean and in good order at all times. The Contractor shall be prepared at all times to repair any damage caused by the movement of equipment on any of the haul roads at the direction of the Airport Operations Manager or DIA Project Manager, whether in designated or undesignated areas. Establishment of haul roads off of Airport property shall be the sole responsibility of the Contractor.

Contractor movement shall be restricted to the pre-determined access routes as described below:

The contractor will access the AOA through Gates P10, G7, and P44T. Once in the AOA, the contractor will travel unescorted to the work areas by traveling on Vandiver Street, Oak Hill, Allium and VSRs as needed. The contractor will need to be escorted onto the actual worksite to set the closure.

The access route is detailed on the attached sheet G-4.00.

4. Marking and Lighting of Vehicles

All vehicles operating within the AOA and in the movement areas must clearly identify themselves for control purposes. The identification symbols should be a minimum 8-inch block-type characters of a contrasting color and easy to read. They may be applied either by

using type or a water-soluble paint to facilitate removal. Magnetic signs are also acceptable. To operate in those areas during daylight hours, the vehicle must have a flag (day only) or beacon (day or night) attached to it. Any vehicle operation on the movement areas during hours of darkness or reduced visibility must be equipped with a flashing dome-type light. Marking and lighting shall be in conformance with FAA Advisory Circular 150/5210-5D, *Painting, Marking, and Lighting of Vehicles Used on an Airport*.

5. Description of Proper Vehicle Operations

Proper vehicle operations is described as confirming to all rules and regulation for driving as directed by the Denver International Airport.

6. Required Escorts

When any vehicle, other than one that has prior approval from the airport operator, must travel over any portion of an aircraft movement area or limited access routes, the vehicle will be escorted and properly identified. To operate in those area during daylight hours, the vehicle must have a flag (day only) or beacon (day or night) attached to it. Any vehicle operation on the movement areas during hours of darkness or reduced visibility must be equipped with a flashing dome-type light.

All Contractor vehicles will need to be escorted with traveling on active Taxiways and/or Runways. This project will not require traveling on active Taxiways and/or Runways.

7. Training Requirements of Vehicle Drivers

If an individual requests Driver Authorization, a valid driver's license must be presented and the individual must view a training film on Denver Municipal Airport System Rules and Regulations, as they pertain to overall Movement of Vehicles in the Restricted Area, and pass a corresponding test to assure understanding of the Rules and Regulations.

8. Situational Awareness

Vehicle drivers must confirm by personal observation that no aircraft is approaching their position (either in the air or on the ground) when given clearance to cross a runway, taxiway, or any other area open to airport operations. In addition, it is the responsibility of the escort vehicle driver to verify movement/position of all escorted vehicles at any given time.

9. Two-way Radio Communication Procedures

The Contractor's personnel are not allowed to use Two-way radios to communicate on any DIA or FAA frequency.

10. Maintenance of the Secured Area of the Airport

Airport operators and contractors must take care to maintain security during construction when access points are created in the security fencing to permit the passage of construction vehicles or personnel. In addition, all personnel must either be badged or escorted while working in the AOA.

Escorted personnel must stay near by the badged personnel at all times to ensure that security at the Airport is maintained.

Because the Airport is subject to 49 CFR Part 1542, *Airport Security*, even during construction, the Airport must meet standards for access control, movement of ground vehicles, and identification of construction contractor and tenant personnel.

6. WILDLIFE MANAGEMENT

All wildlife management within the Airport Operations Area shall be accomplished in conformance to Advisory Circular 150/5200-33, *Hazardous Wildlife Attractants On or Near Airports*, and Certalert 98-05, *Grasses Attractive to Hazardous Wildlife*. In general, the Contractor must carefully control and continuously remove waste or loose material that might attract wildlife.

A. TRASH

The Contractor is responsible to complete a daily inspection of the construction site for any trash or objects that might attract wildlife.

B. STANDING WATER

Because standing water can attract wildlife, the Contractor is responsible to complete a daily inspection of the construction site for any standing water. With the discretion of the Airport Operations Manager and DIA Project Manager, the Contractor shall remove this hazard.

C. TALL GRASS AND SEEDS

This project does not involve grass or seeding.

D. POORLY MAINTAINED FENCING AND GATES

This project does not involve working at or near any fencing or gates.

E. DISRUPTION OF EXISTING WILDLIFE HABITAT

The Contractor shall notify the Airport Operations Manager and DIA Project Manager when a wildlife sighting has occurred on the project site to mitigate any disruption to the existing wildlife habitat.

7. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT

The presence of FOD on the apron is a significant safety concern, as debris can be ingested into an aircraft's engine causing extensive damage, or can be launched across the apron by jet blast, potentially causing bodily injury or damaging other aircraft. Materials capable of creating FOD must be continuously removed during the construction project. The Contractor is required to keep all taxiways and aprons, open to aircraft and free from FOD at all times. The Contractor is required to maintain FOD several times a day and to the satisfaction of the Airport Operations Manager and DIA Project Manager. Prior to opening any pavement to aircraft, the contractor shall conduct a sweep of the pavement to verify that it is FOD free.

8. HAZARDOUS MATERIAL (HAZMAT) MANAGEMENT

Although hazardous material is not anticipated to be present on this project, if hazardous material is encountered, the Contractor shall inform the Airport Operations Manager, DIA Project Manager and Airport Emergency immediately.

9. NOTIFICATION OF CONSTRUCTION ACTIVITIES

A. MAINTENANCE OF A LIST OF RESPONSIBLE REPRESENTATIVES/POINTS OF CONTACT

Agency Name	Telephone No.
Fire, Rescue	(303) 342-4200
Denver Police Department	(303) 342-4211
Project Administration	(303) 342-2933
Project Manager	(303) 342-2604
ID Badging	(303) 342-4300
Airport Security	(303) 342-4307
Vehicle Permits	(303) 342-4308
Driver Qualification	(303) 342-4310

B. NOTICES TO AIRMEN (NOTAM)

Only the Airport Operations Manager may initiate or cancel NOTAMs on airport conditions, and is the only entity that can close or open a runway. The Airport Operations Manager must coordinate the issuance, maintenance, and cancellation of NOTAMs about airport conditions resulting from construction activities and must provide information on closed or hazardous conditions on airport movement areas to the FAA Flight Service Station (FSS) so it can issue a NOTAM. The Contractor must notify the Airport Operations Manager and DIA Project manager when scheduling/scoping for the project has changed that would require a modification the NOTAMs.

C. EMERGENCY NOTIFICATION PROCEDURES

In an event of an emergency, the Contractor shall notify the Airport Operations Manager and DIA Project Manager. If necessary, the Contractor shall contact Airport Emergency.

D. COORDINATION WITH ARFF PERSONNEL

In an event that the Contractor must coordinate construction activities with ARFF Personnel, the Contractor will notify the Airport Operations Manager or DIA Project Manager. The Airport Operations Manager or DIA Project Manager will be responsible to notify the event to ARFF Personnel.

E. NOTIFICATION TO THE FAA

Any person proposing construction or alteration of objects that affect navigable airspace, as defined in Part 77, must notify the FAA. This includes construction equipment and proposed parking areas for this equipment. In regards to NAVAIDS damage, the Airport shall contact 1-866-432-2622.

10. INSPECTION REQUIREMENTS

A. DAILY (OR MORE FREQUENT) INSPECTIONS

Inspections shall be conducted daily, and more frequently if necessary to ensure conformance with this document. The checklist provided in the Advisory Circular 150-5370-2F Appendix 3, *Safety and Phasing Plan Checklist*, shall be used and completed by the Contractor.

B. FINAL INSPECTIONS

Final inspections shall be conducted after every construction phase is complete as detailed in Section 2 of this document. The checklist provided in the Advisory Circular 150-5370-2F Appendix 3, *Safety and Phasing Plan Checklist*, shall be completed by the Contractor to the Airport's satisfaction.

11. UNDERGROUND UTILITIES

The Contractor shall attempt to locate the Sponsor's underground cables and other sub-surface utilities prior to construction. Coordination among the Contractor, DIA Project Manager, Airport Operations Manager, FAA, National Weather Service, utility companies, and any other appropriate entity or organization must be complete prior to construction. NAVAIDS, Weather Service facilities, electric cables, and other utilities must be fully protected during the entire construction time. Power, communication and control cables leading to and from any FAA NAVAIDS, Weather Service, and other facilities will be marked in the field by the appropriate individuals as identified in Section 01020 – Utilities Interface of the contract documents for the information of the Contractor before any work in their general vicinity is started. Thereafter, through the entire duration of construction, they shall be protected from any possible damage, including crossing with unauthorized equipment. Damage to the underground cables, whether FAA's or Sponsor's, through negligence on the part of the Contractor will require replacement by the Contractor at no cost to the Sponsor. Any splicing or replacing of damaged cable shall meet current FAA specifications. Damage to other underground utilities through Contractor's negligence shall be repaired according to the relevant utility's standards and at no cost to the Sponsor.

12. PENALTIES

Any employer not regulated under 49 C.F.R. Part 1544, Aircraft Operator, will be responsible for payment or reimbursement to the City & County of Denver of any Civil Penalties imposed by the Transportation Security Administration (TSA) for individual security violations by their employees for violations under 49 C.F.R. Part 1542.

An employee may be personally subject to Civil Penalties imposed by the Transportation Security Administration (TSA) for individual security violations they commit under 49 C.F.R Part 1542. Each individual who is issued an Airport ID Badge shall comply with all Security Advisories, Denver Municipal Airport System Rules and Regulations, the Manager's Directives, and DIA Standard Policies and Procedures regarding Airport Safety, Security, and Operations. The failure of any individual to comply with such Security Advisories, rules and directives will result in the issuance of a Violation Notice and may result in the assessment of a Federal

Civil Penalty and/or the denial, suspension, or revocation of Airport ID Badges.

No individual to whom an Airport ID Badge or Security Key(s) (including Intellikey(s)) has been issued shall intentionally perform any of the following acts as described in Denver Municipal Airport System Rules and Regulations Part 20.04-16. The intentional commission of any such acts, due to their critical negative effect on the safety and security of Airport employees and the traveling public, is reason for immediate confiscation and suspension (and possible permanent revocation) of the Airport ID Badge, issuance of a Violation Notice, and a Violation Notice Hearing in accordance with Section 20.04-8.

13. SPECIAL CONDITIONS

Special conditions are not applicable to this project.

14. RUNWAY AND TAXIWAY VISUAL AIDS

A. EQUIPMENT AND METHODS FOR COVERING SIGNAGE AND AIRFIELD LIGHTS

The procedure to cover signage and airfield lights shall consist of the following. Elevated taxiway edge lights shall be covered using corrugated PVC, full length. The globe shall be covered so as to block any light that may be visible to a pilot. Taxiway exit signs will be modified with a black plastic cover. The cover shall cover the face so that the lettering is not recognizable during daytime or nighttime operations. Once construction is complete, the edge lights covers and sign covers shall be removed and the lights and signs shall be restored to normal operations.

B. EQUIPMENT AND METHODS FOR TEMPORARY CLOSURE MARKINGS (PAINT, FABRIC, OTHER)

The procedure to close off the apron/taxiway for construction shall consist of placing barricades and flashers on the perimeter of the construction area as shown in the milestone sheets at the end of this document.

C. TYPES OF TEMPORARY VISUAL GUIDANCE SLOPE INDICATORS (VGSI)

This is not applicable to the project.

15. MARKING AND SIGNS FOR ACCESS ROUTES

All required signs and markings shall conform to either Advisory Circular 150/5340-18, *Standard for Airport Sign Systems*, or the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD). Signs adjacent to areas used by aircraft must comply with the frangible requirements as stated in Advisory Circular, *Frangible Connections*. These signs will be directed by the Airport and provided by the Contractor.

16. HAZARD MARKINGS AND LIGHTINGS

A. PURPOSE

The hazard marking and lighting prevent pilots from entering areas closed to aircraft, and prevents construction personnel from entering areas open to aircraft. Prior to construction on or adjacent to any taxiway, the Contractor shall, upon approval by the Airport, close the taxiway and begin work. The Contractor shall be responsible for clearly marking and defining the closed taxiways by use of warning lights, barricades, flags and closed taxiway or runway markings in conformance with Advisory Circular 150/5370-2F. The Contractor shall be responsible for maintaining these barricades and keeping them clearly visible at all times as detailed on the construction sheets.

B. EQUIPMENT

Approved low-profile barricades are to identify and define the limits of construction and hazardous areas on airports as detailed on at the attached sheet D1.00. The spacing of the barricades is specified in the construction drawings for this project. The barricades must be weighted down per the

manufacturer's recommendations to prevent the barricades from moving due to wind or jet blast. The flashing lights on the approved barricades must meet the luminance requirement of the State Highway Department. The flashing lights must be red or an approved equal.

17. PROTECTION OF RUNWAY AND TAXIWAY AREAS

A. RUNWAY SAFETY AREA (RSA)

The project does not infringe or approach onto any runways or runway safety areas from DIA.

B. RUNWAY OBJECT FREE AREA (ROFA)

The project does not infringe or approach onto any runways or runway object free areas from DIA.

C. TAXIWAY SAFETY AREA (TSA)

Portions of this project lies within taxiway safety areas. During the construction process, NOTAMs will need to be issued to close taxiways as required on the attached milestone sheets.

Open trenches and excavations are not permitted within the TSA while the taxiway is open. If possible, backfill trenches before the taxiway is opened. If the taxiway must be opened before excavations are backfilled, cover the excavations appropriately.

Soil erosion must be controlled to maintain TSA standards, that is, the TSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting snow removals equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

D. TAXIWAY OBJECT FREE AREA (TOFA)

Portions of this project lies within taxiway object free areas. During the construction process, NOTAMs will need to be issued to close taxiways as required on the attached milestone sheets. Signs/embankments/equipment within the TOFA must comply with the frangible requirements as stated in Advisory Circular, *Frangible Connections*.

E. OBSTACLE FREE ZONE (OFZ)

The project does not infringe or approach onto any obstacle free zone from DIA.

F. RUNWAY APPROACH/DEPARTURE SURFACES

The project does not infringe or approach onto any runways approach/departure surfaces from DIA.

18. OTHER LIMITATIONS ON CONSTRUCTION

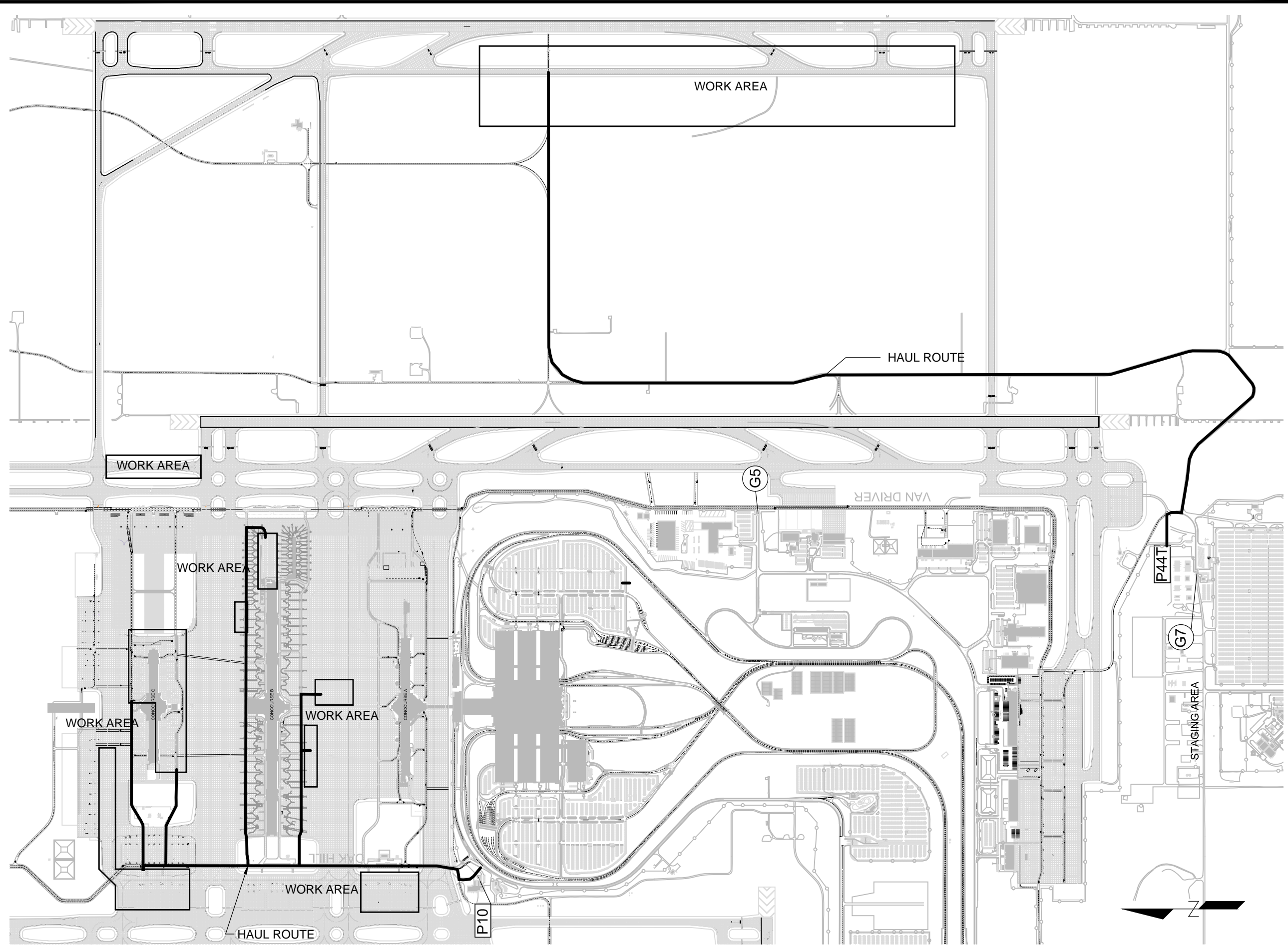
This is not applicable to this project.

PHASING DESCRIPTION

MILESTONE	PHASE	AREAS AND OPERATIONS AFFECTED BY CONSTRUCTION ACTIVITY					WORK TYPE	WORK PERIOD	ESTIMATED WORK DURATION (CALENDAR DAYS)	WORK RESTRICTIONS	NOTES		
		WORK AREA LOCATION	CLOSURE LIMITS	CONTRACTOR ACCESS	PROTECTION OF NAVAIDS	ADG RESTRICTIONS						TRAFFIC RESTRICTIONS	
1	1	TW CN, FROM TW H TO 1,100' EAST OF TW J	NORTH = EDGE OF RON PAD	GATE P10	N/A	N/A	TW CN CLOSED, RON PAD CLOSED	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	24	NOT TO BE IN CONJUNCTION WITH PHASES 16, 17, 18	FLAGGERS REQUIRED	
			SOUTH = OFA PURPLE LINE & SOUTH OFA TW CN	OAK HILL ST									
			EAST = 1,100' EAST OF TW J										
			WEST = TW G OFA										
	2	DE-ICE PAD C & TW H		NORTH = TW CN GROUP III OFA	GATE P10	N/A	TW CN REDUCED TO GROUP III MAX	TW H CLOSED, DE-ICE PAD C, J CLOSED	CONCRETE PANEL REMOVE AND REPLACE, ADJUST ELEVATION 1, 2-GRATE INLET	DAY AND NIGHT	20	NONE	FLAGGERS REQUIRED
				SOUTH = TW CS OFA	OAK HILL ST								
				EAST = 1 PANEL WEST OF OAK HILL ST									
				WEST = TW G OFA									
	3	DE-ICE PAD A & TW A		NORTH = TW AN OFA	GATE P10	N/A	N/A	TW H CLOSED, DE-ICE PAD A CLOSED	CONCRETE PANEL REMOVE AND REPLACE, DE-ICE BOOM REMOVAL, ADJUST ELEVATION OF 1, 1-GRATE INLET	DAY AND NIGHT	17	NONE	FLAGGERS REQUIRED
SOUTH = TW AS OFA				OAK HILL ST									
EAST = EAST EDGE TW H													
WEST = TW G OFA													
2	4	TW P, SOUTH OF P6 & NORTH OF P2	NORTH = TW P-6 OFA	GATE P44T	N/A	N/A	TW P CLOSED, SOUTH OF P6 & NORTH OF P2	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	20	NONE	FLAGGERS & HAUL ROUTE MONITORS REQUIRED	
			SOUTH = TW P-2 OFA	ALLIUM ST									
			EAST = RW 17L/35R OFA	84TH AVE									
			WEST = WEST EDGE OF TW P										
	5	TW M, SOUTH OF TW ED & NORTH OF TW M-10		NORTH = TW ED OFA	GATE P44T	N/A	N/A	TW M CLOSED, SOUTH OF TW ED & NORTH OF TW M-10	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	RED-STRIPE BADGE ESCORT REQUIRED	FLAGGERS & HAUL ROUTE MONITORS REQUIRED
				SOUTH = TW M-10 OFA	VANDRIVER ST								
				EAST = EAST EDGE OF TW M	M-10								
				WEST = WEST EDGE OF TW M									
3	6	SOUTH OF GATE B24	NORTH = SOUTH EDGE OF VSR	GATE P10	N/A	TW BS REDUCED TO GROUP IV MAX	B24 CLOSED GREEN LINE CLOSED ABEAM B22, B24, B26	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 8, 10, 15. DEMO WORK TO BE DONE AT NIGHT	FLAGGERS REQUIRED	
			SOUTH = TW BS OFA	OAK HILL ST									
			EAST = EAST EDGE OF GATE B24	VSR									
			WEST = WEST EDGE OF GATE B24										
	7	SOUTH OF GATES C30 & C32		NORTH = SOUTH EDGE OF VSR	GATE P10	N/A	N/A	C30 & C32 CLOSED, PURPLE LINE CLOSED ABEAM C28, C30, C32	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	12	NOT TO BE IN CONJUNCTION WITH PHASES 9, 11, 13, 14	FLAGGERS REQUIRED
				SOUTH = TW CS OFA	OAK HILL ST								
				EAST = EAST EDGE OF GATE C32	VSR								
				WEST = WEST EDGE OF GATE C30									
	8	SOUTH OF GATE B26		NORTH = SOUTH EDGE OF VSR	GATE P10	N/A	TW BS REDUCED TO GROUP IV MAX	B26 CLOSED, GREEN LINE CLOSED ABEAM B24, B26, B28	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 6, 10, 15. DEMO WORK TO BE DONE AT NIGHT	FLAGGERS REQUIRED
				SOUTH = TW BS OFA	OAK HILL ST								
				EAST = EAST EDGE OF GATE B26	VSR								
				WEST = WEST EDGE OF GATE B26									
9	NORTH OF GATES B51 & B53		NORTH = TW BN OFA	GATE P10	N/A		B51, B53 CLOSED, GREEN LINE CLOSED ABEAM B51, B53	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 7, 11, 13, 14	FLAGGERS REQUIRED	
			SOUTH = NORTH EDGE OF VSR	OAK HILL ST									
			EAST = EAST EDGE OF GATE B53	VSR									
			WEST = WEST EDGE OF GATE B53										
10	SOUTH OF GATE B28		NORTH = SOUTH EDGE OF VSR	GATE P10	N/A	TW BS REDUCED TO GROUP IV MAX	B28 CLOSED, GREEN LINE CLOSED ABEAM B26, B28, B30	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 6, 8, 15. DEMO WORK TO BE DONE AT NIGHT	FLAGGERS REQUIRED	
			SOUTH = TW BS OFA	OAK HILL ST									
			EAST = EAST EDGE OF GATE B28	VSR									
			WEST = WEST EDGE OF GATE B28										

MILESTONE	PHASE	AREAS AND OPERATIONS AFFECTED BY CONSTRUCTION ACTIVITY					WORK TYPE	WORK PERIOD	ESTIMATED WORK DURATION (CALENDAR DAYS)	WORK RESTRICTIONS	NOTES		
		WORK AREA LOCATION	CLOSURE LIMITS	CONTRACTOR ACCESS	PROTECTION OF NAVAIDS	ADG RESTRICTIONS						TRAFFIC RESTRICTIONS	
3	11	NORTH OF GATES B53 & B55	NORTH = TW BN OFA	GATE P10	N/A	GATE B57 REDUCED TO RJ AIRCRAFT MAX	B53, B55 CLOSED, GREEN LINE CLOSED ABEAM B51, B53, B55	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 7, 9, 13, 14	FLAGGERS REQUIRED	
			SOUTH = NORTH EDGE OF VSR	OAK HILL ST									
			EAST = EAST EDGE OF GATE B53	VSR									
			WEST = WEST EDGE OF GATE B55										
	12	NORTH OF GATES B81 THRU B91		NORTH = CENTER VSR	GATE P10	N/A		B81 CLOSED, TRAFFIC REDUCED TO ONE-WAY OPERATIONS IN HORSESHOE	CONCRETE PANEL REMOVE AND REPLACE, ADJUST ELEVATION OF 3, 4-GRATE INLETS	DAY AND NIGHT	10	NONE	FLAGGERS REQUIRED
				SOUTH = NORTH TW CENTERLINE	OAK HILL ST								
				EAST = INLINE WITH EAST EDGE OF B89	VSR								
				WEST = WEST EDGE OF VSR									
	13	GATE C38		NORTH = NORTH EDGE C38	GATE P10	N/A		C38 CLOSED, VSR RELOCATED, PURPLE LINE CLOSED ABEAM C38	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 7, 9, 11, 14	FLAGGERS REQUIRED
				SOUTH = SOUTH EDGE OF VSR	OAK HILL ST								
				EAST = EAST EDGE OF C38	VSR								
				WEST = WEST EDGE OF C38									
14	GATE C40		NORTH = NORTH EDGE C40	GATE P10	N/A		C40 CLOSED, VSR RELOCATED, PURPLE LINE CLOSED ABEAM C40	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 7, 9, 11, 13	FLAGGERS REQUIRED	
			SOUTH = SOUTH EDGE OF VSR	OAK HILL ST									
			EAST = EAST EDGE OF C40	VSR									
			WEST = WEST EDGE OF C40										
15	BETWEEN TW AN & BS, EAST OF CENTER CORE		NORTH = 1 PANEL NORTH OF TW BS	GATE P10	N/A	GREEN LINE & PURPLE LINE REDUCED TO GROUP IV MAX	TW AN & BS CLOSED	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 6, 8, 10.	FLAGGERS REQUIRED	
			SOUTH = 1 PANEL SOUTH OF TW AN	OAK HILL ST									
			EAST = INLINE WITH LEAD IN LINE OF B38	VSR									
			WEST = EAST EDGE OF NORTH/SOUTH VSR										
16	GATE C41		NORTH = NORTH EDGE C41	GATE P10	N/A			CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 1, 17, 18	FLAGGERS REQUIRED	
			SOUTH = SOUTH EDGE OF VSR	OAK HILL ST									
			EAST = EAST EDGE OF C41	VSR									
			WEST = WEST EDGE OF C41										
17	GATE C47		NORTH = NORTH EDGE C47	GATE P10	N/A			CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 1, 16, 18	FLAGGERS REQUIRED	
			SOUTH = SOUTH EDGE OF VSR	OAK HILL ST									
			EAST = EAST EDGE OF C47	VSR									
			WEST = WEST EDGE OF C47										
18	GATE C49		NORTH = NORTH EDGE C49	GATE P10	N/A			CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 1, 16, 17	FLAGGERS REQUIRED	
			SOUTH = SOUTH EDGE OF VSR	OAK HILL ST									
			EAST = EAST EDGE OF C49	VSR									
			WEST = WEST EDGE OF C49										

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CITY & COUNTY
of DENVER
DENVER
INTERNATIONAL
AIRPORT



DESIGNER OF RECORD
DENVER INTERNATIONAL AIRPORT
MAINT. & ENG.
8500 Peoria Blvd.
Denver, CO 80249-6340

2012 ANNUAL AIRFIELD PAVEMENT REHABILITATION

ISSUE RECORD			
NO.	BY	PURPOSE	DATE
1	TNR	IFB	02/21/RBN

SCALE: NTS

DATE: 02/21/2012

DRAWN BY: TNR

CHECKED BY: RBN

FAA AIP NO:

WORK BREAKDOWN NO.

DESIGN CONTRACT NO.

CONST. CONTRACT NO. 201204726

VOLUME NO. 1

SHEET TITLE
**HAUL
ROUTE**

SHEET NO.
G4.00

CADD FILE NO.
G4.00 - HAUL ROUTE

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MILESTONE	PHASE	PHASING DESCRIPTION												
		AREAS AND OPERATIONS AFFECTED BY CONSTRUCTION ACTIVITY					WORKTYPE	WORK PERIOD	ESTIMATED WORK DURATION (CALENDAR DAYS)	WORK RESTRICTIONS	NOTES			
		WORK AREA LOCATION	CLOSURE LIMITS	CONTRACTOR ACCESS	PROTECTION OF NAVAIDS	ADG RESTRICTIONS						TRAFFIC RESTRICTIONS		
1	1	TV CN, FROM TWH TO 1,100 EAST OF TW J	NORTH = EDGE OF RON PAD SOUTH = OFA PURPLE LINE & SOUTH OFA TW CN EAST = 1,100' EAST OF TW J WEST = TW G OFA	GATE P10 OAK HILL ST	N/A	N/A	TW CN CLOSED, RON PAD CLOSED	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	24	NOT TO BE IN CONJUNCTION WITH PHASES 16, 17, 18	FLAGGERS REQUIRED		
		2	DE-ICE PAD C & TW H	NORTH = TW CN GROUP III OFA SOUTH = TW CS OFA EAST = 1 PANEL WEST OF OAK HILL ST WEST = TW G OFA	GATE P10 OAK HILL ST	N/A	TW CN REDUCED TO GROUP III MAX	TW H CLOSED, DE-ICE PAD C, J CLOSED	CONCRETE PANEL REMOVE AND REPLACE, ADJUST ELEVATION 1, 2-GRATE INLET	DAY AND NIGHT	20	NONE	FLAGGERS REQUIRED	
				3	DE-ICE PAD A & TW A	NORTH = TW AN OFA SOUTH = TW AS OFA EAST = EAST EDGE TW H WEST = TW G OFA	GATE P10 OAK HILL ST	N/A	N/A	TW H CLOSED, DE-ICE PAD A CLOSED	CONCRETE PANEL REMOVE AND REPLACE, DE-ICE BOOM REMOVAL, ADJUST ELEVATION OF 1.1 GRATE INLET	DAY AND NIGHT	17	NONE
3	4	TW P, SOUTH OF P6 & NORTH OF P2	NORTH = TW P-6 OFA SOUTH = TW P-2 OFA EAST = RW 17L/35R OFA WEST = WEST EDGE OF TW P			GATE P44T ALLIUM ST 84TH AVE	N/A	N/A	TW P CLOSED, SOUTH OF P6 & NORTH OF P2	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	20	NONE	FLAGGERS & HAUL ROUTE MONITORS REQUIRED
			5	TW M, SOUTH OF TW ED & NORTH OF TW M-10	NORTH = TW ED OFA SOUTH = TW M-10 OFA EAST = EAST EDGE OF TW M WEST = WEST EDGE OF TW M	GATE P44T VANDRIVER ST M-10	N/A	N/A	TW M CLOSED, SOUTH OF TW ED & NORTH OF TW M-10	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	RED-STRIPE BADGE ESCORT REQUIRED	FLAGGERS & HAUL ROUTE MONITORS REQUIRED
					6	SOUTH OF GATE B24	NORTH = TW P-6 OFA SOUTH = TW BS OFA EAST = EAST EDGE OF GATE B24 WEST = WEST EDGE OF GATE B24	GATE P10 OAK HILL ST VSR	N/A	TW BS REDUCED TO GROUP IV MAX	B24 CLOSED GREEN LINE CLOSED ABEAM B22, B24, B26	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10
7	SOUTH OF GATES C30 & C32	NORTH = SOUTH EDGE OF VSR SOUTH = TW CS OFA EAST = EAST EDGE OF GATE C32 WEST = WEST EDGE OF GATE C30	GATE P10 OAK HILL ST VSR	N/A			N/A	C30 & C32 CLOSED, PURPLE LINE CLOSED ABEAM C28, C30, C32	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	12	NOT TO BE IN CONJUNCTION WITH PHASES 9, 11, 13, 14	FLAGGERS REQUIRED	
		8	SOUTH OF GATE B26	NORTH = SOUTH EDGE OF VSR SOUTH = TW BS OFA EAST = EAST EDGE OF GATE B26 WEST = WEST EDGE OF GATE B26			GATE P10 OAK HILL ST VSR	N/A	TW BS REDUCED TO GROUP IV MAX	B26 CLOSED, GREEN LINE CLOSED ABEAM B24, B26, B28	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 6, 10, 15. DEMO WORK TO BE DONE AT NIGHT
9	NORTH OF GATES B51 & B53			NORTH = TW BN OFA SOUTH = NORTH EDGE OF VSR EAST = EAST EDGE OF GATE B53 WEST = WEST EDGE OF GATE B53	GATE P10 OAK HILL ST VSR	N/A	N/A	B51, B53 CLOSED, GREEN LINE CLOSED ABEAM B51, B53	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 7, 11, 13, 14	FLAGGERS REQUIRED	
		10	SOUTH OF GATE B28	NORTH = SOUTH EDGE OF VSR SOUTH = TW BS OFA EAST = EAST EDGE OF GATE B28 WEST = WEST EDGE OF GATE B28	GATE P10 OAK HILL ST VSR	N/A	TW BS REDUCED TO GROUP IV MAX	B28 CLOSED, GREEN LINE CLOSED ABEAM B26, B28, B30	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 6, 8, 15. DEMO WORK TO BE DONE AT NIGHT	FLAGGERS REQUIRED	
11	NORTH OF GATES B53 & B55			NORTH = TW BN OFA SOUTH = NORTH EDGE OF VSR EAST = EAST EDGE OF GATE B53 WEST = WEST EDGE OF GATE B55	GATE P10 OAK HILL ST VSR	N/A	GATE B57 REDUCED TO RJ AIRCRAFT MAX	B53, B55 CLOSED, GREEN LINE CLOSED ABEAM B51, B53, B55	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	10	NOT TO BE IN CONJUNCTION WITH PHASES 7, 9, 13, 14	FLAGGERS REQUIRED	
		2	12	NORTH OF GATES B81 THRU B91	NORTH = CENTER VSR SOUTH = NORTH TW CENTERLINE EAST = INLINE WITH EAST EDGE OF B89 WEST = WEST EDGE OF VSR	GATE P10 OAK HILL ST VSR	N/A	N/A	B81 CLOSED, TRAFFIC REDUCED TO ONE-WAY OPERATIONS IN HORSESHOE	CONCRETE PANEL REMOVE AND REPLACE, ADJUST ELEVATION OF 3, 4-GRATE INLETS	DAY AND NIGHT	10	NONE	FLAGGERS REQUIRED
13	GATE C38				NORTH = NORTH EDGE C38 SOUTH = SOUTH EDGE OF VSR EAST = EAST EDGE OF C38 WEST = WEST EDGE OF C38	GATE P10 OAK HILL ST VSR	N/A	N/A	C38 CLOSED, VSR RELOCATED, PURPLE LINE CLOSED ABEAM C38	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 7, 9, 11, 14	FLAGGERS REQUIRED
		14	GATE C40	NORTH = NORTH EDGE C40 SOUTH = SOUTH EDGE OF VSR EAST = EAST EDGE OF C40 WEST = WEST EDGE OF C40	GATE P10 OAK HILL ST VSR	N/A	N/A	C40 CLOSED, VSR RELOCATED, PURPLE LINE CLOSED ABEAM C40	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 7, 9, 11, 13	FLAGGERS REQUIRED	
15	BETWEEN TW AN & BS, EAST OF CENTER CORE			NORTH = 1 PANEL NORTH OF TW BS SOUTH = 1 PANEL SOUTH OF TW AN EAST = INLINE WITH LEAD IN LINE OF B38 WEST = EAST EDGE OF NORTH/SOUTH VSR	GATE P10 OAK HILL ST VSR	N/A	GREEN LINE & PURPLE LINE REDUCED TO GROUP IV MAX	TW AN & BS CLOSED	CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 6, 8, 10.	FLAGGERS REQUIRED	
		16	GATE C41	NORTH = NORTH EDGE C41 SOUTH = SOUTH EDGE OF VSR EAST = EAST EDGE OF C41 WEST = WEST EDGE OF C41	GATE P10 OAK HILL ST VSR	N/A	N/A		CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 1, 17, 18	FLAGGERS REQUIRED	
17	GATE C47			NORTH = NORTH EDGE C47 SOUTH = SOUTH EDGE OF VSR EAST = EAST EDGE OF C47 WEST = WEST EDGE OF C47	GATE P10 OAK HILL ST VSR	N/A	N/A		CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 1, 16, 18	FLAGGERS REQUIRED	
		18	GATE C49	NORTH = NORTH EDGE C49 SOUTH = SOUTH EDGE OF VSR EAST = EAST EDGE OF C49 WEST = WEST EDGE OF C49	GATE P10 OAK HILL ST VSR	N/A	N/A		CONCRETE PANEL REMOVE AND REPLACE	DAY AND NIGHT	30	NOT TO BE IN CONJUNCTION WITH PHASES 1, 16, 17	FLAGGERS REQUIRED	

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2012 ANNUAL
AIRFIELD PAVEMENT
REHABILITATION

ISSUE RECORD
NO. BY PURPOSE DATE CKD

1 TNR IFB 02/21/RBN

SCALE NTS

DATE 02/21/2012

DRAWN BY: TNR

CHECKED BY: RBN

FAA AIP NO:

WORK BREAKDOWN NO:

DESIGN CONTRACT NO:

CONST. CONTRACT NO. 201204726

VOLUME NO. 1

SHEET TITLE

PHASING DESCRIPTION

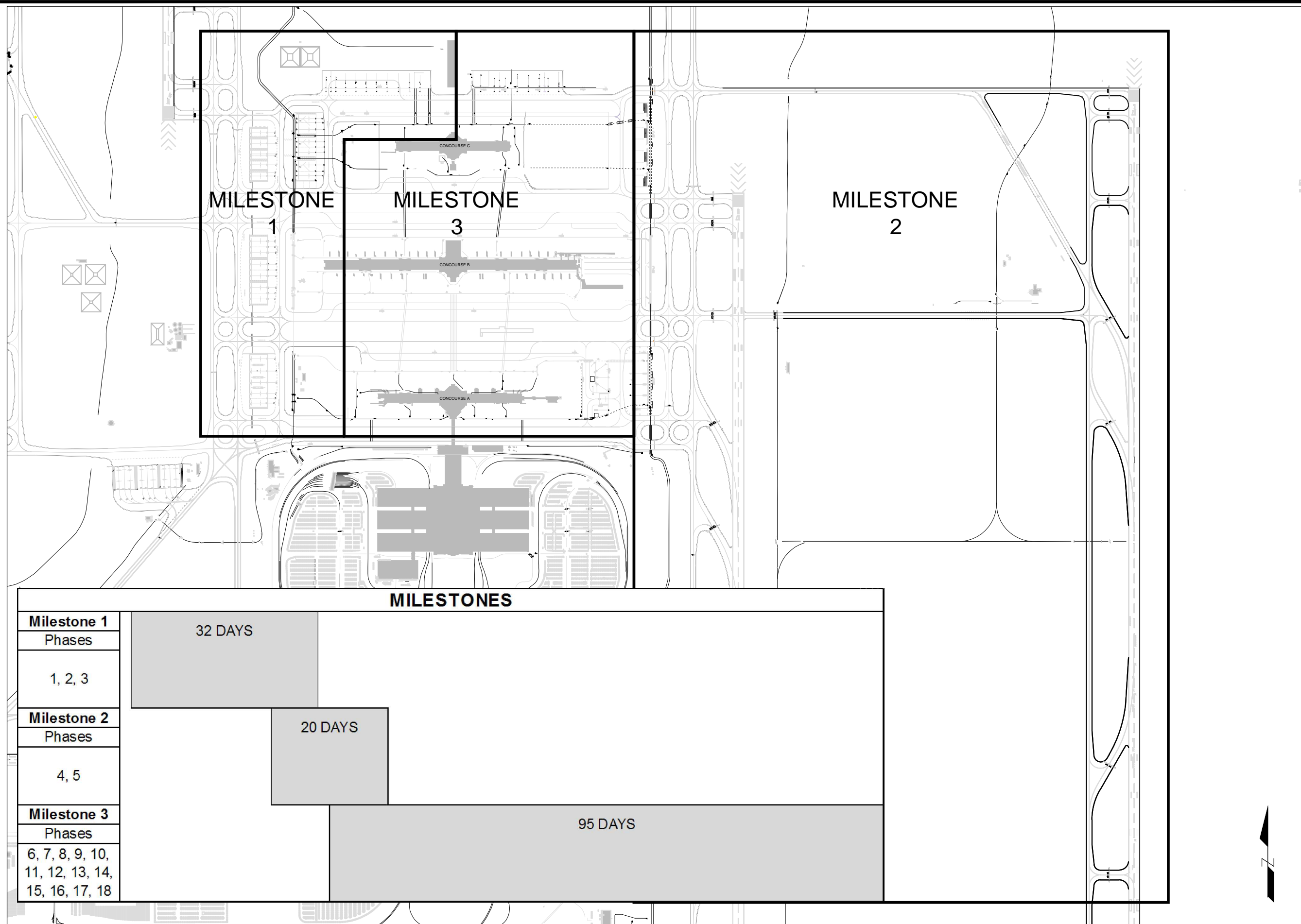
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G4.10

CADD FILE NO.

G4.10 - PHASING DESCRIPTION

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MILESTONES	
Milestone 1 Phases	32 DAYS
1, 2, 3	
Milestone 2 Phases	20 DAYS
4, 5	
Milestone 3 Phases	95 DAYS
6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18	



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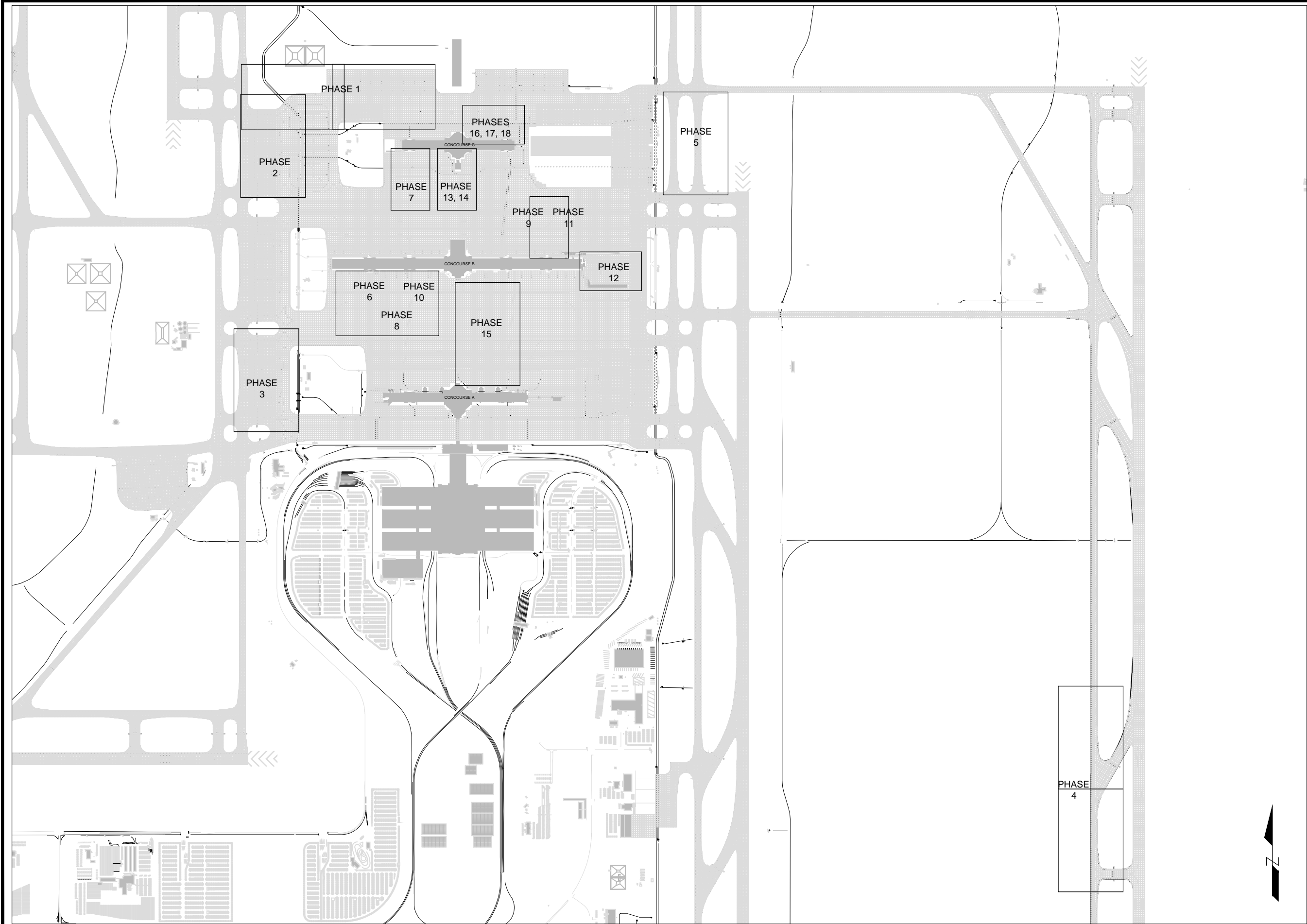
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2012 ANNUAL AIRFIELD PAVEMENT REHABILITATION

NO.	BY	PURPOSE	DATE	CHKD
1	TNR	IFB	02/20/12	RBN

SCALE _____ NTS
DATE _____
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CHECKED BY: _____ RBN
FAA AIP NO: _____
WORK BREAKDOWN NO. _____
DESIGN CONTRACT NO. _____ CE
CONST. CONTRACT NO. _____ 201204726
VOLUME NO. _____ 1
SHEET TITLE
**MILESTONE
OVERVIEW**
SHEET NO.
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G5.0 - MILESTONE OVERVIEW

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2012 ANNUAL
AIRFIELD PAVEMENT
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SCALE: NTS

DATE: 02/21/2012

DRAWN BY: TNR

CHECKED BY: RBN

FAA AIP NO:

WORK BREAKDOWN NO:

DESIGN CONTRACT NO:

CONST. CONTRACT NO: 201204726

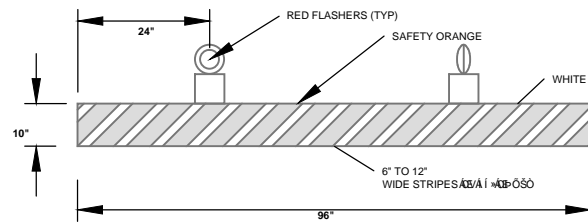
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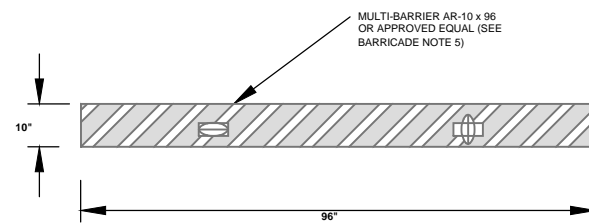
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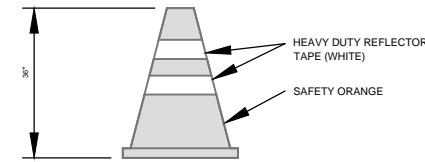
LOW-PROFILE BARRICADE DETAIL - ELEVATION



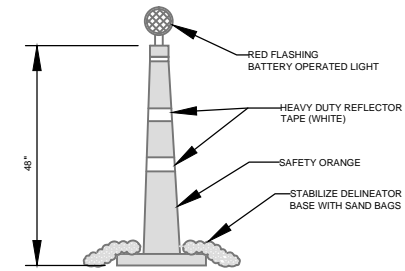
LOW-PROFILE BARRICADE DETAIL - PLAN



DUNCE CONE DETAIL - DAY/NIGHT

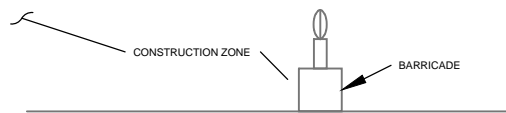


LIGHTED CONE DETAIL - NIGHT

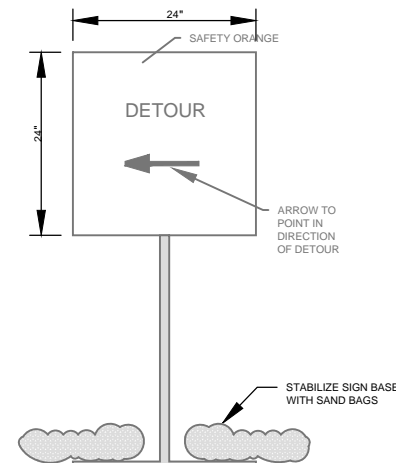


LIGHTED CONE NOTES:
 1. LIGHTED CONES SHALL BE SPACED AT TWENTY FIVE (25) FOOT INCREMENTS, EXCEPT SECTIONS PARALLEL TO A VSR. THE CONES PLACED PARALLEL TO A VSR SHALL BE SPACED AT TEN (10) FOOT INCREMENTS

LOW-PROFILE BARRICADE DETAIL - SECTION

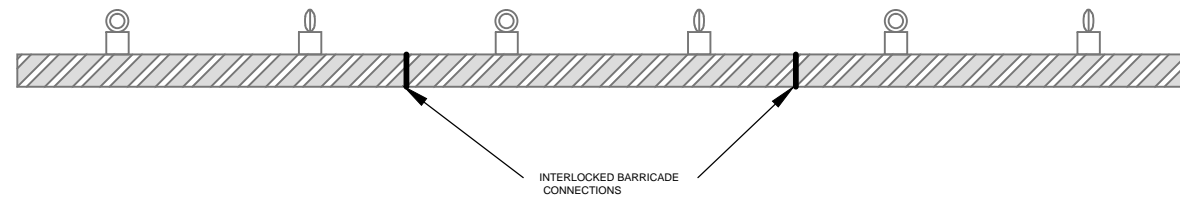


DETOUR SIGN - DETAIL



BARRICADE NOTES:
 1. A DETOUR SIGN WILL BE REQUIRED AT THE BEGINNING AND THE END OF CLOSURE WHEN ANY VSR IS PARTIALLY OR COMPLETELY CLOSED
 2. WHEN ANY VSR IS RESTRICTED TO ONE LANE OF TRAFFIC, FLAGGERS WILL BE REQUIRED

INTERLOCKED BARRICADE LAYOUT - TAXIWAY CLOSURE



BARRICADE NOTES:
 1. FLASHERS TO BE BATTERY OPERATED AND/OR SOLAR POWERED. LENS TO BE RED ABLE TO ROTATE 90 DEGREES
 2. FACING OF LOW-PROFILE BARRICADE TO BE COVERED WITH REFLECTIVE MATERIAL
 3. LOW-PROFILE BARRICADES SHALL BE INTERLOCKED ALONG OPERATIONAL PAVEMENT, ADJACENT TO CONSTRUCTION, AS DIRECTED BY THE PLANS OR AIRPORT OPERATIONS
 4. FLASHERS SHALL BE SECURED TO THE BARRICADES PER MANUFACTURERS INSTRUCTIONS. ALTERNATE FLASHER LENS SO THAT EVERY OTHER LENS IS ROTATED 90 DEGREES
 5. LOW-PROFILE BARRICADES SHALL BE OF LOW MASS, EASILY COLLAPSIBLE UPON CONTACT WITH AN AIRCRAFT OR ANY OF ITS COMPONENTS, AND WEIGHTED OR STURDILY ATTACHED TO THE SURFACE. IF AFFIXED TO THE SURFACE, THE BARRICADE MUST BE FRANGIBLE AT GRADE LEVEL OR AS LOW AS POSSIBLE. NOT TO EXCEED 3 INCHES ABOVE THE GROUND
 6. THE CONTRACTOR SHALL MAINTAIN ALL BARRICADES AND ENSURE THEY ARE IN WORKING ORDER TWENTY-FOUR (24) HOURS A DAY, FOR THE DURATION OF THE PROJECT. THE BARRICADE LIGHTING SHALL BE CHECKED NIGHTLY BY THE CONTRACTOR.
 7. THE LIGHTS SHALL BE OPERATIONAL AT EACH BARRICADE LOCATION AT ALL TIMES. ANY LIGHTS FOUND NON-OPERATIONAL SHALL BE REPAIRED WITHIN TWENTY-FOUR (24) HOURS
 8. PLACE THREE (3) LOW-PROFILE BARRICADES CONNECTED END TO END ACROSS THE CENTERLINE OF THE TAXIWAY
 9. BARRIER SYSTEM CAN BE PLACED IN CURVES OR ANGLES AS LONG AS THEY ARE PLACED IN A NEAT AND ORDERLY MANNER
 10. AT NIGHT LIGHT PLANTS SHALL PLACED AT CLOSURE POINTS AND SHALL ILLUMINATE THE CLOSED PAVEMENT

GENERAL NOTES
 1. GIVE WAY TO AIRCRAFT AT ALL TIMES.
 2. AIRFIELD SAFETY IS PARAMOUNT. SAFE DRIVING PRACTICES WILL BE OBSERVED AT ALL TIMES. THERE IS A NO TOLERANCE POLICY FOR VEHICLE ERROR.
 3. STAY WITHIN THE LANES OF THE VEHICLE SERVICE ROAD AND FOLLOW THE POSTED SPEED LIMITS.
 4. ONLY DRIVERS WITH DRIVING PRIVILEGES ON THEIR AIRPORT ISSUED ID BADGE MAY DRIVE VEHICLES WITHIN THE AIRFIELD.
 5. PRIOR TO BEING ESCORTED BOTH THE ESCORTER AND THE ESCORTEE MUST HAVE A BRIEF DISCUSSION ON THE RULES, THE INTENDED ROUTE, AND ANY OTHER CONCERNS THAT ARISE WHEN DRIVING ON THE AIRFIELD.
 6. WHEN UNDER ESCORT THE ESCORTEE MUST FOLLOW THE ESCORTER AT ALL TIMES.
 7. ALL VEHICLES MUST HAVE OPERATING BEACONS, IN COMPLIANCE WITH THE CONSTRUCTION SAFETY PHASING PLAN, VISIBLE FROM 360 DEG. AT ALL TIMES ON THE AIRFIELD. IF THE BEACON, FOR WHATEVER REASON, IS NOT OPERATIONAL THE VEHICLE SHALL IMMEDIATELY BE ESCORTED OFF THE AIRFIELD UNTIL AN OPERATIONAL BEACON IS IN USE FOR THE VEHICLE.
 8. STAGING SHALL OCCUR ONLY AT THE DESIGNATED STAGING AREAS AS MARKED IN THE PLANS.
 9. THE CONTRACTOR WILL ONLY BE ALLOWED ACCESS TO THE AIRFIELD THROUGH THEIR APPROVED GATE FOR THEIR SCOPE OF WORK. USE OF ANY UNAUTHORIZED HAUL ROUTES WILL NOT BE TOLERATED. USE OF ANY UNAPPROVED GATES WILL NOT BE TOLERATED.
 10. REQUESTS FROM THE CONTRACTOR FOR CLOSURES, ESCORTS, AND ROUTES MAY OR MAY NOT HAPPEN AS REQUESTED. AIRPORT FUNCTIONALITY HAS HIGHER PRECEDENT THAN CONSTRUCTION ACTIVITIES.
 11. DUE TO AIRPORT FUNCTIONALITY, THE CONTRACTOR SHALL ABIDE BY THE CONSTRAINTS OF THE CLOSURE REQUEST WITH A FIFTEEN MINUTE VARIANCE. AIRPORT OPERATIONS HAS THE SOLE AUTHORITY TO GRANT/TAKE AWAY CLOSURE REQUESTS.
 12. THE WORK LIMITS AS DELINEATED BY THE CONES SHALL NOT BE CROSSED WITHOUT THE APPROVAL OF THE CCD ONSITE REPRESENTATIVE. FAILURE TO REMAIN INSIDE THE WORK AREA WILL NOT BE TOLERATED AND MAY RESULT IN LOSS OF BADGE.
 13. USE OF GATES DESIGNATED "P#H" HAVE SPECIAL RULES AND REGULATIONS ASSOCIATED WITH THEM. CONSULT D.I.A. SECURITY OFFICE.
 14. AIRCRAFT MAY BE PARKED IN GATES ADJACENT TO WORK AREAS.
 15. UNDER NO CIRCUMSTANCES SHALL VEHICLES BE ALLOWED TO PASS UNDER AIRCRAFT WINGS. USE EXTREME CAUTION WHEN DRIVING IN THE AOA.

CAUTION- UNDERGROUND UTILITIES:

UNDERGROUND UTILITIES EXIST WITHIN AND ADJACENT TO TO THE LIMITS OF CONSTRUCTION. AN ATTEMPT HAS BEEN MADE TO LOCATE THESE UTILITIES ON THE PLANS, AND THE LOCATION OF THE UTILITIES SHOWN MAY VARY FROM THE LOCATION SHOWN ON PLANS. PRIOR TO BEGINNING ANY TYPE OF EXCAVATION, THE CONTRACTOR SHALL CONTACT THE CCD PROJECT MANAGER AT DENVER INTERNATIONAL AIRPORT AND MAKE ARRANGEMENTS FOR THE LOCATION OF THE UTILITY ON THE GROUND. THE CONTRACTOR SHALL MAINTAIN THE UTILITY LOCATION MARKINGS UNTIL THEY ARE NO LONGER NECESSARY.

CITY & COUNTY of DENVER

DENVER INTERNATIONAL AIRPORT



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2012 ANNUAL AIRFIELD PAVEMENT REHABILITATION

ISSUE RECORD

NO.	BY	PURPOSE	DATE	CHKD
1	TNR	IFB	02/21	RBN

SCALE _____ NTS

DATE 02/21/2012

DRAWN BY: TNR

CHECKED BY: RBN

FAA AIP NO: _____

WORK BREAKDOWN NO. _____

DESIGN CONTRACT NO. _____

CONST. CONTRACT NO. 201204726

VOLUME NO. 1

SHEET TITLE

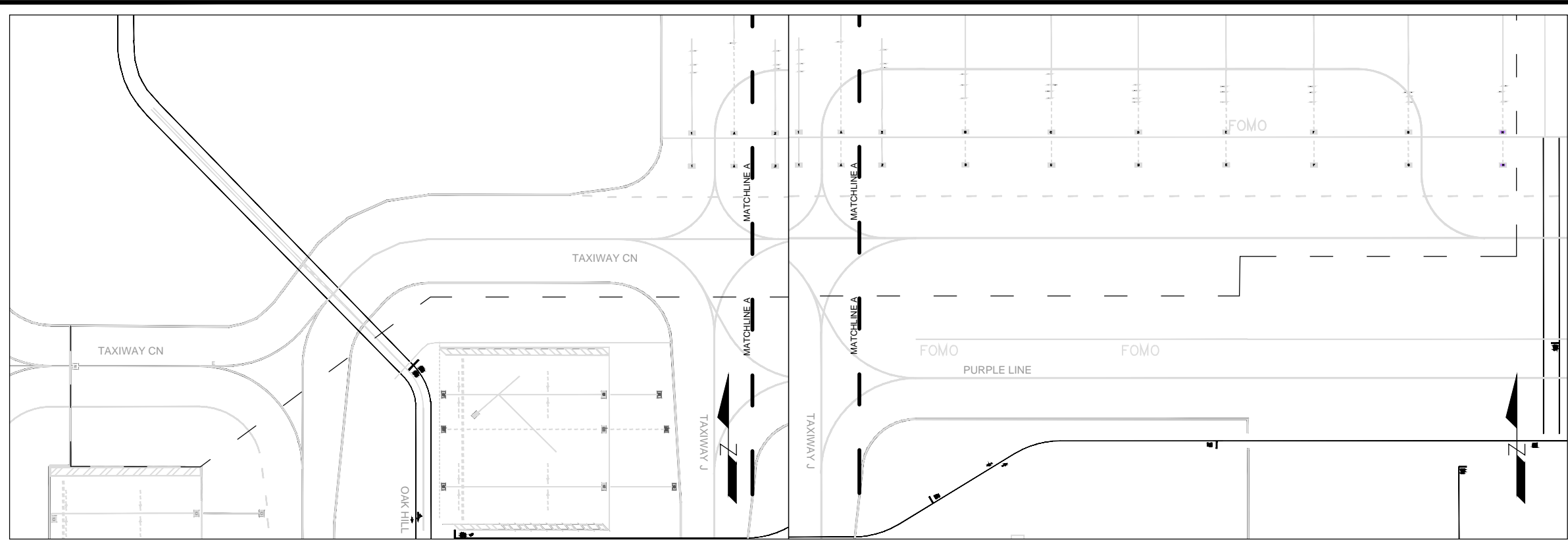
SAFETY DETAILS

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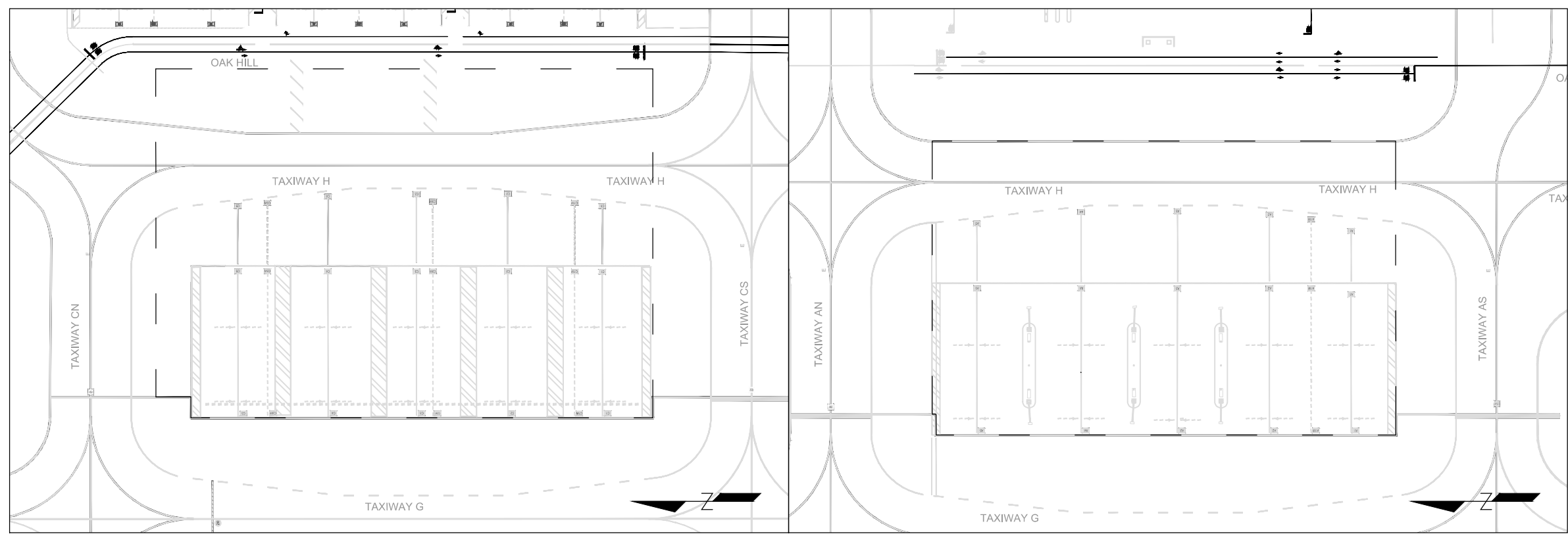
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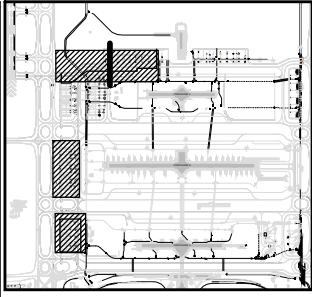
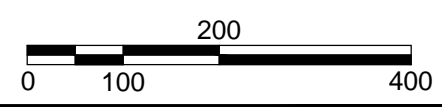
PHASE 1 BARRICADE PLACEMENT WEST

PHASE 1 BARRICADE PLACEMENT EAST



PHASE 2 BARRICADE PLACEMENT

PHASE 3 BARRICADE PLACEMENT



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2012 ANNUAL AIRFIELD PAVEMENT REHABILITATION

NO.	BY	PURPOSE	DATE	CHKD
1	TNR	IFB	02/20/12	RBN

SCALE 1"=200'

DATE 02/20/12

DRAWN BY: TNR

CHECKED BY: RBN

FAA AIP NO:

WORK BREAKDOWN NO:

DESIGN CONTRACT NO. CE

CONST. CONTRACT NO. 20#204726

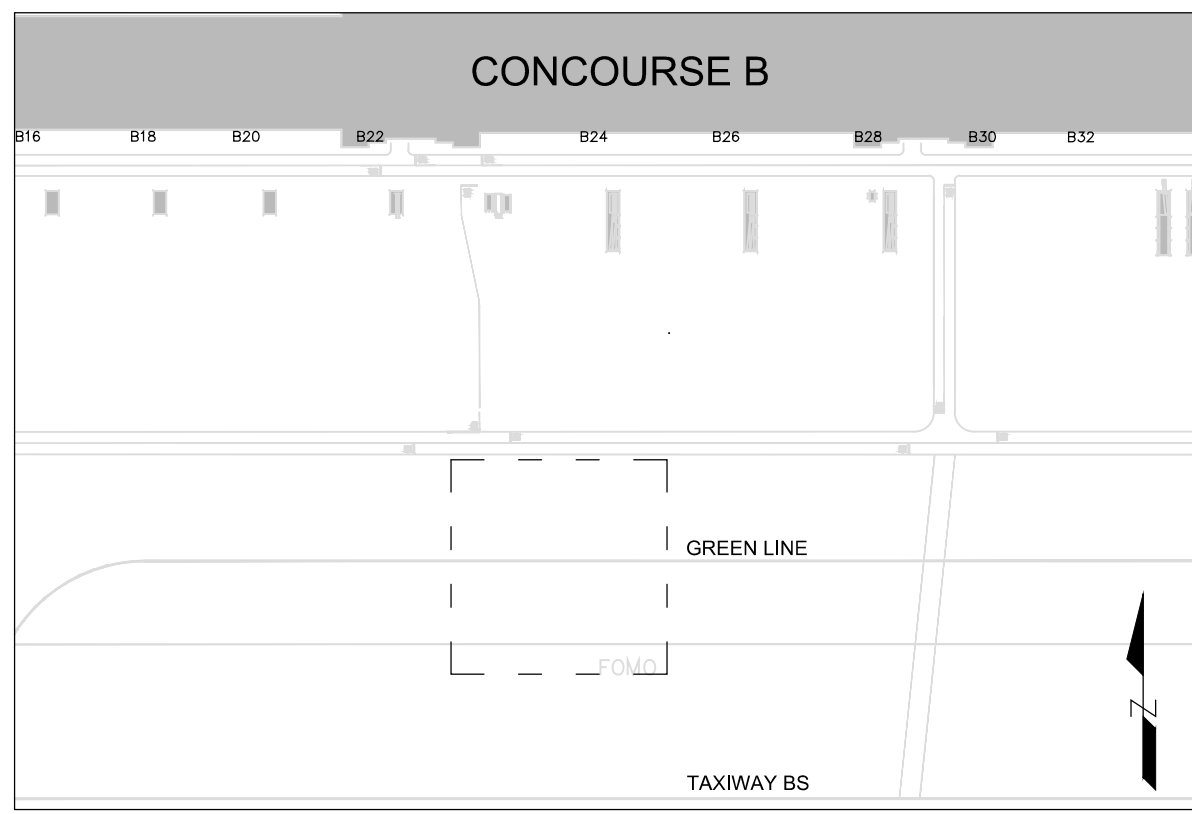
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**MILESTONE 1
BARRICADES**

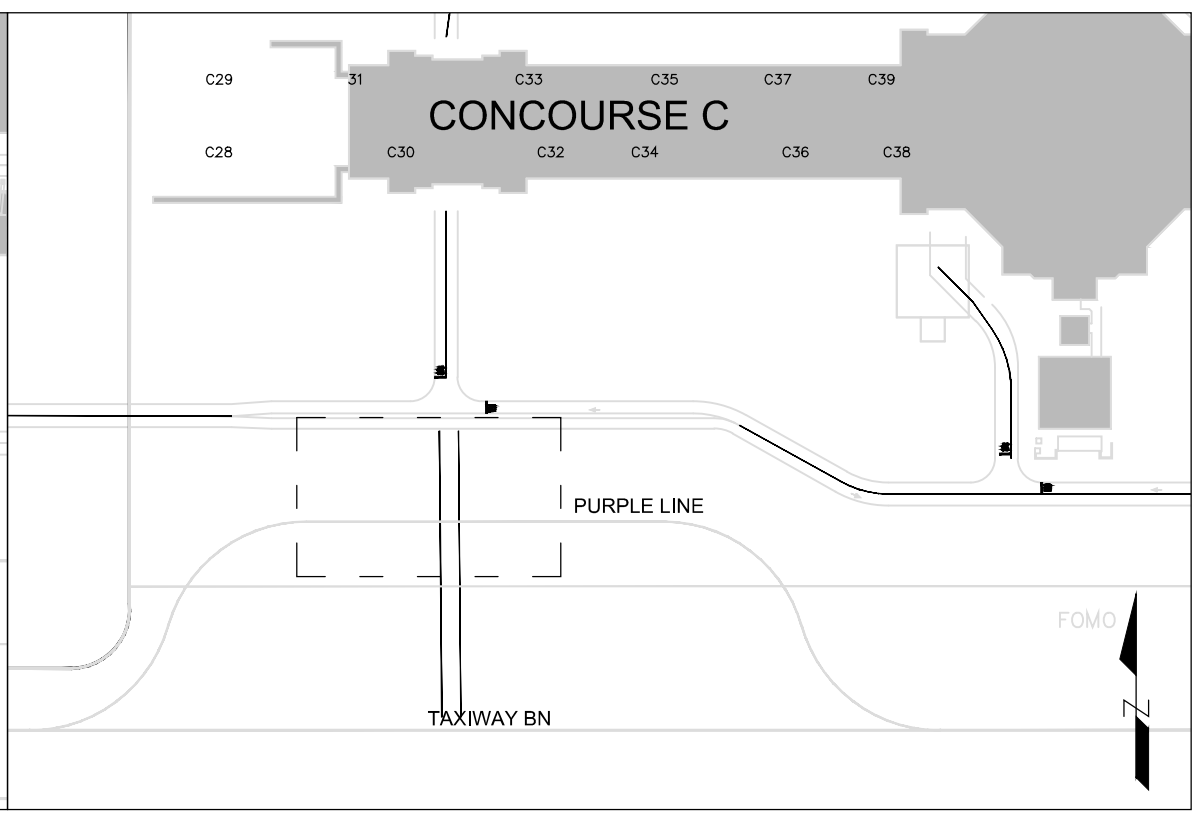
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S1.0 - SAFETY BARRICADES

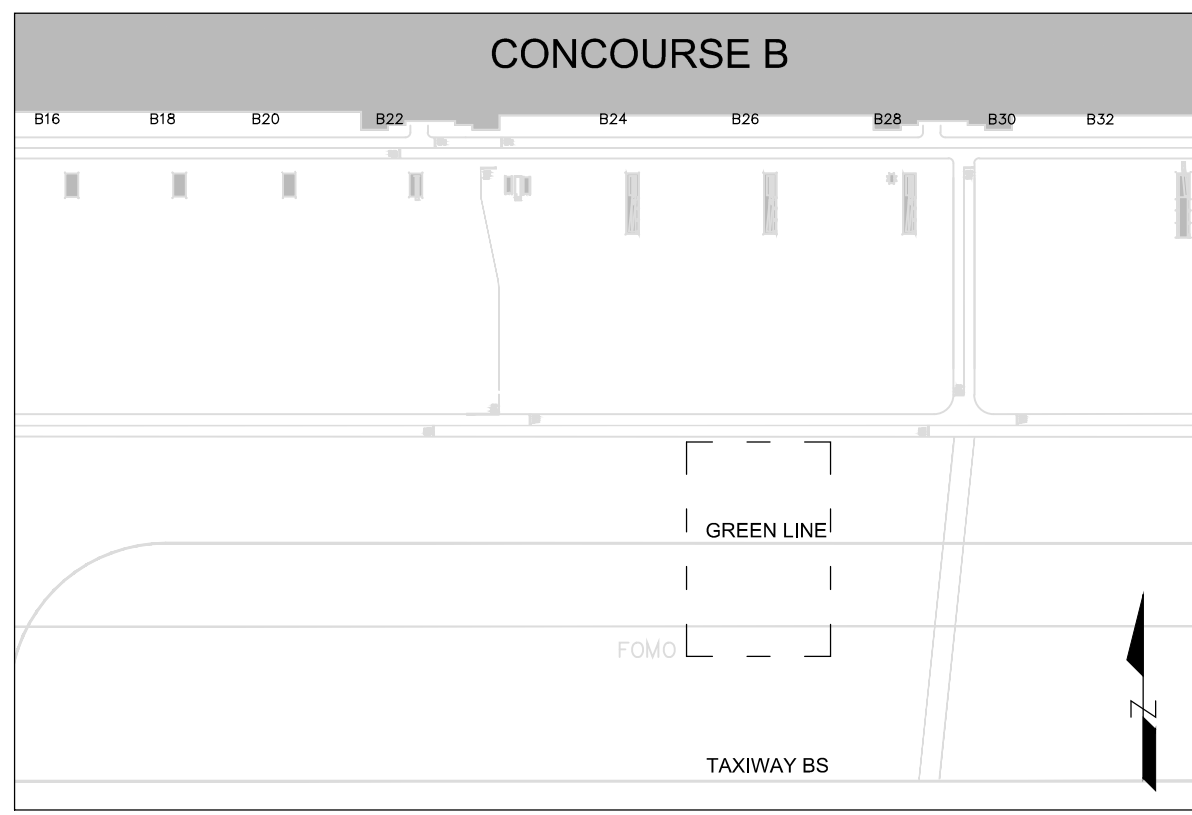
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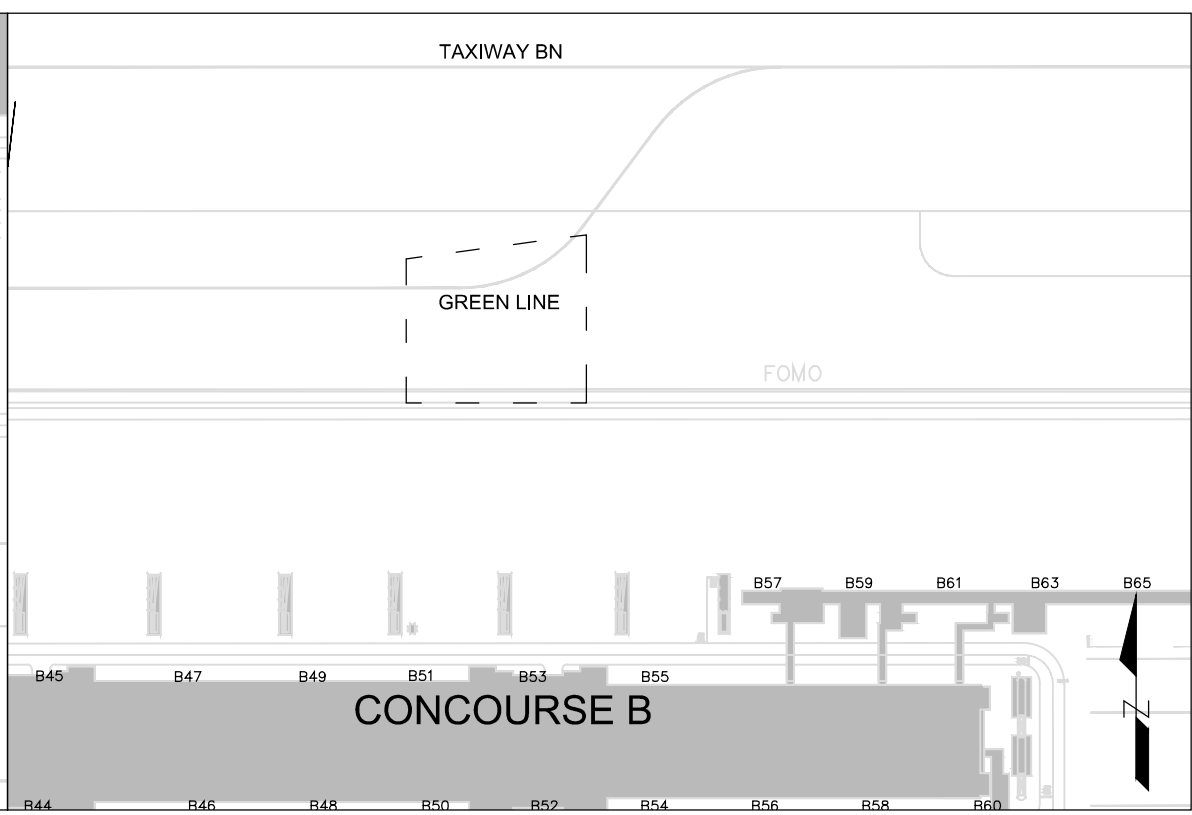
PHASE 6 BARRICADE PLACEMENT



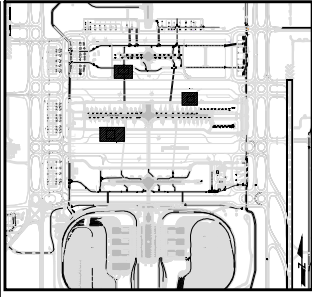
PHASE 7 BARRICADE PLACEMENT



PHASE 8 BARRICADE PLACEMENT



PHASE 9 BARRICADE PLACEMENT



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**2012 ANNUAL
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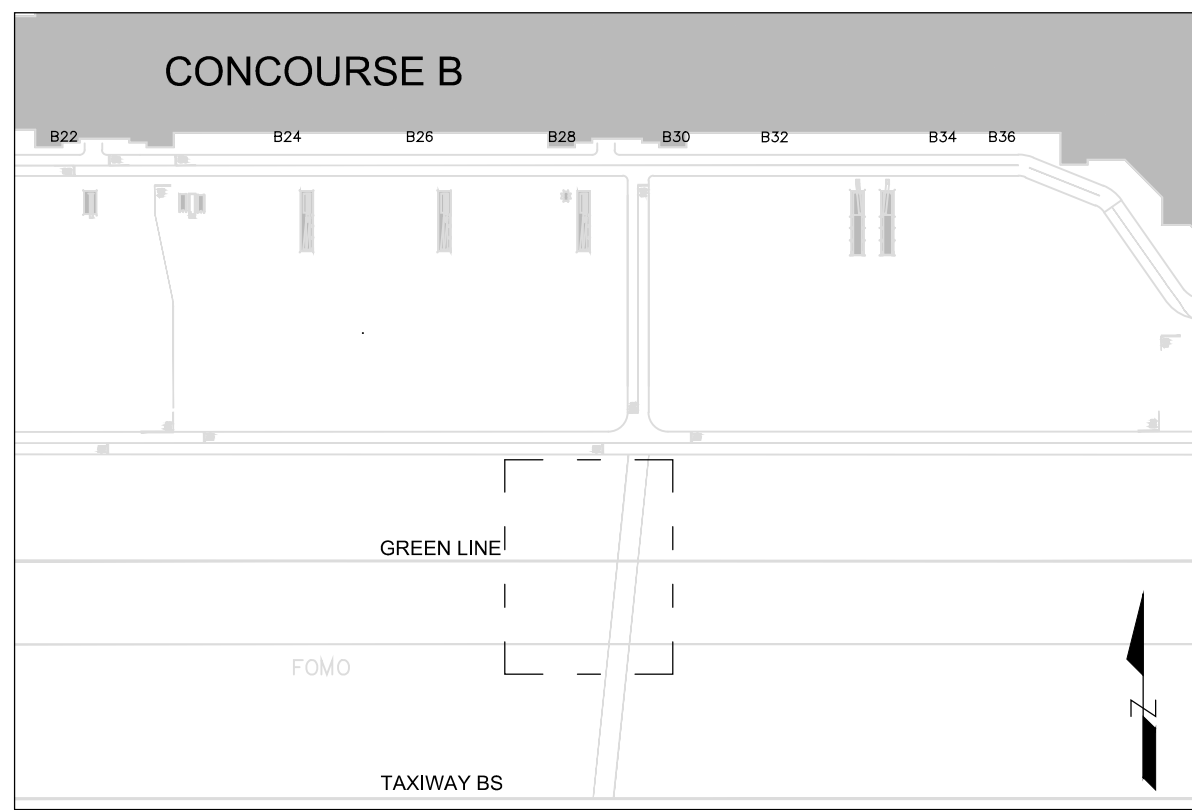
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BARRICADES**

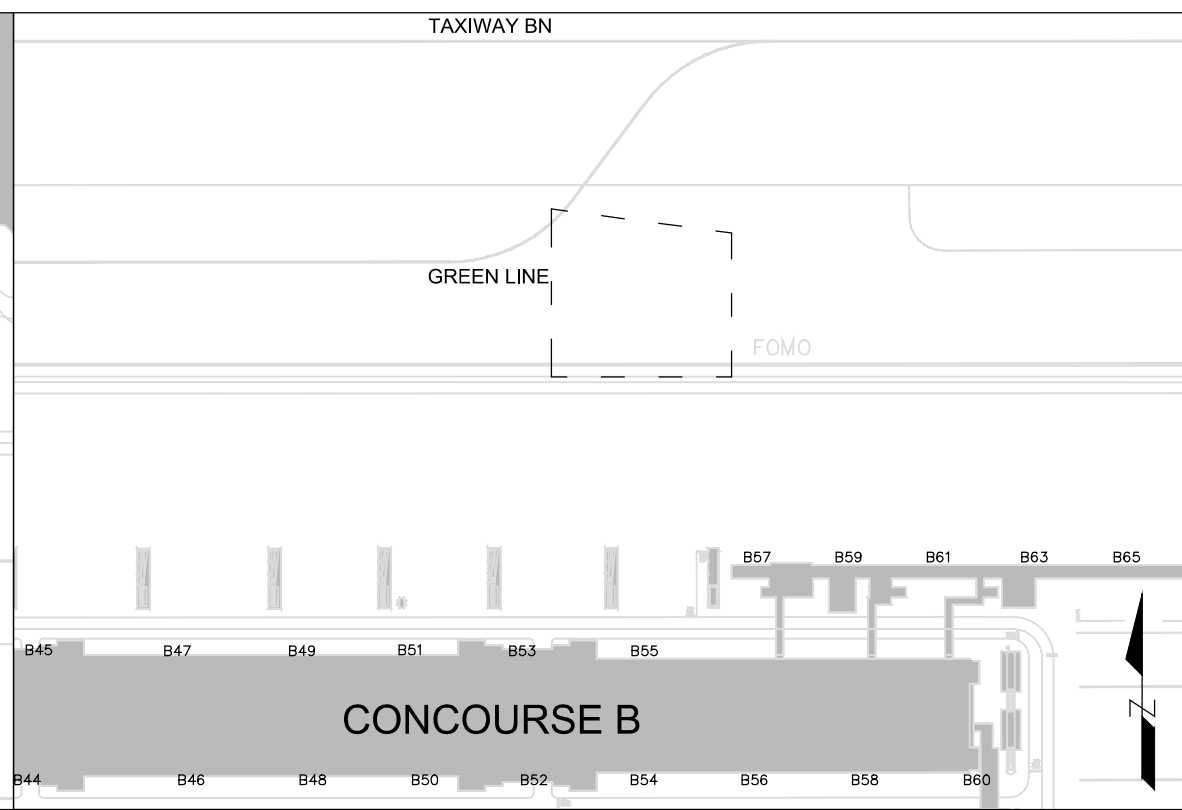
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S2.0 - SAFETY BARRICADES

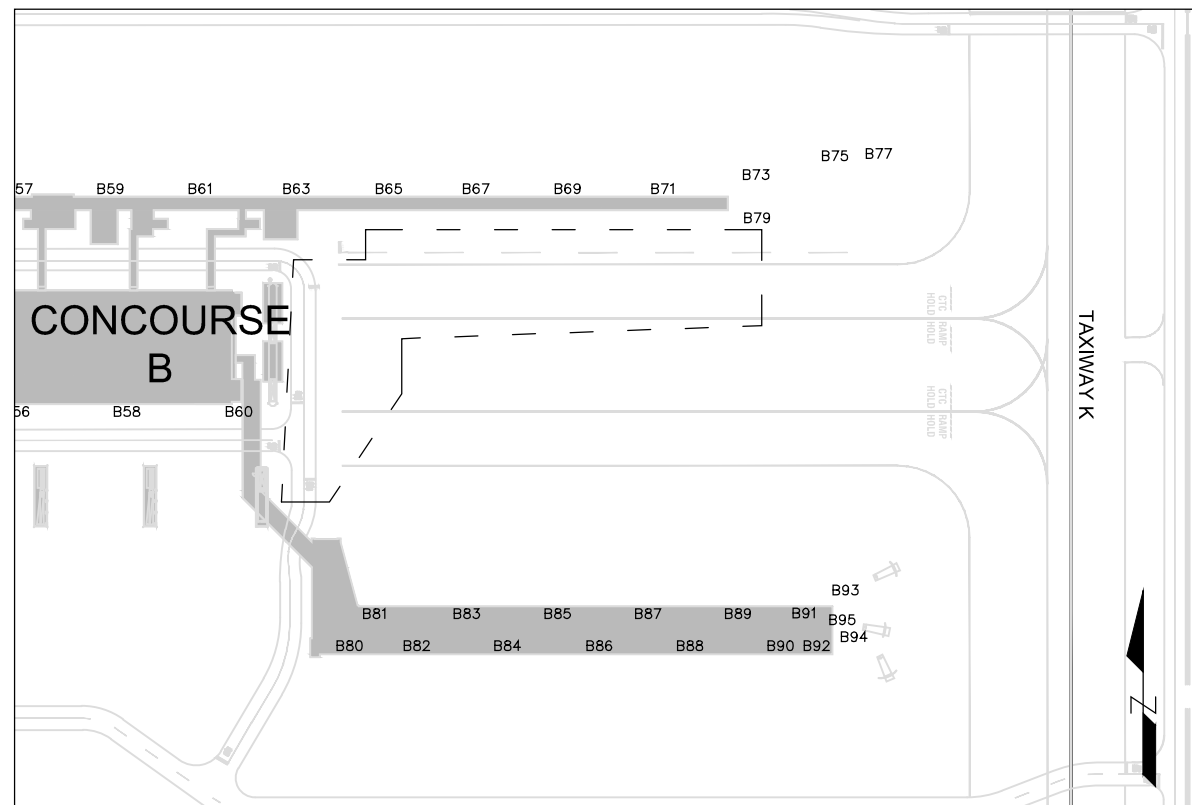
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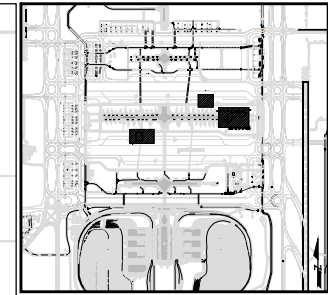
PHASE 10 BARRICADE PLACEMENT



PHASE 11 BARRICADE PLACEMENT



PHASE 12 BARRICADE PLACEMENT



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DESIGNER OF RECORD
DENVER INTERNATIONAL AIRPORT
MAINT. & ENG.
8500 Pena Blvd.
Denver, CO 80249-6340

**2012 ANNUAL
AIRFIELD PAVEMENT
REHABILITATION**

NO.	BY	PURPOSE	DATE	CHKD
1	TNR	IFB	02/20/12	RBN

SCALE 1" = 200'

DATE 02/20/2012

DRAWN BY: TNR

CHECKED BY: RBN

FAA AIP NO:

WORK BREAKDOWN NO:

DESIGN CONTRACT NO:

CONST. CONTRACT NO. 201204726

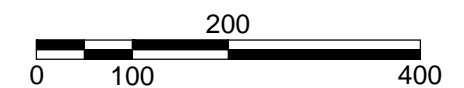
VOLUME NO. 1

SHEET TITLE
**MILESTONE 2
BARRICADES**

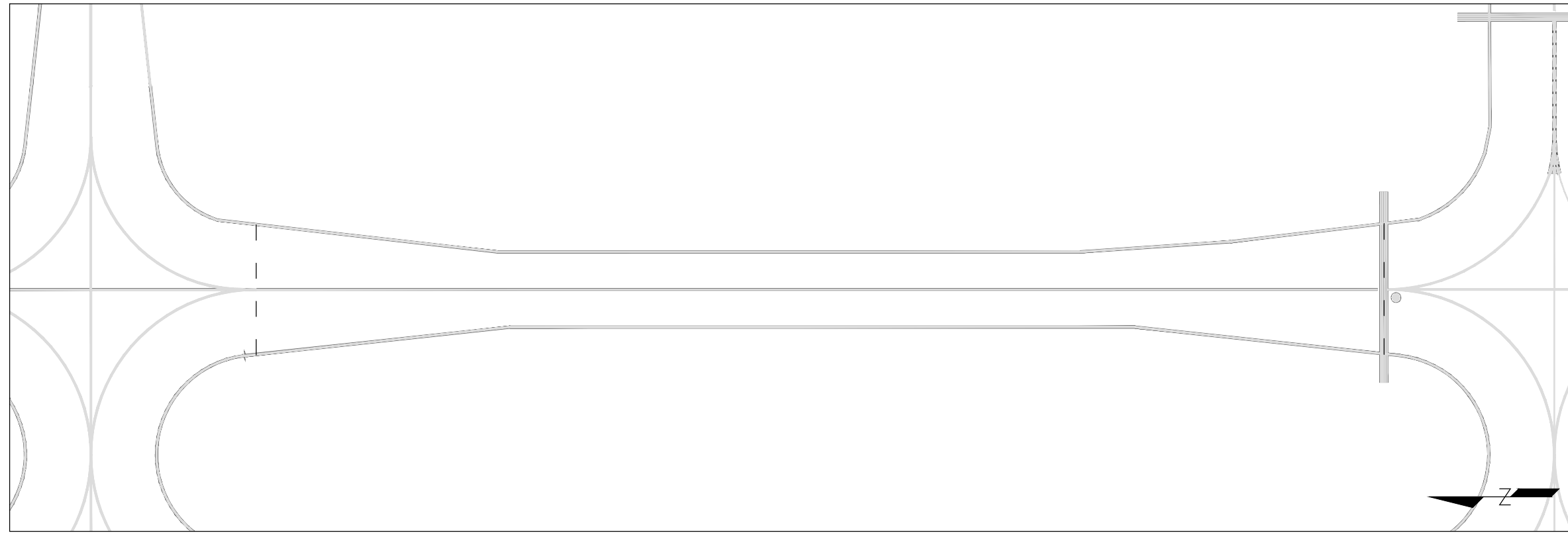
SHEET NO. S2.10

CADD FILE NO.

S2.1 - SAFETY BARRICADES

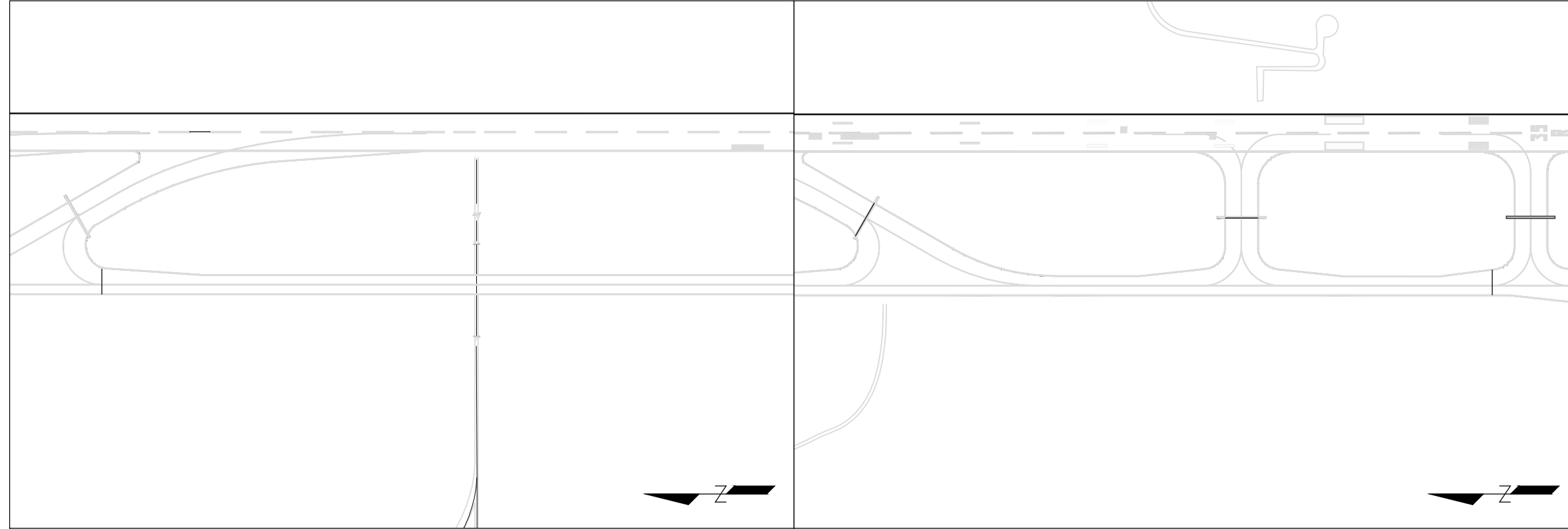


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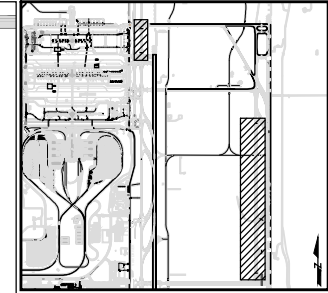
PHASE 6 BARRICADE PLACEMENT

PHASE 7 BARRICADE PLACEMENT



PHASE 4 BARRICADE PLACEMENT SOUTH

PHASE 4 BARRICADE PLACEMENT SOUTH



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MAINT. & ENG.
8500 Peers Blvd.
Denver, CO 80249-6340

**2012 ANNUAL
AIRFIELD PAVEMENT
REHABILITATION**

ISSUE RECORD

NO. BY PURPOSE DATE CKD

1 TNR IFB 02/20/12 RBN

SCALE NTS

DATE 02/20/2012

DRAWN BY: TNR

CHECKED BY: RBN

FAA AIP NO:

WORK BREAKDOWN NO.

DESIGN CONTRACT NO.

CONST. CONTRACT NO.
201204726

VOLUME NO. 1

SHEET TITLE
**MILESTONE 3
BARRICADES**

SHEET NO.
S3.00

CADD FILE NO.
S3.0 - SAFETY BARRICADES

1
2
3 **SECTION GP-110**
4 **METHOD OF ESTIMATING PERCENTAGE OF MATERIAL WITHIN SPECIFICATION**
5 **LIMITS (PWL)**

6 **PART 1 GENERAL**

7
8 1.01 When the specifications provide for acceptance of material based on the method of estimating
9 percentage of material within specification limits (PWL), the PWL will be determined in accordance
10 with this section. All test results for a lot will be analyzed statistically to determine the total
11 estimated percent of the lot that is within specification limits. The PWL is computed using the
12 sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for
13 the lot and the specification tolerance limits, L for lower and U for upper, for the particular
14 acceptance parameter. From these values, the respective Quality index(s), Q_L for Lower Quality
15 Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is
16 determined from Table 1.

17
18 There is some degree of uncertainty (risk) in the measurement for acceptance because only a
19 small fraction of production material (the population) is sampled and tested. This uncertainty exists
20 because all portions of the production material have the same probability to be randomly sampled.
21 The Contractor's risk is the probability that material produced at the acceptable quality level is
22 rejected or subjected to a pay adjustment. The Owner's risk is the probability that material
23 produced at the rejectable quality level is accepted.
24

25 IT IS THE INTENT OF THIS SECTION TO INFORM THE CONTRACTOR THAT, IN ORDER TO
26 CONSISTENTLY OFFSET THE CONTRACTOR'S RISK FOR MATERIAL EVALUATED,
27 PRODUCTION QUALITY (USING POPULATION AVERAGE AND POPULATION STANDARD
28 DEVIATION) MUST BE MAINTAINED AT THE ACCEPTABLE QUALITY SPECIFIED OR
29 HIGHER. IN ALL CASES, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PRODUCE
30 AT QUALITY LEVELS THAT WILL MEET THE SPECIFIED ACCEPTANCE CRITERIA WHEN
31 SAMPLED AND TESTED AT THE FREQUENCIES SPECIFIED.
32
33

34 **PART 2 METHOD FOR COMPUTING PWL**

35
36 2.01 The computational sequence for computing PWL is as follows:

- 37
38 a. Divide the lot into n sublots in accordance with the acceptance requirements of the
39 specification.
40 b. Locate the random sampling position within the subplot in accordance with the requirements of
41 the specification.
42 c. Make a measurement at each location, or take a test portion and make the measurement on
43 the test portion in accordance with the testing requirements of the specification.
44 d. Find the sample average (X) for all subplot values within the lot by using the following formula:

45
46 $X = (x_1 + x_2 + x_3 + \dots + x_n) / n$

47
48 Where: X = Sample average of all subplot values within a lot
49 x_1, x_2 = Individual subplot values
50 n = Number of sublots

- 51
52 e. Find the sample standard deviation (S_n) by use of the following formula:

53
54 $S_n = [(d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2)/(n-1)]^{1/2}$

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Where: S_n = Sample standard deviation of the number of subplot values in the set

d_1, d_2, \dots = Deviations of the individual subplot values x_1, x_2, \dots from the average value X

that is: $d_1 = (x_1 - X), d_2 = (x_2 - X) \dots d_n = (x_n - X)$

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:

$$Q_L = (X - L) / S_n \text{ and } Q_U = (U - X) / S_n$$

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

2.02 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

109 A-3 99.30
110 A-4 98.35
111 n = 4
112

113
114 2. Calculate average density for the lot.

115
116
$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

117
$$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$$

118
$$X = 97.95 \text{ percent density}$$

119
120 3. Calculate the standard deviation for the lot.

121
122
$$S_n = \left[\frac{((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)}{(4 - 1)} \right]^{1/2}$$

123
124
$$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$$

125
$$S_n = 1.15$$

126
127 4. Calculate the Lower Quality Index Q_L for the lot. ($L=96.3$)

128
129
$$Q_L = (X - L) / S_n$$

130
$$Q_L = (97.95 - 96.30) / 1.15$$

131
$$Q_L = 1.4348$$

132
133 5. Determine PWL by entering Table 1 with $Q_L = 1.44$ and $n = 4$.

134
135
$$PWL = 98$$

136
137 B. PWL Determination for Air Voids

138
139 1. Air Voids of four random samples taken from Lot A.

140
141

A-1	5.00
A-2	3.74
A-3	2.30
A-4	3.25

145

146 2. Calculate the average air voids for the lot.

147
148
$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

149
150
$$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$$

151
152
$$X = 3.57 \text{ percent}$$

153
154 3. Calculate the standard deviation S_n for the lot.

155
156
$$S_n = \left[\frac{((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2)}{(4 - 1)} \right]^{1/2}$$

157
158
159
$$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$$

160
161
$$S_n = 1.12$$

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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 $Q_L = 1.40$ and $n = 4$.

$$P_L = 97$$

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 $Q_U = 1.27$ and $n = 4$.

$$P_U = 93$$

8. Calculate Air Voids PWL

$$PWL = (P_L + P_U) - 100$$

$$PWL = (97 + 93) - 100 = 90$$

2.03 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 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: $(\text{measurement} - \text{average}) / (\text{standard deviation})$ is less than test criterion,

216 Then: the measurement is not considered an outlier
 217 for A-3 Check if $(99.30 - 97.95) / 1.15$ greater than
 218 1.463
 219 1.174 is less than 1.463, the value is not an outlier

220
 221 b. For measurements less than the average:
 222 If $(\text{average} - \text{measurement}) / (\text{standard deviation})$ is less than test
 223 criterion, the measurement is not considered an outlier

224
 225 for A-1 Check if $(97.95 - 96.60) / 1.15$ greater than 1.463
 226 1.0 is less than 1.463, the value is not an outlier

227
 228 NOTE: In this example, a measurement would be considered an outlier if the
 229 density was:
 230 greater than $(97.95 + 1.463 \times 1.15) = 99.63$ percent or,
 231 less than $(97.95 - 1.463 \times 1.15) = 96.27$ percent

232
 233
 234 TABLE 1. TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)
 235

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

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
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
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

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
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

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END OF SECTION GP-110

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SECTION GP-120
NUCLEAR GAUGES

PART 1 GENERAL

1.02 TESTING When the specifications provide for nuclear gauge testing of material, the testing shall be performed in accordance with this test section. At each test location, the in-place density and moisture content shall be determined in accordance with ASTM D 6938 using Procedure A, the Direct Transmission Method. The depth of the probe shall represent the full thickness of the layer (lift) requiring testing. The operator of the nuclear gauge must show evidence of safety training and experience in the use of the instrument. The test report shall include as a minimum the information required in ASTM D 6938, paragraph 12.

The nuclear gauge shall be calibrated in accordance with Annex A1 and Annex A2. The gauge shall also be standardized daily in accordance with ASTM D 6938, paragraph 9.

END OF SECTION GP-120

1
2 **ITEM P-150**

3
4 **DEMOLITION**

5
6 **PART 1 GENERAL**

7
8 1.01 DESCRIPTION This item shall consist of removal of existing concrete slabs on grade,
9 foundations, sheds and building foundations, fences, water wells, asphalt pavement,
10 corrugated metal and reinforced concrete pipe and existing headwalls and wingwalls,
11 guardrail, drainage items, and any non-newly constructed above ground features remaining
12 within the Project Limits. The Contractor shall dispose of the material at a licensed disposal
13 site or as directed by the Engineer. Material salvaged shall become the property of the
14 Contractor.

15
16 The Contractor shall notify oil and gas facility owners and the Engineer in writing 30 days in
17 advance of requiring work areas currently occupied by oil and gas wells and buried
18 pipelines.

19
20 1.02 BURIED PIPELINES. Contractor is responsible to contact the owner as to the status of the
21 pipeline. If pipelines have been abandoned in-place by the pipeline owners. The pipelines
22 may not have been purged or cleaned and may contain petroleum products. The contractor
23 shall exercise extreme care in removing these facilities and is responsible for removing the
24 pipe including any remaining contents, irrespective of the current pipe conditions. The
25 Contractor should also expect to find other pipelines, etc. which have been abandoned by
26 unknown owners during the 15 to 20 year life of the oil and gas fields. Contract documents
27 indicate the general location of known pipelines and developed utilities. All pipelines shown
28 on the drawings shall be located by Contractor by potholing to verify location, depth, and
29 usage. The Contractor shall remove all utility pipes and lines included in the earthwork
30 contract area in accordance with these specifications. All buried pipelines, utilities, buried
31 tanks, and any other structures within the construction area of all runways, taxiways and
32 aprons extending to 10 feet outside the limits of construction and not less than 15 feet below
33 the finished grade level shall be removed.

34
35 Piping a minimum of 15' below finished grade elevations or plan excavation may be left in
36 place or removed and salvaged at the discretion of the Contractor. The ends of any
37 pipelines left in place shall have the ends capped prior to burial, according to applicable
38 Federal Department of Transportation Regulations. Any piping which is left in place, shall be
39 surveyed and the coordinates of the ends of the abandoned pipe (or other items left in
40 place) shall be provided to the Resident Engineer and included on the "as-built" drawings.

41
42 1.03 ELECTRICAL. The Contractor shall remove all abandoned cable, ductwork, and remove
43 base cans including concrete encasement and all light fixtures within the construction limits
44 of taxiway pavements to be removed, as shown on the Drawings. Protect airfield lighting
45 fixtures, base plates from damage and deliver them to the Airport for storage as directed by
46 the Engineer. Discard all base cans, conduit, Transformers and cable off-site.

47
48 1.04 FOUNDATIONS AND SLABS ON GRADE. All structures at or above grade and to a depth

49 of not less than 15 feet below the final finished grade line and within 10 feet horizontally of
50 the construction limits shall be removed.

51
52 1.05 WATER WELLS. There is a possibility that water wells are located in work areas. The
53 wells are permitted by the State of Colorado and shall be abandoned in accordance with
54 current Revised and Amended Rules and Regulations of the Board of Examiners of Water
55 Well Construction and Pump Installation Contractors.

56
57 1.06 REMOVAL OF PAVEMENT MARKINGS. All paint shown on the Plans shall be removed
58 from the surface of the existing pavement. Chemicals, high-pressure water, heat scarifier
59 (asphaltic concrete only), or sandblasting may be used. Any methods used shall not cause
60 major damage to the pavement. Major damage is defined as changing the properties of the
61 pavement or removing the pavement over 1/8 inch deep. No material shall be deposited on
62 the shoulder pavement. All wastes shall be disposed of offsite.

63
64 1.07 EXISTING ROADWAYS. Roadway demolition shall consist of all portions of asphalt and
65 concrete roadway within the project limits, including all existing haul roads and any alternate
66 access road.

67
68 1.08 REMOVAL OF GUARDRAIL. Guardrail removal shall consist of the removal and disposal
69 of the existing guardrail, cable road guard and guardrail posts.

70
71 1.09 REMOVAL OF ASPHALT PAVEMENT. The sawing and removal of asphalt pavement shall
72 meet the requirements of Colorado Department of Transportation "Standard Specification
73 for Road and Bridge Construction" and all application sections found elsewhere in the plans
74 and technical specifications.

75
76 1.10 EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR

77
78 All operations shall be carefully controlled to prevent damage to the concrete pavement
79 and to the underlying material to remain in place. All saw cuts shall be made
80 perpendicular to the slab surface.

81
82 A. Removal of Existing Pavement Slab When it is necessary to remove existing
83 concrete pavement and leave adjacent concrete in place the joint between the
84 removal area and adjoining pavement to stay in place shall first be cut full depth with
85 a standard diamond-type concrete saw. Next, a full depth saw cut shall be made
86 parallel to the joint at least 24 inches from the joint and at least 12 inches from the
87 end of any dowels. All pavement between this last saw cut and the joint line shall be
88 carefully broken up and removed using hand-held jackhammers, 30 lb. (14 kg) or
89 less, or the approved light-duty equipment which will not cause stress to propagate
90 across the joint saw cut and cause distress in the pavement which is to remain in
91 place. The joint face shall be sawed or otherwise trimmed so that there is no abrupt
92 offset in any direction greater than 1/2-inch and no gradual offset greater than 1 inch
93 when tested in a horizontal direction with a 12 ft. straightedge.

94
95
96 An alternative removal method may be accepted by the Project Manager if the

97 Contractor can demonstrate to the Project Manager successful removal without
98 damage to adjacent concrete. If during subsequent removals it is found the
99 method is causing damage to the adjacent panels, the Contractor's method shall
100 be rejected by the Project Manager and the Project Manager shall direct the
101 Contractor to begin using Method A above.

102
103 B. Edge Repair The edge of existing concrete pavement against which new
104 pavement abuts shall be protected from damage at all times. Areas which are
105 damaged during construction shall be repaired at not cost to the Owner; repair of
106 previously existing damage areas will be paid for as listed in the bid schedule.

107
108 (1) Spall Repair Spalls shall be repaired where indicated and where
109 directed. Repair materials and procedures shall be as required in
110 specification P-501.

111
112 (2) Underbreak Repair . Any under breaking of slabs that are to remain in-
113 place shall result in the entire slab removal and replacement at the
114 Contractor's expense to the next joint.

115
116 (3) Underlying Material The underlying material adjacent to the edge of an
117 under the existing pavement which is to remain in place shall be
118 protected from damage or disturbance during removal operations and
119 until placement of new concrete, and shall be shaped as shown on the
120 drawings or as directed. Sufficient material shall be kept in place outside
121 the joint line to prevent disturbance (or sloughing) of material under the
122 pavement which is to remain in place. Any material under the portion of
123 the concrete pavement to remain in place which is disturbed or loses its
124 compaction shall be carefully removed and replaced with concrete as
125 specified in paragraph "Underbreak Repair." The underlying material
126 outside the joint line shall be thoroughly compacted and moist when new
127 concrete is placed.

128
129

130 PART 2 MATERIALS

131

132 2.01 BURIED PIPELINE. Materials used to cap off pipelines remaining in the ground shall be of
133 the size and type normally used for this operation. Materials used for backfilling trenches
134 shall conform to the same specifications as described in Item P-152, Excavation and
135 Embankment.

136

137 2.02 EQUIPMENT. Excavation and Hauling Equipment: Provide equipment as necessary to
138 remove underground pipelines and other demolished items.

139

140 Backfilling and Compaction Equipment: Provide equipment as necessary to restore
141 trenches and other areas back to final grade and to compact backfill as specified.

142

143 2.03 BACKFILL MATERIALS. Materials used for backfilling the first 12 inches of the trench shall
144 consist of naturally occurring material that can be rendered by normal construction activity to

145 contain no individual particles greater than one (1) inch in maximum diameter. The material
146 shall also meet all criteria for select material in Section P-152.

147
148

149 **PART 3 CONSTRUCTION METHODS**

150

151 3.01 General. Blasting will not be allowed on this project.

152

153 3.02 SLABS AND FOUNDATIONS. All existing foundation structures encountered within the
154 established grading sections shall be removed. Structures consist of concrete slabs on
155 grade, farmhouse and outbuilding foundations, and other foundations for existing or
156 abandoned structures.

157

158 3.03 BURIED PIPELINE AND STORM SEWERS.

159

160 A. Trenching. The removal of cover on top of and surrounding the abandoned
161 pipelines shall be performed without damaging the pipeline. All trench sidewalls
162 shall be properly sloped or benched and/or braced, shored or sheeted to afford safe
163 working conditions, to protect adjacent pipelines, and to prevent caving.

164

165 B. Testing. The Contractor shall test the exposed trench excavation and the pipeline
166 for dangerous or explosive gases and to positively determine that the line has been
167 emptied, cleaned and/or purged prior to performing any further operations.

168

169 C. Cutting of Pipeline and Storm Sewers. Extreme care shall be exercised whenever
170 the pipeline or storm sewer to be removed is cut into, especially the first cut on the
171 abandoned pipeline. The Contractor shall use a method to cut the pipeline into
172 sections for removal which provides safety for workers and equipment. The initial
173 cut shall not be made with an cutting torch.

174

175 D. 1. BACKFILLING

176

177 a. If required, select embankment (1" maximum size), per Technical
178 Specification P-152 Excavation and Embankment, or P-162 Controlled
179 Low-Strength Material, to 12 inches over the top of the pipe shall be
180 completed before backfilling operations are started.

181

182 b. The Contractor shall take all necessary precautions to protect the pipe from
183 any damage, movement or shifting. In general, backfilling shall be
184 performed by pushing the material from the end of the trench into, along
185 and directly over the pipe so that the material will be applied in the form of a
186 rolling slope rather than by side filling which may damage the pipe.
187 Backfilling from the sides of the trench will be permitted after sufficient
188 material has first been carefully placed over the pipe to such a depth as to
189 protect the pipe.

190

191 c. Compaction equipment used above the pipe zone shall be of a type that
192 does not damage the pipe.

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- d. Provide for the proper maintenance of traffic flow and accessibility as may be necessary.
 - e. Make adequate provisions for the safety of property and persons.
 - f. Temporary cribbing, sheeting, or other timbering shall be removed unless specifically authorized in writing.
 - g. Dewatering shall be continued until the trench is completely backfilled.
 - h. Brush, stumps, logs, planking, disconnected drains, boulders, etc., shall be removed from the material to be used for backfilling the trench.
2. GENERAL COMPACTION REQUIREMENTS
- a. Requirements of this section shall apply unless more stringent requirements are established by the local agency involved.
 - b. When working in an existing traveled roadway, restoration and compaction must be achieved as the trench is backfilled so as to maintain traffic.
 - c. Trench backfill shall be mechanically compacted to not less than 95.0% of the maximum dry density as determined by ASTM D 698.
3. MECHANICAL COMPACTION
- a. Method of compaction shall be at Contractor's option.
 - b. The Contractor shall be responsible to provide the proper size and type of compaction equipment and select the proper method of utilizing said equipment to attain the required compaction density.
 - c. In place compaction tests shall be made. Contractor shall remove and recompact material that does not meet specified requirements.
- E. Removal of Water and Residual Petroleum Products from Pipelines. Any pipeline containing water or residual petroleum products after abandonment by the pipeline owner, shall have the water or the residual products removed from the pipeline, by the Contractor, using a nitrogen purge, steam, or other approved means. The material removed from the pipeline shall be hauled away and disposed of properly. The Contractor shall assume that all pipelines to be removed contain significant amounts of residual products that must be disposed of offsite.

- 238 3.04 BURIED UTILITY LINES. The Contractor shall remove all abandoned electrical and
239 telephone lines whether shown on the contract drawings or not. All known lines are shown,
240 but there may be other unknown abandoned lines in the area. It shall be the Contractor's
241 responsibility to check the status of all abandoned lines. Care shall be taken to assure that
242 all abandoned electric lines are not live and can not be activated accidentally.
243
- 244 3.05 Section Deleted.
245
- 246 3.06 GROUND SURFACE REPAIR. The Contractor shall rough grade and compact areas
247 affected by demolition to maintain site grades and contours. All holes remaining after
248 demolition operations shall have sides broken down to flatten out the slopes, and shall be
249 filled with acceptable material, moistened and properly compacted in layers to the density
250 required in Item P-152, Excavation and Embankment. The ground surface area repaired
251 shall properly drain and that water will not pond.
252
- 253 3.07 WATER WELLS. The Contractor shall employ a licensed water well contractor to demolish
254 and abandon existing water wells and provide necessary documentation to the State of
255 Colorado Agencies and Boards as required.
256
- 257 3.08 WASTE DISPOSAL. Refer to Division 1 Technical Specification Section 01566 -
258 Environmental Controls.
259
- 260 3.09 INSPECTION POINTS. Upon completion of demolition work and prior to backfilling
261 operations, the Project Manager shall inspect the Contractor's work. After backfilling and
262 grading operations, the Contractor's Quality Control Inspector shall perform inspection and
263 final acceptance, per Division 1 Technical Specification Section 01403 – Contractor Quality
264 Control Program.
265

266 **PART 4 METHOD OF MEASUREMENT**
267

- 268 4.01 Refer to Appendix A for Method of Measurement.
269

270 **PART 5 BASIS OF PAYMENT**
271

- 272 5.01 Refer to Appendix A for Basis of Payment.
273

274
275 **END OF ITEM P-150**

1
2 **ITEM P-151**

3
4 **CLEARING AND GRUBBING**

5
6 **PART 1 GENERAL**

7
8 1.01 DESCRIPTION This item shall consist of clearing and grubbing, including the disposal of materials,
9 for all existing excavation or embankment areas designated on the Contract Drawings. The
10 designated areas shall be cleared and grubbed of six (6) inches of topsoil and vegetation prior to
11 beginning any excavation or embankment operations. In addition, the Contractor shall clear, grub
12 and strip an area 10 feet beyond the top of cut slopes and the toe of fill slopes.

13
14 Site clearing and grubbing work includes protection of adjacent areas, removal of unsuitable
15 material, and disposal of all waste materials.

16
17 Topsoil management shall be performed consistent with the requirements of Section T-905,
18 Topsoiling, 3.04 of the contract technical specifications.

19
20
21 **PART 2 CONSTRUCTION METHODS**

22
23 2.01 FIELD ENGINEERING The areas denoted on the plans to be cleared and grubbed shall be staked
24 by the Contractor. The Contractor shall employ a Land Surveyor registered in the State of Colorado
25 for the surveying work required.

26
27 2.02 CLEARING AND GRUBBING Clearing shall consist of the removal and disposal of all abandoned
28 vehicles, drums, trees, brush, trash, rubbish, debris and all other surface materials not suitable for
29 inclusion in the embankment.

30
31 Grubbing shall consist of the removal of all stumps, roots, brush, buried logs and other unsatisfactory
32 material within the limits specified above. Tap roots and other projections over 1/2 inches in
33 diameter shall be grubbed out to a depth of at least 12 inches below the existing grade. The clearing
34 and grubbing shall be done at a satisfactory distance in advance of the grading operations.

35
36 All holes remaining, after the grubbing operation in embankment areas, shall have the sides broken
37 down to flatten out the slopes, and shall be filled with acceptable material, moistened and properly
38 compacted, in layers, to the density required in Item P-152, Excavation and Embankment.

39
40 2.04 VEGETATION REMOVAL Significant portions of the existing embankment and excavation areas
41 have substantial vegetation growth including weeds on the surface and slopes. All vegetation shall
42 be removed and disposed of as a result of the clearing and grubbing operation and as specified
43 under Section P-152 Excavation and Embankment.

44
45 2.05 WASTE DISPOSAL All hazardous waste materials shall be disposed of off site in accordance with
46 Division 1 Technical Specification Section 01566, Environmental Controls, paragraph 3.a. The
47 Contractor shall furnish the Project Manager a written statement from the disposal site facility which
48 confirms that the waste material is allowed at the disposal site in accordance with all pertinent
49 Federal, State, and local rules, regulations, and ordinances. All other waste material shall be
50 disposed of as specified under Section P-152 Excavation and Embankment.

51
52 2.06 ABANDONED TRAILER AND HOUSING SITE FACILITY The Contractor may encounter old septic

53 system piping, buried utility lines, and other surface or buried objects abandoned from abandoned
54 dwellings and subdivisions in the site.

55
56 2.07 INSPECTION POINTS During construction and upon completion of the clearing and grubbing
57 operations, the Project Manager shall inspect all the Contractor's work before other grading
58 operations begin.

59
60 2.08 PERMITS Permit requirements are addressed in Part I, General Conditions and Special Conditions.

61
62

63 **PART 3 METHOD OF MEASUREMENT**

64

65 3.01 Refer to Appendix A for Method of Measurement.

66

67

68 **PART 4 BASIS OF PAYMENT**

69

70 4.01 Refer to Appendix A for Basis of Payment.

71

72

73

END OF ITEM P-151

ITEM P-152

EXCAVATION AND EMBANKMENT

PART 1 GENERAL

1.01 DESCRIPTION This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to grade the runway safety areas, runways, taxiways, aprons, drainage channels, detention ponds, as well as other areas for other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the Contract Drawings.

PART 2 MATERIALS

2.01 GENERAL Materials encountered on the project shall be identified by the Unified Classification System per ASTM D 2487.

- A. Rock - A sound and solid mass, layer, or ledge of mineral matter in place and of such hardness and texture that it cannot be effectively loosened or broken down by ripping in a single pass with a late model tractor-mounted hydraulic ripper equipped with a single shank of standard manufacturer's design adequately sized for use with and propelled by a track mounted dozer with a minimum rated 500 net flywheel horsepower, operating in low gear. Ripping is still more art than science and much will depend on the skill and experience of the tractor operator. Therefore, the Project Manager can direct cross-ripping, the number and type of shanks, tooth angle, direction and throttle position, as well as, determine operator's qualifications to help determine if a material is unripable.
- B. Common Material - All earth materials which are not classifiable as topsoil, rock embankment material, select embankment material or unsuitable material.
- C. Formation - Any sedimentary, igneous, or metamorphic material represented as a unit in geology, generally called rock but not necessarily meeting the classification requirements for rock in (A) above.
- D. Cobbles - Rounded pieces of rock which are not greater than 12 inches, but are larger than 3 inches in maximum dimension.
- E. Boulders - Detached pieces of rock, generally rounded but may be subrounded to angular, which are larger than 12 inches in maximum dimension.
- F. Rock Fragments - Pieces of rock which generally are not rounded.
- G. Select Material - Clays and/or sands, meeting the requirements of Article 2.03
- H. Soil Components - Soils in nature usually consist of a number of soil components. They are identified by the predominance of one of the components and other criteria given in the Unified Soil Classification System.
 - (1) Clay - Plastic soil which passes a United States Standard No. 200 sieve.
 - (2) Silt - Non-plastic soil which passes a United States Standard No. 200 sieve.

54
55 (3) Sand - Mineral grains which pass a United States Standard No. 4 sieve and are
56 retained on a United States Standard No. 200 sieve.

57
58 (4) Gravel - Pieces of rock which are not greater than 3 inches in maximum
59 dimension, and are retained on a United States Standard No. 4 sieve.

60
61 I. Sedimentary Bedrock Materials: Sedimentary bedrock materials may be composed of
62 sand, silt or clay and occur in definable formations or geologic units. The sedimentary
63 bedrock materials are lithified into formations by overburden pressure and cementing by
64 various types and in different degrees. Common sedimentary bedrock types in the
65 project area include sandstone, siltstone and claystone. These types of sedimentary
66 bedrock may also be interbedded.

67
68 J. Deleterious Materials: Deleterious materials are defined as materials which are subject to
69 chemical decomposition in the soil mass. If placed in fill material, deleterious substances
70 may decompose, leaving a void which could result in settlement. Materials such as wood,
71 plant matter, or other organic materials are considered deleterious.

72
73 K. Topsoil - Refer to Section T-905, 2.01 of these Technical Specifications.

74
75 2.02 ROCK EMBANKMENT MATERIAL: Shall be comprised of rock fragments which do not break
76 down under normal construction activity to less than 5 (five) inches in size. Normal construction
77 activity includes ripping, excavation, hauling, processing and placement in 8 (eight) inch thick
78 loose lifts, moisture conditioning in the borrow area and on the fill.

79
80 2.03 SELECT EMBANKMENT MATERIAL: There are 2 zones of Select Embankment Material: the
81 lower 4.5 feet, and the upper 1.5 feet. The upper 1 foot will be lime or cement treated.

82
83 The lower 4.5 feet of Select Embankment Material shall be free of unsuitable materials, including
84 claystone, contain 100% passing the 3-inch sieve, less than 90% passing the No. 200 sieve, have
85 a maximum Liquid Limit of 40, a maximum Plasticity Index of 30, and less than 3% swell potential.
86 The swell sample shall be remolded to 95% of the maximum dry density at optimum moisture as
87 determined by ASTM D 698 for initial acceptance of the proposed Select Embankment Material.
88 During placement of the Select Embankment Material, the swell sample shall be obtained from
89 the compacted in-place Select Embankment Material. The sample shall be tested for swell-
90 consolidation in accordance with Section 6.03.

91
92 A. Lime Treated Select Embankment: The upper 1.5 feet of Select Embankment Material,
93 of which the upper 1-foot will be lime treated, shall meet the requirements for the lower
94 4.5 feet of Select Embankment.

95
96 B. Cement Treated Select Embankment: The upper 1.5 feet of Select Embankment Material,
97 of which the upper 1-foot will be cement-treated shall be free of unsuitable materials, contain
98 100% passing the 1-inch sieve, no more than 45% retained on a No. 4 sieve, less than 50%
99 passing the No. 200 sieve, have a maximum Plasticity Index of 15, a maximum water
100 soluble sulfates content of 0.5% and less than 3% swell potential. The swell sample shall be
101 remolded to 95% of the maximum dry density at optimum moisture as determined by ASTM
102 D 698 for initial acceptance of the proposed Select Embankment Material. During
103 placement of the Select Embankment Material, the swell sample shall be obtained from the
104 compacted in-place Select Embankment Material. The sample shall be tested for swell-
105 consolidation in accordance with Section 6.03.

106

107 The select embankment should be properly moisture conditioned and compacted in accordance with
108 section 3.09.

109
110 Select embankment used in the upper 1.5 feet for cement treatment shall be obtained from the
111 borrow area indicated in the plans and shall meet the requirements of 2.03 B.

112
113 2.04 COMMON EMBANKMENT MATERIAL: Shall be comprised of common material which meets the
114 requirements of Section 2.01B except as allowed in Sections 3.06 and 3.07

115
116 2.05 WATER. Construction water shall be obtained from the City in accordance with Section P-153
117 Watering.

118
119 2.06 UNSUITABLE MATERIAL. Material which is not classified as topsoil, rock work, common
120 embankment, select embankment or containing vegetable material, construction debris or
121 deleterious material.

122
123 2.07 VEGETABLE MATERIAL. The removed vegetable material accumulated as a part of the clearing
124 and grubbing operation shall be hauled to a stockpile area designated by the Project Manager.

125
126

127 **PART 3 CONSTRUCTION METHOD**

128
129 3.01 GENERAL Before beginning excavation, grading, and embankment operations in any area, the area
130 shall be completely cleared and grubbed in accordance with Section P-151, Clearing and Grubbing,
131 and demolition shall be completed in accordance with Section P-150, Demolition. Areas shall be
132 cleared and grubbed of 6 inches of topsoil and vegetation prior to beginning any excavation or
133 embankment operations.

134
135 Any existing turf areas which become disturbed due to construction activities, outside the contract
136 limits shall be reclaimed at no additional cost to the City.

137
138 Several utilities cross the construction area as shown (from best information available) on the
139 Contract Drawings. The Contractor shall schedule and conduct its work to protect all utilities until
140 they are removed by the Contractor, utility owner or others. Demolition of utilities by the
141 Contractor is covered in Section P-150, Demolition. The Contractor's proposed method(s) to
142 protect and locate the utilities shall be submitted to the Project Manager, in writing, for approval a
143 minimum of 14 days in advance of the work. The Contractor shall be responsible for protecting all
144 utilities within the project limits whether shown on the Contract Drawings or not.

145
146 If and when the Contractor's excavating operations encounter artifacts of archeological
147 significance, including but not limited to discovery of skeletal remains and associated burial
148 artifacts, the Contractor shall immediately cease work in that area and notify the Project Manager.
149 At the direction of the Project Manager, the Contractor shall arrange for the excavation of the site
150 in such a manner as to preserve the artifacts encountered and allow for their removal and proper
151 disposal, in accordance with the General Conditions.

152
153 If it becomes necessary to temporarily interrupt existing surface drainage, sewers or under-
154 drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible
155 for and shall take all necessary precautions to preserve them or provide temporary services.
156 When such facilities are encountered, the Contractor shall notify the Project Manager, in writing.
157 The Contractor shall, at its own expense, satisfactorily repair or pay the cost of all damage to such
158 facilities or structures which may result from any of the Contractor's operations during the period
159 of the Contract.

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3.02 EXCAVATION No excavation shall be started in any area until the work has been staked out by the Contractor, cross-sections of existing ground taken and plotted, and all surveying and cross-sections approved in writing by the Project Manager. Excavation shall be made to the lines and grades shown on the Contract Drawings. All suitable excavated materials shall be used in the formation of embankment, subgrade, or for other purposes shown on the Contract Drawings. All unsuitable material shall be disposed of as described herein.

Rock excavated in the borrow areas, if encountered, can be buried in locations designated by the Project Manager.

The criteria for burial of rock in these borrow areas shall be as follows:

- 1) There is no size limitation of buried rock in these areas.
- 2) A minimum of two feet of common embankment shall be placed over the top of the buried rock.
- 3) All areas shall be graded to drain upon completion of the rock fill.
- 4) Rock obtained from the prism fill areas may be placed in the borrow rock fill areas at the option of the Contractor.
- 5) All aspects of the rock disposal area shall be included in the written Common Excavation Plan.

“XYZ” coordinates of the rock disposal area in common borrow areas shall be carefully measured and shown on the as-built plans.

Grades shall be maintained so that all surfaces are well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the work. The cost of placing rock in the borrow area is incidental to the cost of the common embankment.

- A. Unsuitable Material - If the Contractor encounters at the bottom of the excavation: muck, peat, matted roots, or other material unsatisfactory for embankment construction he shall notify the Project Manager in accordance with the General Condition Article 12 and request whether the material is to be removed. If removal is required the Contractor shall submit to the Project Manager written recommendations outlining the proposed handling, placement or removal of the material. The Contractor shall not begin excavation of the material until written approval is obtained from the Project Manager. When material is encountered that is classified as unsuitable, it shall be disposed of at a location on site as approved by the Project Manager. The unsuitable material shall be compacted to a density to allow pickups to drive across and sloped to drain with side slope of a 4 horizontal to 1 vertical.
- B. Carbonaceous Materials Carbonaceous materials encountered during excavation operations shall be placed as common embankment as noted hereafter. Excavated carbonaceous materials shall be thoroughly mixed with other common embankment materials in the ratio of 5 parts of common materials (minimum) to 1 part of carbonaceous material in the embankment. The carbonaceous materials shall be thoroughly mixed with the common material in order to fully meet all of the requirements

213 for common embankment.

214

215 C. Overbreak Overbreak, including slides, is that portion of any material displaced or
216 loosened which occurs outside of the plans line and grade. The contractor shall submit a
217 plan to the Project Manager to restore the effected area to a stable condition at no
218 expense to the City. The plan shall be approved in writing by the Project Manager prior to
219 the Contractor proceeding with the work.

220

221 In the event over-excavation occurs, excavation in the area in question shall cease
222 immediately and the Contractor shall accept all liabilities for damages caused by over-
223 excavation. The contractor shall submit a plan to fill in the over-excavation to the same
224 strength and stability as the material was prior to excavation. The plan shall be approved
225 in writing by the Project Manager prior to fill placement in the over excavated area.

226

227 In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise
228 removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly
229 dressed to the slope, cross section and alignment shown on the Contract Drawings.

230

231 D. Hazardous Materials. Some material (equipment, debris, soil, wastes, etc.) may be
232 affected by hazardous constituents, chemicals or compounds used during oil and gas
233 production, residential development, public improvement construction or agricultural use.
234 Material contaminated or potentially contaminated with hazardous constituents, chemicals
235 or compounds shall be assessed by the contractor regarding the hazardous
236 characteristic(s) of each material. The assessment will be made in accordance with
237 requirements specified by the Colorado Department of Public Health and Environment
238 (CDPHE) and the Colorado Department of Natural Resources - Oil and Gas Conservation
239 Commission (OGCC). The Contractor shall notify the Project Manager in writing
240 immediately upon discovery or suspicion of the existence of such hazardous material.

241

242 3.03 EXCAVATION OF SELECT MATERIAL When material meeting the criteria for Select
243 Embankment is encountered in the runway or taxiway prisms, it shall be excavated and placed
244 directly as Select Embankment or stockpiled as required for later use as select material.

245

246 Select Embankment material shall be obtained from available sources.

247

248 The Contractor shall prepare a Select Material Plan for select material excavation and select
249 material placement based on the plan information and the Contractor's further exploration of
250 select material availability and other criteria as mentioned in Section 2.03. The Select Material
251 Plan shall contain the results of the following investigation:

252

253 A. Select Borrow investigation for designated areas.

254

255 1. Test hole or pit explorations in runway/taxiway and select borrow areas at
256 approximately 300' on centers.

257

258 2. Sample testing at each exploration for depth of topsoil, depth of select material,
259 elevation of surface, and laboratory tests for Plasticity Index, sieve analysis,
260 percent passing 200 sieve, classification, soluble sulfates, and swell
261 consolidation.

262

263 3. Detailed log of each test hole or pit.

264

265 4. Estimate of select material available in each area.

266
267 3.04 DRAINAGE EXCAVATION Drainage excavation shall consist of excavating for intercepting, inlet
268 or outlet ditches and channels, detention ponds, or for any other type as designed or as shown on
269 the Contract Drawings. The work shall be performed in the proper sequence with the other
270 construction. All material meeting the criteria in Section 2.04 shall be placed in embankments;
271 intercepting ditches shall be constructed prior to starting adjacent excavation and embankment
272 operations. All necessary work shall be performed to secure a finish true of line, elevation, and
273 cross section.

274
275 The Contractor shall maintain ditches constructed on the project to the required cross section and
276 shall keep them free of debris or obstructions until the project is accepted. There will be no pay
277 item for maintaining drainage channels and ditches and shall be considered incidental.

278
279 3.05 PREPARATION OF EMBANKMENT AREA All testing shall be done by a laboratory hired by the
280 Contractor. The results shall be provided to the Project Manager in accordance with 6.02
281 paragraph 2.

282
283 Where an embankment is to be constructed, all sod, vegetable matter, debris, organic, or other
284 undesirable material and topsoil shall be removed from the surface upon which the embankment
285 is to be placed, and the cleared surface shall be completely broken up by plowing or scarifying to
286 a minimum depth of 8 inches. No debris, organic, or other unsuitable material shall be allowed in
287 the embankment.

288
289 This area shall then be recompact to a minimum of 95.0% of the maximum dry density at -2%
290 of optimum moisture content or above as determined by ASTM D 698.

291
292 The top 8" of all existing surfaces shall also be scarified, moisture conditioned, recompact, and
293 retested, prior to any additional fill placement. All work required in the top 8" of existing material
294 shall be included in the price of common embankment. No separate payment shall be made.

295
296 Where embankments are to be placed on slopes steeper than 4 (horizontal) to 1 (vertical),
297 benches shall be excavated into the slope. These slopes include natural and previously
298 constructed embankments. The benches shall be cut a minimum of ten (10) feet horizontally into
299 the existing slope and shall be of sufficient width to accommodate the approved construction
300 equipment, to create a stepped bench condition the full length of the section. The vertical step
301 shall not exceed two (2) feet in the bench. All surfaces to receive embankment material shall be
302 inspected and approved by the Project Manager immediately prior to embankment placement.

303
304 3.06 FORMATION OF COMMON EMBANKMENTS No embankment fill shall be placed until the work
305 has been staked out, and cross-sections obtained by the Contractor, and approved in writing by
306 the Project Manager. The first embankment placed shall be a test fill. Embankments shall be
307 formed in successive horizontal layers of not more than 8 inches in loose depth for the full width of
308 the cross section. No cobble shall exceed five (5) inches in top 10 feet of common embankment
309 or as defined in Article 3.07. Each layer shall be disked to break up lumps and clods of soil,
310 claystone, sandstone, and claystone-sandstone mixes before compaction of the layer. Claystone
311 and sandstone fragments in the layer shall be broken down to three (3) inch maximum pieces
312 before compaction of the layer. Disking shall be performed with a heavy disk plow to full depth of
313 the compacted layer.

314
315 The grading operations shall be conducted, and the various soil strata shall be placed, to produce
316 a soil structure as shown on the typical cross section in the Contract Drawings or as directed by
317 the Project Manager. Materials such as brush, hedge, roots, and stumps shall not be
318 incorporated or buried in the embankment.

319
320 Some carbonaceous claystone and lignite lenses may be found in the excavated materials.
321 These materials can be incorporated into the common embankments provided they are well
322 mixed with other common embankment material in a ratio of 5 parts of common (minimum) to 1
323 part carbonaceous claystone or lignite material to meet all the requirements of common
324 embankment.

325
326 Operations on earthwork shall be suspended at any time when satisfactory results cannot be
327 obtained because of rain, snow, sleet, freezing, or other unsatisfactory conditions of the field. The
328 Contractor shall drag, blade, seal, or slope the embankment to provide proper surface drainage.
329 In no case shall frozen soils, snow or ice be allowed in any embankment materials, nor shall any
330 material be placed over frozen native or embankment materials, snow or ice.

331
332 The material in the layer shall be at least minus two (-2) of optimum moisture content or above as
333 determined by ASTM D 698 after rolling and after compaction. In order to achieve a uniform
334 moisture content throughout the layer, wetting or drying of the material and manipulation shall be
335 required when necessary. Should the material be too wet, all work on all of the affected portions
336 of the embankment shall be delayed until the material has dried to the required moisture content.
337 Wetting of dry material to obtain the proper moisture content shall be done with approved
338 equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required
339 water shall be available at all times. Moisture conditioning shall be done in both the excavation
340 and embankment areas, as required. Each layer of embankment shall be conditioned by disking
341 or other approved methods so that the water is distributed uniformly throughout the layer prior to
342 compaction. If wet or dry areas are observed, these areas shall be remediated so that the water is
343 distributed uniformly throughout the area prior to compaction.

344
345 For claystone fill where the in situ moisture content is more than 3% below optimum moisture,
346 pre-wetting of the borrow area or hydration of the placed fill may be required to achieve a uniform
347 moisture prior to placement of subsequent lifts.

348
349 Compaction operations shall be continued until each layer of embankment material is compacted
350 to not less than 95.0% of maximum dry density as determined by ASTM D 698. Additional fill shall
351 not be placed upon any 8 inch thick loose lift until it is tested and meets compaction and moisture
352 requirements.

353
354 For embankments higher than 10 feet directly beneath the paved portions of the runways and
355 taxiways, fill shall be compacted to a minimum 98.0% of the maximum dry density with moisture
356 contents at or above the optimum moisture content as determined by ASTM D 698.

357
358 The Contractor shall provide access to the Project Manager, testing and inspection personnel for
359 all lifts of material for testing purposes. The Contractor shall plan his work so as to allow sufficient
360 time for the testing to be completed in all cases.

361
362 In the construction of embankments, layer placement shall begin in the deepest portion of the fill;
363 as placement progresses, layers shall be constructed approximately parallel to the finished rough
364 grade line. Temporary gaps through the embankment shall be allowed with the Project Manager's
365 approval. All temporary slopes between the previously completed portions of the embankment
366 and the embankment to be placed shall not be steeper than 4H:1V. Prior to construction of
367 embankment in temporary openings, all loose, disturbed, dry or frost damaged embankment shall
368 be removed from the bonding surface.

369
370 The surfaces of previously placed embankment and foundation areas that have not had fill placed
371 on them for a period of time sufficient to allow those surfaces to become dry, less than minus two

372 (-2) percent of the optimum moisture content shall be reconditioned and brought to specified
373 tolerances.
374

375 All areas, below foundations, will require proof rolling with pneumatic tired equipment with a
376 minimum axel load of 18 kips/18,000 lbs per axel. Tire pressure shall be inflated to 90 psi. Proof
377 rolling shall be performed in a systematic manner ensuring documentation of the location and the
378 results. Areas that are observed to have soft spots, where deflection is not uniform, or where
379 deflection is excessive as determined by the Project Manager's Inspector, shall be ripped,
380 scarified, moisture conditioned as needed, and then recompacted to the requirements for density
381 and moisture at the Contractor's expense. After recompaction, these areas shall be proof rolled
382 again and all failures corrected at the Contractor's expense. Any areas containing free standing
383 water on the surface shall be removed to stable material, tested, then proof rolled as required
384 above.
385

386 Earthmoving equipment, watering equipment and compaction equipment are the responsibility of
387 the Contractor. Such equipment shall be of suitable type and capacity to perform the excavation
388 and embankment work in accordance with these specifications and to meet the contract schedule.
389 The equipment shall be operated in accordance with manufacturer's recommendations and
390 instructions and maintained such that it will deliver the manufacturer's rated energies and
391 compactive efforts. If equipment at the site proves inadequate to maintain Contract schedules or
392 results in work not meeting specification requirements, additional, larger and/or different types of
393 equipment shall be obtained and used.
394

395 Any existing bituminous roadway surfaces shall be scarified and broken into pieces suitable for
396 embankments prior to placing embankment over the existing surface.
397

398 3.07 ROCK MATERIAL IN COMMON EMBANKMENT
399

400 Excavated material containing solid rock consisting of cobbles, boulders or rock fragments (rock
401 material) less than - one- third cubic yard in volume; a maximum thickness of one (1) foot; and a
402 maximum dimension of three (3) feet that can be placed in layers without additional crushing,
403 breaking or pulverizing, may be placed in embankments below ten feet from the rough subgrade
404 elevation in embankments as shown on the Contract Drawings or directed by the Project Manager.
405 The rock material shall be incorporated in layers (or lifts) no larger than the thickness of the largest
406 pieces. The rock material shall be carefully dispersed throughout the layers and throughout the
407 embankment to avoid nesting. Rocks shall be spaced far enough apart to allow the Contractor's
408 equipment to operate between the rock. Contractor shall demonstrate his ability to achieve filling in
409 of all voids with fines and obtaining the required uniform density around the rock fragments. Voids
410 shall be filled with finer material to form a dense and thoroughly compacted mass. The embankment
411 areas containing such rock material shall be compacted with adequate equipment and sufficient
412 passes to ensure that the embankments meet all specified moisture and density requirements for
413 common embankment before the next lift is placed. The Contractor shall perform a test fill in
414 accordance with the requirements of Section P-152-3.10 to demonstrate satisfactory compliance
415 with these specifications prior to placing rock material. No additional payment will be made to the
416 Contractor for incorporation of rock material into common embankment. All costs will be included in
417 the unit price payment for Section P-152-5.01, Common Embankment in Place.
418

419 3.08 ROCK EMBANKMENT ZONE
420

421 Rock material of one-third cubic yard or greater in volume which occurs in sound and solid
422 masses, layers or ledges of mineral matter of such hardness and texture that it cannot be broken
423 down with rippers, scrapers, etc., may be placed in designated Rock Embankment areas.
424

425 The Contractor shall notify the Project Manager upon encountering rock material which cannot be
426 broken down with rippers, scraper, etc., as noted in Section P-152-2.01. The Contractor shall
427 uncover the rock material so that its volume can be estimated and shall demonstrate by ripping,
428 that the material should be classified as material suitable for rock embankment. A written
429 agreement shall be executed by the Contractor and Project Manager acknowledging that the rock
430 is unrippable, is classified as rock material for the rock embankment and an agreed upon
431 estimate of material based upon physical measurements by the Contractor of the uncovered rock.
432

433
434 Rock material for Rock Embankment Zones, should be well-graded in size to a maximum of one
435 cubic yard. The Contractor shall provide suitable equipment to process the rock material to
436 generally meet maximum size requirement, and to load, haul, intermix common material as
437 necessary to fill voids, spread in 8" loose lifts and compact the rock material. All Rock
438 Embankments shall be constructed in areas designated on the plans. The rock material shall be
439 placed in layers (maximum lift thickness three (3) feet) with the voids filled with finer materials and
440 compacted to form a stable mass.
441

442 The rock embankment shall be constructed by (6) passes of a vibrating smooth wheel, steel drum
443 compactor, operating at a frequency between 1100 and 1500 vibration per minute (vpm). The
444 compactor shall be equipped with cleaning devices to maintain a clean drum surface. The
445 vibratory compactor may be either towed or self-propelled and shall have an unsprung drum
446 weight that is a minimum of sixty (60) percent of the compactor's static weight. Towed
447 compactors shall have at least ninety (90) percent of their weight transmitted to the ground
448 through the compaction drum when the compactor is standing in a level position hitched to the
449 towed vehicle. The compactor shall have a minimum static weight of twenty thousand (20,000)
450 pounds, a minimum dynamic force of forty thousand (40,000) pounds when operation at 1400
451 vpm, and an applied force not less than nine thousand (9,000) pounds per foot or compaction,
452 drum length. A compactor pass shall be one passage of the roller drum over the entire surface of
453 the layer. A minimum overlap of six (6) inches shall be maintained for adjacent coverage of fill
454 compaction. The compactor shall operate within the specified frequency range of 1100-1500 vpm
455 and at a maximum travel rock fill.
456

457 Rock embankment zones shall be constructed so that there are no interferences with drainage,
458 utilities, blanket drains, or other construction features. The Contractor shall perform a test fill in
459 accordance with the requirements of Section P-152-3.10 to demonstrate satisfactory compliance
460 with these specifications.
461

462 Any rock material removed before the physical inspection by the Project Manager and written
463 agreement execution shall be paid for as common embankment.
464

465 The rock embankment zone for this contract shall be as noted on the Contract Drawings. This
466 area shall be reserved for rock embankment only until the Contractor is notified in writing that
467 other materials may be placed in this area.
468

469 3.09 SELECT EMBANKMENT
470

471 Prior to placement of Lower Select Embankment, Upper Select Embankment, and Lime or
472 Cement stabilized subgrade, the existing surfaces shall be proof rolled using pneumatic tired
473 equipment with a minimum axel load of 18 kips/18,000 lbs per axel and tires inflated to 90psi.
474 Proof rolling shall be performed in a systematic manner ensuring documentation of the location
475 and the results. Areas that are observed to have soft spots, where deflection is not uniform, or
476 where deflection is excessive as determined by the Project Manager's Inspector, shall be ripped,
477 scarified, moisture conditioned as needed, and then recompacted to the requirements for density

478 and moisture at the Contractor's expense. After recompaction, these areas shall be proof rolled
479 again and all failures corrected at the Contractor's expense.
480

481 The Select Embankment material shall be placed in loose lifts no greater than eight (8) inches.
482 Water shall be added to the soil and/or the soil should be dried, to obtain moisture content at a
483 minimum of minus one (-1) percentage points of the optimum moisture content or above. For
484 sandier select embankment that has a maximum 20% fines, the moisture content shall be a
485 minimum of minus three (-3) percentage points of the optimum moisture content or above. No
486 individual particle size greater than five (5) inches in maximum diameter shall be allowed in the
487 select embankment.
488

489 Approved Select Embankment materials shall be compacted to at least 95.0% of the maximum
490 dry density as determined by ASTM D698.
491

492 The Contractor's Independent Testing laboratory shall conduct Swell-Consolidation Tests as
493 specified in 6.01, Test Schedule. If the Plasticity Index of the material is less than 10 when
494 tested in accordance with ASTM D 4318, Swell-Consolidation testing may be waived by the
495 Project Manager (with concurrence of the DOR) upon written request by the Contractor.
496

497 3.10 TEST FILLS

498
499 Test fills will be performed for Common Embankment, Select Embankment, Rock Embankment,
500 Common Embankment containing Carbonaceous Materials, and for other conditions which vary
501 from the conditions tested in the initial test fills.
502

503 The Contractor shall incorporate test fills in its work to establish and demonstrate methods and
504 procedures to moisten and compact fill materials to specified conditions. The test fills shall
505 consist of a minimum of 2 lifts. The tests fills shall be conducted at the beginning of each type of
506 fill placement and when materials used for fills change sufficiently that previously established
507 moistening and compaction procedures do not consistently produce fills meeting specification
508 requirements. Data concerning spreading, disking, additional moistening, type and numbers of
509 compaction equipment, and number of compactor coverages per fill layer to obtain minimum
510 specified compaction shall be developed and demonstrated from the test fills. The test fills shall
511 be conducted within project fill areas. The Contractor shall submit a proposed construction and
512 testing plan for each test fill for approval by the Project Manager prior to starting work. Based on
513 the test fills, the minimum number of coverages of each type of compactor shall be chosen which
514 consistently produces the minimum specified relative compaction. Each subsequent layer of fill
515 shall be compacted with the minimum number of coverages developed above. Additional
516 compactor coverages shall be made as needed to obtain the minimum specified relative
517 compaction. The contractor shall maintain the fill at all times so that water will not pond.
518

519 Upon completion of each test fill, the Contractor shall submit a letter to the Project Manager
520 documenting the results of the test fill including type of material, equipment type used, number of
521 passes for all equipment including water wagons, compactors, and disks per lift, and all other
522 pertinent facts about the test fill operation. This letter shall be submitted within five (5) days of the
523 completion of the test fill for the Project Manager's written approval.
524
525

526 3.11 FINISHING AND PROTECTION OF COMPLETED WORK. Excavations, embankment and
527 stockpiles shall be graded to the lines and grades shown on the Contract Drawings. In common,
528 select, and topsoil borrow areas the site shall be graded uniformly with no slopes exceeding
529 neither 4:1 nor flatter than 1% prior to topsoiling. The surfaces of completed excavations and
530 embankment shall be rolled with wheeled equipment to help seal them and to reduce subsequent

- 531 erosion.
- 532
- 533 Grading of the embankment and excavated surfaces including common, select, and topsoil
- 534 borrow areas shall be performed so that it will drain readily. The Contractor shall take all
- 535 precautions necessary to protect the surface from damage. Hauling over the finished surface
- 536 shall be limited to that which is essential for construction purposes. All ruts or rough places that
- 537 develop in a completed surface shall be smoothed and recompacted.
- 538
- 539 3.12 ALTERNATIVE ACCESS ROADS. The construction of alternative access roads including
- 540 embankments, gravel, associated drainage, structures, and all other work associated with the
- 541 alternative access roads shall be considered incidental to the excavation and embankment items
- 542 of work and shall be removed upon completion of the work.
- 543
- 544 3.13 HAUL. All hauling shall be considered a necessary and incidental part of the work. Its cost shall
- 545 be considered by the Contractor and included in the contract unit price for the pay of items of work
- 546 involved. No payment shall be made separately or directly for hauling on any part of the work.
- 547
- 548 3.14 TOLERANCES. The surface of excavations, common embankments, select embankments, and
- 549 drainage channels shall be of such smoothness that it will not vary more than plus 0 to minus ½
- 550 inch from true grade as shown on the Contract Drawings. Any deviation in excess of this amount
- 551 shall be corrected by loosening, adding and removing materials, and reshaping.
- 552
- 553 The top of common embankments shall be surveyed and approved in writing by the Project
- 554 Manager prior to placement of any select or topsoil material. The top of common embankment,
- 555 under the select shall not vary more than 0 to minus ½ inch from the true grade as shown on the
- 556 Contract Drawings.
- 557
- 558 3.15 TOPSOIL. When topsoil is specified or required as shown on the Contract Drawings, it shall be
- 559 salvaged from stripping or other grading operations. If, at the time of excavation or stripping, the
- 560 topsoil cannot be placed in its proper and final section of finished construction, the material shall
- 561 be stockpiled at approved locations. If, in the judgment of the Project Manager, it is practical to
- 562 place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its
- 563 final position without stockpiling or further rehandling.
- 564
- 565 Upon completion of grading operations, stockpiled topsoil shall be handled and placed as directed
- 566 or as required in Section T-905.
- 567
- 568 No direct payment shall be made for topsoil as such under Section P-152. Topsoil shall be paid
- 569 for at the contract unit prices as provided in Section T-905.
- 570
- 571 3.16 QUALITY CONTROL. The Contractor's Independent Testing Laboratory shall provide all testing .
- 572 The Independent Testing Agency shall meet the requirements of Section 01401 and have been
- 573 approved through the submittal process prior to performing testing.
- 574
- 575 The Contractor shall provide X, Y, and Z coordinates for the locations of all tests and inspections.
- 576 These coordinates shall be accurately established by using GPS methods with an accuracy of +/-
- 577 one (1) foot horizontally and +/- one-half (1/2) foot vertically; use of slope stake references shall
- 578 not be acceptable. The proposed control system and method to determine these coordinates shall
- 579 be submitted by the Contractor and approved in writing by the Project Manager prior to any test
- 580 fill, excavation, or embankment operations.
- 581
- 582 The test types, minimum frequency of tests and test standards are shown in P-152-6.01 - Test
- 583 Schedule. If variable earth materials and/or test results indicate that materials do not meet

584 specification requirements, more frequent tests shall be taken.
585

586 Any earthwork construction which does not meet specification requirements shall be reworked, at
587 the Contractor's expense, to bring that work within specification requirements. Remediated areas
588 will be retested as if the area were a new embankment. New test pits shall be dug to the midpoint
589 of the lift in question for visual inspection of moisture uniformity. Density tests shall be taken from
590 the top of the lift in question. The remediated areas, shall equate to the volume of material
591 represented by the failing test.
592

593
594 The Project Manager's Quality Assurance Lab will perform intermittent testing This testing may be
595 in conjunction or independent of the Contractor's Independent Testing Laboratory and shall be
596 used as a guide in evaluating whether project earthwork meets specification requirements. If the
597 test results of the Project Manager's Quality Assurance Laboratory indicates the material does not
598 meet either moisture or compaction requirements, the test fails and a passing retest by the QA
599 Lab will be required.
600

601 The contractor's Independent Testing Laboratory's test results shall be provided to the Project
602 Manager in accordance with 6.02 paragraph 2. Upon completion of embankment testing, the
603 Independent Testing Agency shall provide documentation stating the material used, moisture
604 content, compaction, and test frequencies meet project specifications. This documentation shall
605 be signed and stamped by an Engineer employed by the Independent Testing Agency registered
606 in the State of Colorado At the end of the project, provide a spread sheet with all tests and data
607 performed throughout the project.
608

609
610 3.17 COMPACTION CONTROL TESTS. This section shall govern the determination of the maximum
611 density, field density, and percent compaction of those materials for which a minimum percent
612 compaction is specified. It covers the basic procedures to be followed in performing the test for
613 maximum density, field density, and percent compaction. In all cases density shall be stated as
614 the dry weight in pounds per cubic foot.
615

616 A. Maximum Density. Maximum density is defined as the maximum dry weight in pounds
617 per cubic foot obtained when a material is mixed with different percentages of water and
618 compacted in a standard manner. The percentage of water at which maximum density is
619 obtained is termed the optimum moisture content.
620

621 B. Laboratory Compaction Tests. The maximum dry density shall be determined by using
622 the moist method in accordance with ASTM D 698. For soils that are expected to contain
623 more than 30% retained on the 3/4-inch sieve, use AASHTO T 99.
624

625 C. Field Density. Field density refers to the dry density expressed in pounds per cubic foot of
626 compacted material in place at the site as determined by a sample representative of the
627 compacted layer. The field density shall be determined in accordance with ASTM D 1556
628 or ASTM D 6938.
629

630 If nuclear density gages are to be used for density determination, the gages shall be
631 used and calibrated in accordance with Section GP-120.
632

633 D. Percent Compaction. The percent compaction is defined as the density of the compacted
634 layer expressed as a percentage of the maximum density of the material when tested in
635 accordance with these specifications. The percentage of compaction is computed by the
636 formula:

637
638 Percent compaction = (Field dry density X 100) / Maximum dry density
639

640 The percent compaction shall be reported to the nearest 0.1 (tenth). The areas
641 represented by tests falling below the minimum specified compaction will be corrected
642 and retested.
643

644 3.18 Borrow Areas

645
646 The Contractor shall, upon completion of his borrow excavation activities, prepare the borrow sites
647 for planting by performing the following work:
648

- 649 1) Remove and bury all rock over 6" in dimension in accordance with rock disposal
650 methods as noted under Section 3.02 Excavation P-152.
- 651
652 2) Grade all sites to drain as indicated in these specifications and drawings.
- 653
654 3) Remove all trash and other foreign objects so that the areas can be reused for
655 farming purposes.
656
- 657 4) Rip the borrow area site in a manner noted under Section 302.B T-907 Tilling for
658 Erosion Control, and as approved by the Project Manager. After the area is ripped
659 to the 18 inch depth, the area ripped shall be treated on the surface to reduce
660 excessive surface roughness or cloddiness and produce an area suitable for
661 future seeding. Treatment may include discing, harrowing, cultipacking or other
662 means as approved by the Project Manager. In areas where rock is the
663 predominant surface remaining, the Contractor may spread 18 inches of
664 acceptable material over the rock areas as approved by the Project Manager at
665 no additional cost to the City.
666

667 All work required to prepare the borrow area for planting as designated under this section shall be
668 considered as incidental work.
669
670

671 **PART 4 METHOD OF MEASUREMENT**

672
673 4.01 Refer to Appendix A for Method of Measurement.
674
675

676 **PART 5 BASIS OF PAYMENT**

677
678 5.01 Refer to Appendix A for Basis of Payment.
679
680

681 **PART 6 TESTING REQUIREMENTS**

682
683 6.01 TEST SCHEDULE

684
685 (Use of most current version of ASTM Standard is required)
686

<u>Test Type</u>	<u>Test Standard</u>	<u>Minimum Frequency of Tests</u>
1. Standard Compaction (Moisture Density Relations)	ASTM D 698 (moist preparation)	Ten tests at the beginning of fill placement to provide information on

<u>Test Type</u>	<u>Test Standard</u>	<u>Minimum Frequency of Tests</u>
2. In-Place Soil Density and Moisture Content	ASTM D 1556 ASTM D 6938	moisture density. Characteristics of soils to be used as fills. a) One test per each 10,000 square feet of embankment preparation and existing surface preparation. b) One test for each 1000 cubic yards and portion placed per lift of common and select embankment placed. Every lift is to be representatively tested regardless of quantity placed. c) One test for each 200 linear feet or fraction thereof per 8" lift for Backfill, Storm Sewer trenches, and inlet/outlet structures. d) One test on pipe bedding for each 200 feet of pipe place. e) Correlation tests as outlined below.
3. Correlation Test Procedures	ASTM D 1556 ASTM D 698	One sand cone test (D 1556) and one one point Proctor test (D 698) should be performed for every tenth nuclear density test. The results of these tests should be used to correlate the field nuclear density test results and the Proctor curve selection.
4. Soluble Sulfate	ASTM D 516 10 to 1 ratio dilution rate	One test for every 1000 square yards of the top 20" of select embankment placed under the runway and taxiways. If the P-301 Soil-Cement Base Course is produced at a Pug Mill or similar method, perform one test for every 15,000 cubic yards of select fill excavated and/or stockpiled.
5. Gradation	ASTM D 422 or ASTM D 6913	a) One test for each 20,000 cubic yards of common embankment placed. This test shall be run in conjunction with Item 3. b) One Test for each 2,500 cubic yards of select embankment and initial backfill. This test shall be taken in conjunction with Item 3. c) If procedure D 422 is used, the hydrometer method in determining the particle size of the material passing the No. 200 sieve is not required. Report results for 6 inch, 3 inch, 1-1/2 inch,

<u>Test Type</u>	<u>Test Standard</u>	<u>Minimum Frequency of Tests</u>
6. Atterberg	ASTM D 4318 (Dry Method for preparing the test specimen and Method B for performing the Liquid Limit test).	3/4 inch, 3/8 inch, No. 4, No. 8, No. 16, No. 30, No. 50, No. 100 and No. 200 sieve sizes, for Common Embankment and Select Embankment materials, and on the specified sieve sizes for drainage soils and utility backfill.
7. Classification	ASTM D 2487 ASTM D 2488	Classify each sample of the above tests (Items 1 through 5) using data from those tests and visual methods.
8. Swell-Consolidation Test (Sec. 6.03)		One test for every 10,000 yards of Select Embankment material.

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6.02 TEST RESULTS

1. Tests for reworked areas shall be the quantity represented by the original test.
2. Test results for in-place nuclear soil densities and moisture content shall be given to the inspector in rough draft form immediately upon completion of the day's testing if the inspector is present. If the inspector is unavailable, the rough draft shall be electronically delivered to the Project Manager's office and the QA Lab Manager before commencement of additional fill placement. The final original typed test results shall be provided in the weekly summary reports in accordance with Section 01401, 1.06.

700 6.03 DENVER SWELL TEST (SWELL-CONSOLIDATION TEST)

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- A. Test Objectives: To determine the magnitude of swell/ consolidation of soil sample under a given surcharge load with 1-dimensional consolidometer (DENVER MACHINE),
- B. References: ASTM D 2435-80, Part 1
F.H. Chen, Foundation on Expansive Soils, 1988
- C. Equipment:
 1. Trimming equipment
 2. Calipers, sensitive to 0.001 inch
 3. Balance, sensitive to 0.1 grams
 4. Oven, set at 110 ±5 degree C
 5. Moisture dishes
 6. Consolidometer ring 1.94 inch diameter by 1.00 inch diameter by 1.00 inch depth
 7. Porous stones

- 717 8. Loading device
718 9. Dial Indicator, sensitive to 0.001 inch
719 10. Weights
720
721 D. Procedures: 1. Sample Preparation
722
723 a. For qualification of a borrow area, samples shall be remolded to
724 a minimum 95% of the maximum dry density with a moisture
725 content near optimum moisture as determined by ASTM D 698
726
727 b. For qualification of in-place fill, samples shall be undisturbed
728 samples from California tube, or approved hand drive thin-wall
729 sampler.
730
731 c. Determine and record the sample weight, height, and diameter.
732
733 d. Obtain trimmings of sample for moisture content evaluation.
734
735
736
737 2. Testing
738
739 a. Assemble by placing the ring sample with top and bottom porous
740 stones in the consolidometer dish. Place the top loading cap on
741 top of the porous stone, and place the consolidometer dish into
742 the loading device.
743
744 b. Once the sample is placed in the consolidometer, adjust the dial
745 to read 0 (zero) or a round number (i.e. 200). Record this dial
746 reading.
747
748 c. Apply the specified surcharge load. If no surcharge load is
749 specified, use 200 psf.
750
751 d. Record dial readings hourly until the readings remain constant, or
752 a minimum of 4 hours.
753
754 e. Add water to the consolidometer.
755
756 f. Record dial readings periodically until sample movement
757 stabilizes, and a minimum of 24 hours.
758
759 g. Add additional loads to bring the sample to its original height.
760 The following load increments are suggested 500, 1000, 3000,
761 6000, 10,000, 15,000 and 20,000 psf. As a minimum load the
762 sample to 6000 psf. Record dial readings for each increment
763 until the readings remain constant, or a minimum of 2 to 4 hours,
764 before additional load increment application.
765
766 h. At completion of all load increments, dismantle the
767 consolidometer and obtain final sample moisture content.
768
769 E. Calculations: 1. Obtain final dial reading for each load increment (correct for machine

770 deflection by adding deflection when sample swells, and subtracting
771 when sample consolidates).

772
773 2. Calculate percent swell (+) or consolidation (-) as follows:

774
775
$$\text{Percent Swell} = \frac{\text{Corrected final dial reading} - \text{Initial Sample Height}}{\text{Initial Sample Height}} \times 100$$

776
777
778
779

780 3. Prepare plot of swell % - Consolidation % versus log of pressure
781 curve; include sample number, location, natural dry density, natural
782 moisture, soil description.

783
784
785 **END OF ITEM P-152**

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ITEM P-153

WATERING

PART 1 GENERAL

1.01 DESCRIPTION This work shall consist of obtaining, conveying, and applying water for compaction of embankments and subgrades; for concrete; haul road; for dust control; and for any other purposes in accordance with the requirements of the Contract Documents or as designated by the DIA Project Manager.

PART 2 EQUIPMENT AND MATERIALS

2.01 WATER QUALITY Water required for construction use shall be clean and free from sewage, oil, acid, strong alkalis, organic material, and other substances injurious to the finished product. Water obtained from the City supplied source is acceptable for use as construction water. If the Contractor provides an alternative source for water supply, water of questionable quality shall be tested in accordance with AASHTO T 26. All alternative supply sources shall be subject to approval by the DIA Project Manager.

2.02 CITY SUPPLIED WATER SOURCE. The City shall make available a source of construction water from the water line close to the existing Contractor Staging Area location shown on the Drawings. There is not an unlimited supply of water available and the Contractor will be held responsible for misuse of water. The tap size shall be limited to 1-1/2 inch.

It shall be the Contractor's responsibility to contact the DWD and the DIA Project Manager and arrange for connection to the above referenced waterline, to include installation of meter. The Contractor is advised to initiate such contact with the DWD prior to Bid, Attention: Mr. Tom Malmberg, 628-6112. The Contractor's connection plan, its distribution system, and its filling operations must be coordinated with, submitted to, and approved by the DWD prior to installation. All costs associated with waterline connections and distribution shall be included in the unit prices bid for the applicable items of construction.

2.03 POTABLE WATER Potable water may be hauled in and stored by the Contractor.

PART 3 CONSTRUCTION METHODS

3.01 TRANSPORT OF WATER The Contractor may transport water overland to an approved temporary storage facility, or construct temporary supply piping to his primary use point. The approximate location and alignment of the Contractor's temporary supply/distribution system must be approved by the DIA Project Manager in writing prior to its installation and must be removed by the Contractor upon completion of work. Potential contamination of existing domestic water system shall be held as the responsibility of the contractor.

3.02 EQUIPMENT The water equipment shall be of capacity and designed to assure uniform application of water in the amounts required.

3.03 PERMITS The Contractor shall obtain the required DWD permit(s) relative to tapping the water line and/or the use of said water.

56 **PART 4 METHOD OF MEASUREMENT**

57
58 4.01 Refer to Appendix A for Method of Measurement.

59
60
61 **PART 5 BASIS OF PAYMENT**

62
63 5.01 Refer to Appendix A for Basis of Payment.

64
65
66 **PART 6 TESTING REQUIREMENTS**

67
68 AASHTO T 26 Water

69
70
71 **END OF ITEM P-153**

1
2 **ITEM P-161**

3
4 **GEOTEXTILE**

5
6
7 **PART 1 DESCRIPTION**

8
9 1.01 **WORK INCLUDED** This section covers the work necessary to furnish install the geotextile
10 fabrics, complete.

11
12 1.02 **QUALITY ASSURANCE QUALIFICATION** Contractors shall furnish geotextile fabric
13 materials and shall submit to the DIA Project Manager, six (6) copies, a mill certificate or
14 affidavit signed by a legally authorized official from the company manufacturing the fabric. The
15 mill certificate or affidavit shall attest that the fabric meets chemical, physical, and
16 manufacturing requirements stated in this Specification. Contractors shall also submit to the
17 DIA Project Manager, not later than 45 days prior to commencing work in this section,
18 documented evidence of proven technical competence, past record of satisfactory
19 performance on similar projects, and sufficient capacity to do the volume of work specified
20 herein. Materials shall be the end products of one manufacturer in order to achieve
21 standardization for appearance, maintenance, and replacement.

22
23 1.03 **SUBMITTALS**

24
25 A. All contractors shall furnish to the DIA Project Manager, no later than 45 days prior to
26 delivery of materials to the project, the following data:

27
28 (1) Complete material specifications, descriptive drawings, and literature.

29
30 (2) Listing of all exceptions to the requirements specified herein.

31
32 (3) Factory test results of materials certified by fabric manufacturer being similar
33 shall be submitted showing conformance with the requirements of these
34 Specifications and which by actual usage has been demonstrated to be
35 satisfactory for the intended application.

36
37 B. Before commencing the work specified under this section, the Contractor shall submit
38 to the DIA Project Manager for approval all installation drawings, procedures, and a
39 schedule for carrying out the work.

40
41 C. Contractors shall submit certification from to manufacturer that the product delivered
42 to the project site will have property values equal to or greater than those specified.
43 Certified property values shall be equal to the average value less 2 standard
44 deviations.

45
46 D. A sample of 1 square foot of the geotextile fabric shall be furnished to the DIA Project
47 Manager from each shipment for verification and testing. The lot number of the roll
48 and the location of the sample obtained must be documented.

49
50 E. Samples of fabric sewn seams and/or securing pins shall also be furnished if required
51 on the project.

52
53 1.04 **MANUFACTURER'S SERVICES**

54
55 A. A fabric manufacturer's representative shall inspect the site for acceptability and

56 provide technical supervision and assistance at all times during installation of the
 57 fabric, and as may be required by the DIA Project Manager.
 58
 59

60 **PART 2 EQUIPMENT AND MATERIALS**

61
 62 2.01 NONWOVEN GEOTEXTILE FABRIC
 63

64 A. The nonwoven geotextile fabric shall be used for geotextile lining of the underdrain
 65 trench, placed beneath the shoulder section P-403 Asphalt Treated Permeable Base
 66 and placed over the stabilized base course P-304 Cement Treated Base Course or
 67 P-306 Econocrete Subbase Course. Fabric material as manufactured by Carthage
 68 Mills, Cincinnati, OH; Foss Manufacturing Company, Haverhill, MA; Hoechst
 69 Celanese Corp. Spartanburg, SC; Propex Fabrics ; or equal, shall be a pervious
 70 sheet of polyester, polypropylene, polyethylene, or polyamide fibers oriented into a
 71 stable network so that the fibers retain their relative position with respect to each
 72 other. The fabric shall be composed of continuous or discontinuous (staple) fibers
 73 held together through spun-bonding, melt-bonding, resin-bonding, or
 74 needle-punching. The edges of the fabric shall be salvaged or otherwise finished to
 75 prevent the other material from pulling away from the fabric. The fabric shall be
 76 woven into a width greater than 6 feet. The fabric shall conform to the physical
 77 requirements in Table No. 1.
 78

Table 1 PHYSICAL REQUIREMENTS (for Nonwoven Fabric)		
Physical	Physical Requirements	Test Method
Thickness, MU., min	70	ASTM D 5199
Mass (Weight), oz./sq.yd., min.	6.0	ASTM D 5261
Water Permittivity sec, min.	1.5	ASTM D 4491 (Falling Head)
Apparent Opening Six (AOS), U.S. Standard Sieve Size	50	ASTM D 4751
Grab Tensile Strength, lbs., min.	180	ASTM D 4632
Grab Elongation, % min.	50	ASTM D 4632
Mullen Brust Strength, psi, min.	290	ASTM D 3786
Puncture Strength, lbs., min.	80	ASTM D 4833
Trapezoid Tear Strength, lbs., min.	75	ASTM D 4533
Seam Efficiency, %	70-90	ASTM D 4632
Hydrocarbon Resistance, % Change	<20	USEPA 9090 (Modified)
Ultraviolet Radiation Resistance, % Strength Retention, min. at 150 hours	70	ASTM D 4355

79
 80
 81 2.02 SECURING PINS Securing pins for geotextile filter fabric shall be secured with 9 inch steel
 82 staples having a 3/16 inch dia with pointed ends. Geotextile fabric over CTB shall be secured
 83 with concrete nails with 1.5 inch dia washers long enough to hold the fabric in place while the

84 next pavement section is placed.

85

86 2.03 SEAMS

87

88 A. Seaming may be applied to both woven and nonwoven geotextile fabrics. Seams
89 shall be required in applications where stress transfer from one geotextile to another
90 is necessary. Seaming may replace overlapping at the Contractor's option.

91

92 B. Seam types shall be either a flat or player seam, a "J" type seam, or a butterfly scam.
93 A "J" type seam is preferred. Stitch counts (stitches per inch) shall range from 3 to 7.
94 The standard stitch hype shall be a chainstitch.

95

96 C. Sewing machinery shall make a double thread chainstitch, Type 401, and be capable
97 of penetrating four layers of the geotextile. Machines may be hand-held or
98 table/equipment-mounted, depending on fabric specified.

99

100 D. Sewing thread shall consist of nylon, polypropylene, polyester, or Kevlar thread.

101

102 E. A minimum 2 inches of fabric shall extend beyond the seam threads or a length
103 sufficient to develop the required seam strength.

104

105 F. Seam strength shall be measured using grab-tensile procedures (ASTM D 4632).
106 Scam efficiency is defined as the ratio of tensile strength across the seam to the
107 strength of the intact fabric.

108

109 G. Factory sewing shall be utilized wherever possible to eliminate or reduce field seams.

110

111

112 2.04 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

113

114 A. Geotextile materials delivered to site shall be inspected for damage, unloaded, and
115 stored with the minimum of handling. Materials shall not be stored directly on the
116 ground. During shipment and storage, filter cloth shall be furnished with a suitable
117 wrapping for protection against moisture and extended ultraviolet exposure prior to
118 placement. Rolls shall be stored in a manner which protects them from the elements.
119 If stored outdoors, they shall be elevated and protected with a waterproof cover.
120 Materials shall be handled in such a manner as to ensure delivery to the site in sound,
121 undamaged condition.

122

123 B. Contractor shall furnish certified test reports with each shipment of material attesting
124 that the fabric meets tile requirements of this Specification. Each roll shall be labeled
125 or tagged to provide product identification sufficient for inventory and quality control
126 purposes.

127

128

129 **PART 3 CONSTRUCTION METHODS**

130

131 3.01 GENERAL

132

133 A. The geotextile fabric shall be placed in the manner and at the locations shown in the
134 Drawings or as directed by the DIA Project Manager.

135

136 B. At the time of installation, fabric shall be rejected if it has defects, ribs, holes, flaws,
137 deterioration, or damage incurred during manufacture, transportation, storage, or
138 placement. Visual review of the fabric shall be performed once the fabric has been

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placed and prior to placement of any overlying materials.

- C. The fabric shall be placed with the machine direction (long dimension) down slope or normal to the natural slope, unless otherwise directed by the DIA Project Manager, and shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. The strips shall be laid smooth to provide a minimum width of 12 inches, or greater if specified, of overlap for each joint. Overlap Joints and seams shall be measured as a single layer of cloth.
- D. Securing pins with washers shall be inserted through both strips of overlapped cloth at not greater than the following intervals along a line through the midpoint of the overlap:

Pin Spacing	Slope
2 feet	Steeper than 3:1
3 feet	3:1 to 4:1
5 feet	Flatter than 4:1

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- (1) Additional pins regardless of location shall be installed as necessary to prevent any slippage of the filter fabric. Each securing pin shall be pushed through the fabric until the washer bears against the fabric and secures it firmly to the foundation.
- (2) Bags of soil or other methods approved by the DIA Project Manager shall be used to secure the geotextile during installation.

- E. The fabric shall be protected at all times during construction from contamination by surface runoff and any fabric so contaminated shall be removed and replaced with uncontaminated fabric.
- F. Should the fabric be damaged during any of the installation, the torn or punctured section shall be repaired by placing a piece of fabric which extends at least 18 inches in all directions beyond the damaged area. The fabric shall be sewn, secured with pins and washers as described above, or other methods as approved by the DIA Project Manager.

3.02 UNDERDRAIN/PAVEMENT APPLICATIONS

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- A. The filter geotextile shall be placed in the excavated trench prior to placement of underdrain gravel. Fabric shall surround all aggregate and pipe placed as the drainage media. Fabric shall be in direct contact with the adjacent soil.
- B. Geotextiles shall be overlapped a minimum of 12 inches in the direction of flow.
- C. Care shall be taken during aggregate filter placement operation and pipe installation to prevent damage to the fabric.
- D. Subbase shall be cleared of all sharp objects.
- E. Unroll geotextile fabric on prepared subbase. Provide minimum 18-inch overlap of material. Provide minimum 12-inch overlap of material with geotextile lining of underdrain trench.
- F. Place overlying drainable asphalt treated permeable base material in same direction as the geotextile overlap to avoid separation. Construction equipment other than

190 hauling and paving equipment necessary for placement of the drainable base shall
191 not be allowed on the geotextile. Operate hauling and paving equipment in a manner
192 to prevent damage or displacement of the geotextile. Equipment shall avoid sudden
193 acceleration, hard braking, and sharp turns while on the geotextile, and the paver
194 shall not turn while on the geotextile. Large fabric wrinkles which may develop during
195 the spreading operations shall be folded and flattened in the direction of the
196 spreading. Special care shall be given to maintaining proper overlap and fabric
197 continuity.

198
199 G. After placement of the drainable base, wrap geotextile around edge of drainable base
200 to completely surround exposed drainable base. The exposed fabric shall then be
201 covered with the subsequent course.

202
203 H. Any damage to the fabric, such as tears, puncture, or excessive displacement, shall
204 be repaired. The drainable base shall be cleared from the fabric and the damaged
205 area repaired as previously described Section 3.1-f.

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207

208 **PART 4 METHOD OF MEASUREMENT**

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4.01 Refer to Appendix A for Method of Measurement.

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214 **PART 5 BASIS OF PAYMENT**

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216

5.01 Refer to Appendix A for Basis of Payment.

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218

219 **PART 6 MATERIAL REQUIREMENTS**

220
221

American Society for Testing and Materials (ASTM)

222
223

ASTM D 5199 Method for Measuring Thickness of Textile Materials

224
225

ASTM D 5261 Test Method for Mass per Unit Area (Weight) of Woven Fabric

226
227

ASTM D 3786 Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven
228 Fabrics: Diaphragm Bursting Strength Tester Method.

229
230

ASTM D 4355 Test Method for Deterioration of Geotextiles from Exposure to ultraviolet Light
231 and Water (Xenon-Arc Type Apparatus)

232
233

ASTM D 4491 Test Methods for Water Permeability of Geotextiles by Permittivity

234
235

ASTM D 4533 Test Method for Trapezoid-Tearing Strength of Geotextiles

236
237

ASTM D 4632 Test Method for Breaking Load and Elongation of Geotextiles (Grab Method)

238
239

ASTM D 4751 Test Method for Determining the Apparent Opening Size of a Geotextile

240
241

ASTM D 4833 Index Puncture Resistance of Geotextiles, Geomembranes, and Related
242 Products.

243
244

245

END OF ITEM P-161

1
2 **ITEM P-162**

3
4 **CONTROLLED LOW-STRENGTH MATERIAL (CLSM)**

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6
7 **PART 1 DESCRIPTION**

8
9 1.01 This item shall consist of furnishing, transporting, and placing a controlled low-strength material
10 (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as directed by
11 the Engineer.
12

13
14 **PART 2 MATERIALS**

15
16 2.01

17 A. Portland Cement: Portland cement shall conform to the requirements of ASTM C 150
18 Type V or an equivalent Type I/II cement meeting the requirements of Item P-501, 2.02. If
19 for any reason, cement becomes partially set or contains lumps of caked cement, it shall
20 be rejected. Cement salvaged from discarded or used bags shall not be used.
21

22 B. Fly Ash: Fly Ash shall conform to ASTM C 618, Class F.
23

24 C. Fine Aggregate (Sand): Fine aggregate shall conform to the requirements of ASTM C 33
25 except for aggregate gradation. Any aggregate gradation which produces performance
26 characteristics of the CLSM specified herein will be accepted, except as follows.
27

<u>Sieve Size</u>	<u>Percent Passing by weight</u>
3/4 inch (19.0 mm)	100
No. 200 (0.075 mm)	0 - 12

28
29
30
31
32 D. Water: Water used in mixing shall be free of oil, salt, acid, alkali, sugar, vegetable matter,
33 or other substances injurious to the finished product.
34

35 E. The flowable backfill used in the construction of the L-110, Duct Bank, shall have Red
36 Color added.
37

38
39 **PART 3 CONSTRUCTION METHODS**

40
41 3.01 MIX DESIGN

42
43 PROPORTIONS The mix design shall contain a minimum 50 pounds of cement and 250
44 pounds of fly ash per cubic yard (30 kg cement and 148 kg of fly ash per cubic meter), with
45 the remainder of the volume composed of sand, water, and any admixtures. Additional
46 cement may be substituted for fly ash
47

48
49 A. Compressive Strength: CLSM shall be designed to achieve a 28-day compressive
50 strength of 50 to 300 psi (345 to 2,070 kPa) when tested in accordance with ASTM C 39.
51 There should be no significant strength gain after 28 days. Test specimens shall be
52 made in accordance with ASTM D 4832.
53

54 B. Consistency: Consistency of the fresh mixture shall such that the mixture may be placed

55 without segregation. A desired consistency may be approximated by filling an open-
56 ended three inch (75 mm) diameter cylinder, six inches (150 mm) high to the top, with the
57 mixture and the cylinder immediately pulled straight up. The correct consistency of the
58 mixture will produce an approximate eight inch (205 mm) diameter circular-type spread
59 without segregation. Adjustments of the proportions of materials should be made to
60 achieve proper solid suspension and flowable characteristics, however the theoretical
61 yield shall be maintained at one cubic yard (cubic meter) for the given batch weights.
62

63 3.02 TESTING LABORATORY The laboratory used to develop the mix design shall meet the
64 requirements of ASTM C 1077 including accreditation. Accreditation shall include all test
65 procedures required to develop the mix design. A certification signed by the manager of the
66 laboratory stating it meets these requirements shall be submitted to the Project Manager. The
67 certification shall contain as a minimum:

- 68
- 69 A. Qualifications of personnel: including the laboratory manager, supervision technician and
70 testing technicians.
 - 71
 - 72 B. Evidence of current accreditation by a nationally recognized laboratory accreditation
73 organization for all the test methods used in developing the mix design.
74

75

76 3.03 MIX DESIGN SUBMITTAL The Contractor shall submit a mix design to the Project Manager for
77 the CLSM at least 30 days prior to use. The mix design **will not** be approved when the
78 laboratory trial mix data and materials Certificates of Compliance are the results from
79 tests performed more than one (1) year in the past. The laboratory trial mix submittal
80 package shall include the following:

- 81
- 82 A. The weights and sources of all ingredients including cement, fly ash, aggregates, water
83 and the water/cement ratio (w/c).
84
 - 85 B. Certified Certificates of Compliance showing the cement, fly ash, aggregates and
86 additives meet the specification requirements and supporting this statement with actual
87 test results.
88
 - 89 C. The laboratory trial mix data, consisting of:
 - 90 • Mix identification number
 - 91 • Date mix was developed
 - 92 • Developer of mix
 - 93 • Consistency
 - 94 • Weight per cubic foot
 - 95 • Yield
 - 96 • Air content
 - 97 • Compressive strength (at least two specimens at seven days and three
98 specimens at twenty-eight days)
 - 99
 - 100 D. Testing laboratory qualifications required in Item P-162, Part 3, 3.02.

101

102 3.04 PLACEMENT

- 103
- 104 A. Placement CLSM may be placed by any reasonable means from a mixing unit into the
105 space to be filled. Agitation is required during transportation and waiting time. Placement
106 shall be performed in such a manner that structures or pipes are not displaced from their
107 desired final position and intrusion of CLSM into undesirable areas is avoided. The
108 material shall be brought up uniformly to the fill line shown on the plans or as directed to

109 the Project Manager. Each placement of CLSM shall be as continuous an operation as
110 possible. If CLSM is placed in more than one layer, the base layer shall be free of surface
111 water and loose or foreign material prior to placement of the next layer.
112

113 B. Limitations of Placement CLSM shall not be placed on frozen ground. Mixing and placing
114 may begin when the air or ground temperature is at least 35 degrees F (2 degrees C) and
115 rising. At the time of placement, CLSM shall have a temperature of at least 40 degrees F
116 (4 degrees C). Mixing and placement shall stop when the air temperature is 40 degrees F
117 (4 degrees C) and falling or when the anticipated air or ground temperature will be 35
118 degrees F (2 degrees C) or less in the 24 hour period following proposed placement.
119

120
121 **3.05 CURING AND PROTECTION**
122

123 A. Curing The air in contact with the CLSM should be maintained at temperatures above
124 freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32
125 degrees F (0 degrees C), the material may be rejected by the Engineer if damage to the
126 material is observed.
127

128 B. Protection The CLSM shall not be subject to loads and shall remain undisturbed by
129 construction activities for a period of 48 hours or until a compressive strength of 15 psi
130 (105 kPa) is obtained. The Contractor shall be responsible for providing evidence to the
131 Engineer that the material has reached the desired strength. Acceptable evidence shall
132 be based upon compressive tests made in accordance with paragraph 153-3.01.A.
133

134 **3.06 ACCEPTANCE:** Acceptance of CLSM delivered and placed as shown on the plans or as directed
135 by the Project Manager shall be based upon mix design approval and batch tickets provided by
136 the Contractor to confirm that the delivered material conforms to the mix design. The Contractor
137 shall verify by additional testing, each 5,000 cubic yards (3,825 cubic meters) of material used.
138 Verification shall include confirmation of material proportions and tests of compressive strength to
139 confirm that the material meets the original mix design and the requirements of CLSM as defined
140 in this specification. Adjustments shall be made as necessary to the proportions and materials
141 prior to further production.
142

143
144 **PART 4 METHOD OF MEASUREMENT**
145

146 4.01 Refer to Appendix A for Method of Measurement..
147

148
149 **PART 5 BASIS OF PAYMENT**
150

151 5.01 Refer to Appendix A for Basis of Payment.
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PART 6 MATERIAL REQUIREMENTS

- ASTM C 33 Concrete Aggregates
- ASTM C 94 Ready-Mixed Concrete
- ASTM C 150 Portland Cement
- ASTM C 260 Air Entraining Admixtures for Concrete
- ASTM C 618 Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement concrete
- ASTM C 685 Concrete Made by Volumetric Batching and Continuous Mixing

PART 7 TESTING REQUIREMENTS

- ASTM C 117 Materials Finer than 75 μ m (No.200) Sieve in Mineral Aggregates by Washing
- ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates
- ASTM C 143 Slump of Hydraulic Cement Concrete
- ASTM D 75 Sampling Aggregates
- ASTM D 558 Moisture-Density Relations of Soil-Cement Mixtures
- ASTM D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D 4832 Preparation and Testing of Soil-Cement Slurry Test Cylinders

END OF ITEM P-162

ITEM P-301

SOIL-CEMENT BASE COURSE

PART 1 GENERAL

1.01 DESCRIPTION This item shall consist of constructing a base course by uniformly mixing together soil, Portland cement, and water. The mixed material shall be spread, shaped, and compacted in accordance with these specifications and in conformity to the dimensions and typical cross section shown on the plans.

Runway, taxiway, or apron pavements shall be built in a series of parallel lanes using a plan of processing that reduces longitudinal and transverse joints to a minimum.

PART 2 MATERIALS

2.01 PORTLAND CEMENT Portland cement shall conform to the requirements of ASTM C 150, Type V, or equivalent.

2.02 WATER Water shall be clean and free from sewage, oil, acid, strong alkalis, or vegetable matter. Water of questionable quality shall be tested in accordance with the requirements of AASHTO T 26.

2.03 SOIL The soil shall consist of the upper most 18 inches of select embankment as placed and paid for by Specifications Item P-152b, Select Embankment. The soil shall meet the requirements of P-152, 2.03 B.

2.04 BITUMINOUS MATERIAL The types, grades, controlling specifications, and application temperatures for the bituminous materials used for curing the soil-cement are listed in Table 1. The Designer of Record shall approve the specific material used.

TABLE 1. BITUMINOUS MATERIALS

Type and Grade	Specification	Application Deg. F	Temperature Deg. C
Cutback Asphalt			
RC-70	ASTM D 2028	120-160	50-70
RC-250	ASTM D 2028	160-200	70-95
Emulsified Asphalt			
RS-1, SS-1	ASTM D 977	75-130	25-55
CRS-1	ASTM D 2397	75-130	25-55

PART 3 CEMENT QUANTITY

3.01 LABORATORY SOIL TESTS Prior to soil-cement base course construction, laboratory tests of soils shall be made to determine the quantity of cement required in the mix to provide a minimum 200 psi unconfined compressive strength. Mix designs shall be required for each soil type or combination of soils. The test specimens shall be fabricated in accordance with ASTM D 558, cured at 100 degrees F for 5 days, and tested for compressive strength in accordance with ASTM D 1633.

- 57 3.02 TESTING LABORATORY The Contractor shall employ a testing laboratory to design the soil-
58 cement base course mixture. The laboratory shall meet the requirements of ASTM D 3740
59 including accreditation Accreditation shall include all test procedures required to develop the mix
60 design. A certification signed by the manager of the laboratory stating it meets these
61 requirements shall be submitted to the Project Manager. The certification shall contain as a
62 minimum:
63
64 A. Qualifications of personnel; including the laboratory manager, supervising technician, and
65 testing technicians involved in developing the soil-cement base course mixture.
66
67
68 B. Evidence of current accreditation by a nationally recognized laboratory accreditation
69 organization for all test methods used in developing the soil-cement base course mixture.
70
71
72 3.03 MIX DESIGN SUBMITTAL The contractor shall submit the laboratory soil-cement base course
73 mix design to the Project manager at least thirty (30) days prior to use. The submittal shall include
74 the following:
75
76 A. Source of soil
77 B. Gradation of soil
78 C. Atterberg limits of soil
79 D. Water soluble sulfate content of soil
80 E. Swell potential of soil
81 F. Certificate of Compliance current within one (1) year verifying that the cement meets the
82 specification requirements and support of this statement with test results
83 G. Moisture-density relationships for each cement content
84 H. Compressive strength results for each cement content
85 I. Recommended cement content
86 J. Testing laboratory qualifications required in 3.02
87
88
89

90 **PART 4 CONSTRUCTION METHODS**

- 91
92 4.01 WEATHER LIMITATIONS The soil-cement base shall not be mixed or placed while the
93 atmospheric temperature is below 35°F or when conditions indicate that the temperature may fall
94 below 35°F within 24 hours, or when the weather is foggy or rainy, or when the soil or subgrade is
95 frozen.
96
97 4.02 EQUIPMENT The soil-cement base course may be constructed with any equipment that will meet
98 the requirements for soil pulverization, cement application, mixing, water application, incorporation
99 of materials, compaction, finishing, and curing specified herein.
100
101 4.03 PREPARATION The area to be paved shall be graded and shaped to conform to the grades and
102 typical cross section shown on the plans. Any soft or yielding areas in the subgrade shall be
103 removed and replaced with acceptable soil and compacted as specified.
104
105 4.04 PULVERIZATION The soil for the soil-cement base course shall be so pulverized that at the
106 completion of moist-mixing, 100% by dry weight passes a 1-inch (25 mm) sieve and a minimum of
107 80% passes a No. 4 sieve, exclusive of gravel or stone retained on the No. 4 sieve.
108
109 4.05 CEMENT APPLICATION, MIXING, AND SPREADING Mixing of the soil, cement, and water shall
110 be accomplished either by the mixed-in-place or the central-plant-mixed method.
111
112 The percentage of moisture in the soil, at the time of cement application, shall not exceed the
113 quantity that will permit a uniform and intimate mixture of soil and cement during mixing

114 operations, and it shall not exceed the specified optimum moisture content for the soil-cement
115 mixture.

116
117 (1) Method A - Mixed-in-place The specified quantity of cement shall be spread uniformly on the
118 soil.

119
120 Cement that has been displaced shall be replaced before mixing is started. After the cement
121 has been applied, it shall be mixed with the soil. Mixing shall continue until the cement has
122 been sufficiently blended with the soil to prevent the formation of cement balls when water is
123 applied.

124
125 Immediately after the soil and cement have been mixed, water shall be incorporated into the
126 mixture. Excessive concentrations of water on or near the surface shall be avoided. A water
127 supply and pressure distributing equipment shall be provided that will assure the application
128 within 3 hours of all mixing water on the section being processed. After all mixing water has
129 been applied, mixing shall continue until a uniform and intimate mixture of soil, cement, and
130 water has been obtained.

131
132 The Project Manager may stop the dry mixing application if blowing of cement dust becomes
133 a hindrance to airfield operations. The Contractor shall not spread more dry cement than
134 what his forces can mix within a one-hour time frame. This quantity may be reduced by the
135 Project Manager if, in his/her opinion the blowing cement dust is a hazard to airfield
136 operations.

137
138 (2) Method B - Central plant mixed The soil, cement, and water shall be mixed in a pugmill,
139 either of the batch or continuous-flow type. The plant shall be equipped with feeding and
140 metering devices, which will add the soil, cement, and water into the mixer in the specified
141 quantities. Soil and cement shall be mixed sufficiently to prevent cement balls from forming
142 when water is added. Mixing shall continue until a uniform and intimate mixture of soil,
143 cement, and water is obtained.

144
145 The mixture shall be hauled to the project in trucks equipped with protective covers. The
146 mixture shall be placed on the moistened subgrade in a uniform layer by an approved
147 spreader(s).

148
149 If the design thickness of the soil-cement exceeds 8 inches it shall be placed in equal lifts not
150 less than 4 inches compacted and not greater than 8 inches compacted, uniform in surface
151 contour.

152
153 Not more than 60 minutes shall elapse between the start of moist mixing and the start of
154 compaction of the soil-cement base course.

155
156 4.06 COMPACTION Immediately upon completion of the spreading operations, the mixture shall be
157 thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the
158 mixture to the required density.

159
160 The field density of the compacted mixture shall be at least 98.0 percent of the maximum density
161 of laboratory specimens prepared from samples of the soil-cement base course taken from the
162 material in place. The specimens shall be compacted and tested in accordance with ASTM D
163 558. The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D
164 6938.. If ASTM D 6938 is used, reference GP-120 Nuclear Gauges. Any mixture that has not
165 been compacted shall not be left undisturbed for more than 30 minutes. The moisture content of
166 the mixture at the start of compaction shall not be below the optimum moisture content as
167 determined by ASTM D 558.

168
169

- 170 4.07 FINISHING Finishing operations shall be completed during daylight hours, and the completed
171 soil-cement base course shall conform to the required lines, grades, and cross section. Finishing
172 shall be done in such a manner as to produce a dense surface free of compaction planes, cracks,
173 ridges, or loose materials and will conform to the required grade and cross section. If necessary, the
174 surface shall be lightly scarified to eliminate any imprints made by the compacting or shaping
175 equipment. The surface shall be kept damp during the finishing operations then - re-compacted
176 to the required density using steel-wheel and pneumatic-tire rollers.
177
- 178 4.08 CONSTRUCTION JOINTS At the end of each day's run, a transverse construction joint shall be
179 formed by a header or by cutting back into the compacted material to form a true vertical face free
180 of loose material.
181
182 The protection provided for construction joints shall permit the placing, spreading, and compacting
183 of base material without injury to the work previously laid. Where it is necessary to operate or turn
184 any equipment on the completed base course, sufficient protection and cover shall be provided to
185 prevent damage to the finished surface. A supply of mats or wooden planks shall be maintained
186 and used as approved and directed by the Project Manager.
187
188 Care shall be exercised to ensure thorough compaction of the soil-cement base course
189 immediately adjacent to all construction joints. When spreading or compacting soil-cement base
190 course adjacent to a previously constructed lane, care shall be taken to prevent injury to the work
191 already constructed.
192
193
- 194 4.09 PROTECTION AND CURING After the soil-cement base course has been finished as specified
195 herein, it shall be protected against drying for a period of 7 days by the application of bituminous
196 material or other acceptable methods. The curing method shall begin as soon as possible, but no
197 later than 24 hours after the completion of finishing operations. The finished soil-cement base
198 course shall be kept moist continuously until the curing material is placed.
199
200 The bituminous material specified shall be uniformly applied to the surface of the completed soil-
201 cement base course at the rate of approximately 0.2 gallon per square yard (0.92 liter/square
202 meter) with approved heating and distributing equipment. The exact rate, and temperature of
203 application to give complete coverage without excessive runoff shall be as specified.
204
205 At the time the bituminous material is applied, the surface shall be dense, free of all loose and
206 extraneous material, and shall contain sufficient moisture to prevent penetration of the bituminous
207 material. Water shall be applied in sufficient quantity to fill the surface voids immediately before
208 the bituminous curing material is applied.
209
210 The curing material shall be maintained and applied as needed by the Contractor during the 7-day
211 protection period so that all of the soil-cement base course will be covered effectively during this
212 period.
213
214 Finished portions of soil-cement base course that are used by equipment in constructing an
215 adjoining section shall be protected to prevent equipment from marring or damaging the
216 completed work.
217
218 When the air temperature may be expected to reach the freezing point, sufficient protection from
219 freezing shall be given the soil-cement base course for 7 days after its construction and until it has
220 hardened.
221
222 Other curing materials such as moist straw or hay may be used if approved.
223
- 224 4.10 CONSTRUCTION LIMITATIONS When any of the operations after the application of cement are
225 interrupted for more than 30 minutes or when the un-compacted soil-cement base course mixture
226 exceeds the upper limit of the moisture content tolerance the portion affected shall be removed at

227 the Contractor's expense. In the event the uncompacted, rain-wetted mixture exceeds the
228 specified moisture content tolerance, the Contractor shall reconstruct at his/her expense the
229 portion affected. All material along the longitudinal or transverse construction joints not properly
230 compacted shall be removed and replaced, at the Contractor's expense, with properly moistened
231 and mixed soil-cement base course compacted to specified density.

232
233 4.11 SURFACE TESTS The finished surface shall not vary more than 3/8 inch (9 mm) when tested
234 with a 16-foot (4.8 m) straightedge applied parallel with, or at right angles to, the longitudinal axis
235 of the pavement. Any variations in excess of this tolerance shall be corrected by the Contractor,
236 at his/her own expense, and in a manner satisfactory to the Project Manager.

237
238 A. Grade tolerance; True grade will not vary more than plus zero to minus 1/2 inch from
239 design grade.

240
241 4.12 THICKNESS The thickness of the soil-cement base course shall be determined from
242 measurements of cores drilled from the finished base or from thickness measurements at holes
243 drilled in the base at intervals so that each test shall represent no more than 300 square yards
244 (250 square meters). The average thickness of the base constructed during one day shall be
245 within 1/2 inch (12 mm) of the thickness shown on the plans, except that the thickness of any one
246 point may be within 3/4 inch (13 mm) of that shown on the plans. Where the average thickness
247 shown by the measurements made in one day's construction is not within the tolerance given, the
248 Project Manager shall evaluate the area and determine if, in his/her opinion, it shall be
249 reconstructed at the Contractor's expense or the deficiency deducted from the total material in
250 place.

251
252 4.13.1 MAINTENANCE The Contractor shall be required to maintain, at his/her own expense, the entire
253 soil-cement base course within the limits of his/her contract in a condition satisfactory to the
254 Engineer from the time he starts work until all the work has been completed. Maintenance shall
255 include immediate repairs of any defects that may occur either before or after the cement is
256 applied. The work shall be done by the Contractor at his/her own expense and repeated as often
257 as necessary to keep the area intact at all times. Repairs shall be made in a manner that will
258 insure restoration of a uniform surface and the durability of the part repaired. Faulty work must be
259 replaced for the full depth of treatment. Any low areas shall be remedied by replacing the material
260 for the full depth of treatment rather than by adding a thin layer of soil-cement base course to the
261 completed work.

262
263

264 PART 5 QUALITY ASSURANCE TESTING

265
266 5.01 CONTRACTOR'S INDEPENDENT TESTING AGENCY The Contractor's Independent Testing
267 Agency shall provide all testing. The Independent Testing Agency shall meet the requirements of
268 Section 01401 and have been approved through the submittal process prior to performing testing.

269
270 The testing shall be performed in accordance with the requirements of 4.06 and the Test
271 Schedule. Test results for in-place density and moisture content shall be given to the DIA
272 Inspector in rough draft form upon completion of the day's testing. Electronic copies of the in-
273 place density and moisture content tests and ASTM D 558 tests shall be provided to the Project
274 Manager and the QA Lab Manager the following morning. All test results shall be typed and
275 included in the weekly summary reports in accordance with Section 01401, 1.06. In addition, all
276 test results shall be typed and included in the weekly summary reports in accordance with Section
277 01401, 1.06.

278
279 The Project Manager's Quality Assurance Lab may perform intermittent testing. This testing may
280 be in conjunction or independent of the testing performed by the Contractor's Independent Testing
281 Agency.

282

283 Any soil-cement base course construction that does not meet specification requirements as
284 indicated by testing performed by the Contractor's Independent Testing Agency shall be re-
285 worked, at the Contractor's expense, to bring that work within specification requirements.
286

287 Upon completion of the testing, the Independent Testing Agency shall provide documentation
288 stating the moisture content, compaction, compression strength, and test frequencies meet
289 project specifications. This documentation shall be signed and stamped by an Engineer employed
290 by the Independent Testing Agency in the State of Colorado.
291
292
293
294
295
296

297 **TEST SCHEDULE**

298
299 Use of most current version of ASTM Standard is required.
300

301 <u>Test Type</u>	302 <u>Test Standard</u>	303 <u>Minimum Frequency of Tests</u>
304 Moisture-Density 305 Relations	306 ASTM D 558	307 Two each for the first 2 days of 308 placement, then 1 test each day there 309 after. Additional ASTM D 558 tests shall be 310 performed as variations in the soil-cement base 311 course occur and when in-place density tests 312 do not correlate with previous ASTM D 558 tests 313 results.
314 In-Place Density and 315 Moisture Content 316 ASTM D 1556	317 One test each for each 300 square 318 yards of soil-cement base course material 319 placed per lift, per day or fraction thereof. 320 ASTM D 6938	
321 Compressive 322 Strength	323 ASTM D 558 324 ASTM D 1633	325 a. One set of four cylinders per 6,000 326 square yards or a minimum 2 sets 327 per day. 328 Two sealed and cured for five days 329 accelerated. 330 Two sealed and cured for 28 days at 331 ambient temperature. 332 b. Strength not corrected for diameter.

331 **PART 6 METHOD OF MEASUREMENT**

332
333 6.01 Refer to Appendix A for Basis of Measurement.
334
335

336 **PART 7 BASIS OF PAYMENT**

337
338 7.01 Refer to Appendix A for Basis of Payment.
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PART 8 TESTING REQUIREMENTS

ASTM C 136 Sieve or Screen Analysis of Fine and Coarse Aggregate

ASTM D 558 Moisture-Density Relations of Soil-Cement Mixtures

ASTM D 1556 Test for Density of Soil In-Place by the Sand Cone Method

ASTM D 1663 Compressive Strength of Molded Soil-Cement Cylinders

ASTM D 6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

PART 9 MATERIAL REQUIREMENTS

ASTM C 150 Portland Cement

ASTM D 977 Emulsified Asphalt

ASTM D 202 Liquid Asphalt (Rapid Curing Type)

ASTM D 239 Cationic Emulsified Asphalt

AASHTO T 26 Quality of Water to be used in Concrete

END OF ITEM P-301

ITEM P-304

CEMENT-TREATED BASE COURSE

PART 1 GENERAL

1.01 Description This material shall consist of a base course composed of mineral aggregate and cement uniformly blended and mixed with water. The mixed material shall be spread, shaped, and compacted in accordance with these specifications and in conformity to the lines, grades, dimensions, and typical cross sections shown on the plans. Runway, taxiway, or apron pavements shall be built in a series of parallel lanes using a plan of processing that reduces longitudinal and transverse joints to a minimum. The freeze-thaw weight loss shall not exceed 14 percent after 12 cycles when tested in accordance with ASTM D 560.

PART 2 MATERIALS

2.01 Portland Cement Portland cement shall conform to the requirements of ASTM C 150 Type V, or equivalent.

2.02 Water Water shall be clean, clear, and free from injurious amounts of sewage, oil, acid, strong alkalis, or vegetable matter, and it shall be free from clay or silt. If the water is of questionable quality, it shall be tested in accordance with the requirements of AASHTO T 26.

2.03 Aggregate The aggregate shall be select granular materials or crushed reclaimed concrete meeting the gradation requirements given in Table 1. The material shall be free of roots, sod, and weeds. The crushed or uncrushed coarse aggregate shall consist of hard, durable particles of accepted quality with a percentage of wear not exceeding 50 as determined by the Los Angeles test, ASTM C 131. The aggregate shall be free from an excess of flat, elongated, soft, or disintegrated pieces, or objectionable matter. The method used in producing the aggregate shall be such that the finished product shall be as consistent as practicable. All stones and rocks of inferior quality shall be wasted.

The aggregate shall conform to the gradation shown in Table 1 when tested in accordance with ASTM C 136.

Table 1
Aggregate Cement-Treated Base Course

Sieve Size	Percentage by weight Passing Sieves
1 in. (50 mm)	100
No. 4 (4.75 mm)	45-100
No. 10 (1.80 mm)	37-80
No. 40 (450 micro-m)	15-50
No. 80 (210 micro-m)	0-25

45 The gradations in the table represent the limits which shall determine suitability of aggregate for
 46 use from the sources of supply. The final gradations decided on, within the limits designated in the
 47 table, shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to
 48 the high limit on adjacent sieves, or vice versa. The portion of the base aggregate, including any
 49 blended material, passing the No. 40 sieve shall have a liquid limit of not more than 25 and a
 50 plasticity index of not more than 6 when tested in accordance with ASTM D 4318.

51
 52 All aggregate samples required for testing shall be furnished by the Contractor at the expense of
 53 the Contractor. Sampling shall be in accordance with ASTM D 75 and will be observed by the
 54 Project Manager.

55
 56 2.04 Bituminous Material The types, grades, controlling specifications and application temperatures for
 57 the bituminous material are given in Table 2.

58
 59 **Table 2**
 60 **Bituminous Material**

Type and Grade	Specification	Application Temperature	
		Deg. F	Deg. C
Cutback Asphalt			
RC-70	ASTM D 2028	120-160	50-70
RC-250	ASTM D 2028	160-200	70-95
Emulsified Asphalt			
RS-1, SS-1	ASTM D 977	75-130	25-55
CRS-1	ASTM D 2397	75-130	25-55

61
 62
 63
 64 **PART 3 CEMENT CONTENT**

65
 66 3.01 Prior to start of work, laboratory tests of materials submitted by the Contractor shall be made to
 67 determine the quantity of cement required in the mix. The cement content for construction shall be
 68 that at which the mix develops a 7-day compressive strength of at least 750 psi (5170 kPa), but
 69 not more than 1,200 psi (8,274 kPa). The testing procedure shall be as follows: mold and cure
 70 specimens in accordance with ASTM D 560; soak specimens in water for 4 hours; cap and break
 71 specimens in compression in accordance with ASTM D 1633.

72
 73 3.02 TESTING LABORATORY The Contractor shall employ a testing laboratory to design the soil-
 74 cement base course mixture. The laboratory shall meet the requirements of ASTM D 3740
 75 including accreditation by a national authority such as the National Voluntary Laboratory
 76 Accreditation Program (NVLAP), the American Association for Laboratory Accreditation (AALA),
 77 or AASHTO Accreditation Program (AAP). Accreditation shall include all test procedures required
 78 to develop the mix design. A certification signed by the manager of the laboratory stating it meets
 79 these requirements shall be submitted to the Project Manager. The certification shall contain as a
 80 minimum:

- 81
 82 A. Qualifications of personnel; including the laboratory manager, supervising technician, and
 83 testing technicians involved in developing the cement-treated base course mixture..
 84
 85 B. Evidence of current accreditation by a nationally recognized laboratory accreditation
 86 organization for all test methods used in developing the cement-treated base course
 87 mixture
 88

PART 4 CONSTRUCTION METHODS

4.01 WEATHER LIMITATIONS The cement-treated base course shall not be mixed or placed while the atmospheric temperature is below 40°F (4°C) or when conditions indicate that the temperature may fall below 35°F (2°C) within 24 hours or when the weather is rainy. Cement-treated base course shall not be placed on frozen subgrade or mixed when aggregate is frozen. If temperature will fall below 32 °F blanket to protect from freezing for 3 days. Trim areas failing due to weather, replace with P-501 concrete.

4.02 Operation at Pits All work involved in clearing and stripping pits, including handling unsuitable material, shall be performed by the Contractor. The Contractor shall notify the Project Manager sufficiently in advance of opening of any designated pit to permit staking of boundaries at the site, to take elevations and measurements of the ground surface before material is produced, to permit the Project Manager to take samples of the material for tests to determine its quality and gradation, and to prepare a preliminary design of base mixture.

The pits, as utilized, shall be opened immediately to expose vertical faces of the various strata of acceptable material and, unless otherwise directed, the material shall be secured in successive vertical cuts extending through all the exposed strata in order to secure a uniform material.

4.03 Preparing Underlying Course The underlying course shall be checked and accepted 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 before the base course is placed thereon.

4.04 Mixing The aggregate shall be proportioned and mixed with cement and water in a central mixing plant. The plant shall be equipped with feeding and metering devices which will introduce the cement, aggregate, and water into the mixer in the quantities specified. Mixing shall continue until a thorough and uniform mixture has been obtained.

4.05 Placing The mixture shall be transported to the job site in suitable vehicles and shall be deposited on the moistened subbase in uniform layers by means of approved mechanical spreaders. Not more than 60 minutes shall elapse between the start of moist mixing and the start of compaction of the cement-treated mixture on the prepared subgrade.

It is the intent of this Specification that the Contractor construct the plan depth of cement treated base in one homogenous mass. The addition of thin stabilized layers will not be permitted in order to provide the specified depth.

4.06 Acceptance Sampling and Testing of Cement-Treated Base Course. The Contractor's Independent Testing Agency shall provide all testing. The Independent Testing Agency shall meet the requirements of Section 01401 and have been approved through the submittal process prior to performing testing.

Upon completion of the testing, the Independent Testing Agency shall provide documentation stating the moisture content, compaction, and test frequencies meet project specifications. This documentation shall be signed and stamped by an Engineer employed by the Independent Testing Agency in the State of Colorado.

The Project Manager's Quality Assurance Lab may perform intermittent testing. This testing may be in conjunction or independent of the testing performed by the Contractor's Independent Testing Agency.

143 Immediately upon completion of the spreading operations, the mixture shall be thoroughly
144 compacted. The number, type, and weight of rollers shall be sufficient to compact the mixture to
145 the required density.
146

147 The cement-treated base course shall be accepted for density on a lot basis. A lot will consist of
148 1200 square yards or one day's production, whichever is less, and will be divided into four equal
149 sublots. One test shall be made for each subplot. Sampling locations will be determined by the
150 Project Manager on a random basis in accordance with statistical procedures contained in ASTM
151 D 3665.
152

153 Each lot of compacted material will be accepted, with respect to density, when the average field
154 density is equal to or greater than 98.0 percent of the maximum density of laboratory specimens
155 prepared from samples of cement-treated base course taken from the material in place.
156

157 The laboratory specimens shall be compacted and tested in accordance with ASTM D 558.
158 ASTM D 558 tests shall be provided at a frequency of two each day for the first two days of
159 placement. Additional ASTM D 558 tests shall be performed as variations in the cement-treated
160 base course occur and when in-place dry density tests do not correlate with previous ASTM D 558
161 test results. The in-place field density shall be determined in accordance with ASTM D 1556 or
162 ASTM D 2167.
163

164 In lieu of the sand cone or rubber balloon method of field density determination, acceptance
165 testing may be accomplished using a nuclear gauge in accordance with ASTM D 2922. The
166 gauge shall be calibrated in accordance with paragraphs 7 and 8 of ASTM D 2922.
167

168 Use of ASTM D 2922 results in a wet unit weight, and when using this method ASTM D 3017 shall
169 be used to determine the moisture content of the material. The gauge shall also be calibrated in
170 accordance with paragraph 7 of ASTM D 3017.
171

172 If a nuclear gauge is used for density determination, two random readings shall be made for each
173 subplot.
174

175 The lot will be accepted without adjustment in payment if the average density, based on four
176 acceptance tests of the lot, is greater than or equal to 98.0 percent. If the average density does
177 not meet this requirement, the Contractor may elect to leave the lot in place at a reduced unit
178 price determined in accordance with Table 3.
179

180 Table 3
181 Sliding Scale Pay Factors
182

Average Percent Density	Recommended Percent Payment
98.0 and greater	100
97.0-97.9	95
96.0-96.9	90
95.0-95.9	75
Less than 95.0	Reject

183 Any mixture that has not been compacted shall not be left undistributed for more than 30 minutes.
184 The moisture content of the mixture at the start of compaction shall not be above nor more than 2
185 percentage points below the optimum moisture content. (0 to -2% of optimum moisture content.)
186 The optimum moisture content shall be determined in accordance with ASTM D 558 and shall be
187 less than that amount which will cause the mixture to become unstable during compaction and
188 finishing.
189
190

191 The cement treated base course shall also be accepted for payment with respect to compacted
192 depth on a lot basis. The lot size sample locations, and numbers of test per subplot shall be as
193 described above. Each lot of compacted cement treated base course shall be accepted when the
194 average depth of the lot is not less than 0.25 inches from the plan depth. If the average thickness
195 does not meet this requirement, the Contractor may elect to leave the lot in place at a reduced
196 unit price determined in accordance with Table 4.
197

198 Depth tests on cement treated base will be accomplished by survey, cores, drilled holes, or driven
199 depth tool gauge as determined by the Engineer. If core, drilled holes, or driven tool gauge
200 method is selected, acceptance will be based on a minimum average of four (4) depth
201 measurements per lot.
202

203 Table 4
204 Depth Deficiency Pay Factors

Depth Deficiency, inches	Recommended Percent Payment
0.00 to 0.25	100
0.26 to 0.50	80
0.51 to 1.00	60
Over 1.00	Reject

205
206
207 4.07 Layer Thickness The maximum depth of a compacted layer shall be 6 inches (150 mm), except
208 where that total depth of the compacted base course is required to be greater than 6 inches (150
209 mm), no layer shall be in excess of 8 inches (200 mm) or less than 4 inches (100 mm) when
210 compacted. In multilayer construction, the surface of the compacted material shall be kept moist
211 until covered with the next layer. Successive layers shall be placed and compacted so that the
212 required total depth of the base course is completed the same day.
213

214 4.08 Finishing Finishing operations shall be completed during daylight hours, and the completed base
215 course shall conform to the required lines, grades, and cross section. If necessary, the surface
216 shall be lightly scarified to eliminate any imprints made by the compacting or shaping equipment.
217 The surface shall then be recompactd to the required density.
218

219 The compaction and finishing operations shall be completed within 2 hours of the time water is
220 added to the mixture and shall produce a smooth, dense surface that is free of surface checking,
221 ridges, or loose material.
222

223 4.09 Surface Tolerance The finished surface shall not vary more than 3/8 inch (9 mm) when tested
224 with a 16-foot (4.8 m) straightedge applied parallel with, or at right angles to, the centerline of the
225 stabilized area. Any deviation in excess of this amount shall be corrected by the Contractor at the
226 Contractor's expense.
227

228 4.10 Construction Joints At the end of each day's construction, a transverse construction joint shall be
229 formed by a header or by cutting back into the compacted material to form a true vertical face free
230 of loose material.
231

232 Longitudinal joints shall be formed by cutting back into the compacted material to form a true
233 vertical edge.
234

235 4.11 Protection and Curing The completed cement-treated base shall be cured with a bituminous
236 curing seal or liquid membrane forming white pigmented curing compound ASTM C 309, Type 2,
237 Class A applied as soon as possible, and in no case later than 24 hours after completion of the
238 finishing operations. The surface of the base course shall be kept moist until the bituminous
239 material is applied.

240
241 Bituminous material shall be uniformly applied at a rate of between 0.10 and 0.25 gallons per
242 square yard (0.47 and 1.20 liters per square meter) of surface. The rate of application shall be
243 approved by the Engineer. The rate of application for the white pigmented curing compound,
244 based on ASTM C 309, is 200 square feet per gallon.

245
246 The curing seal shall be maintained and protected for 7 days. Prior to allowing construction
247 equipment traffic (other than for the curing process) a minimum compressive strength of 350 psi
248 must be attained.

249
250 Finished portions of the base course that are used by equipment in the construction of an
251 adjoining section shall be protected to prevent marring or damaging the completed work. The
252 stabilized area shall be protected from freezing during the curing period.

253
254 The Contractor shall be required within the period of this Contract to maintain the Portland cement
255 treated base in good condition until all work has been completed and accepted. Maintenance
256 shall include immediate repairs of any defects that may occur. This work shall be done by the
257 Contractor at his own expense and repeated as often as necessary to keep the area continuously
258 intact. Faulty work shall be replaced for the full depth of base.

259
260
261 **PART 5 METHOD OF MEASUREMENT**

262
263 5.01 Refer to Appendix A for Basis of Measurement.

264
265 **PART 6 BASIS OF PAYMENT**

266
267 6.01 Refer to Appendix A for Basis of Payment.

268
269
270 **PART 7 TESTING REQUIREMENTS**

271		
272	ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
273		
274	ASTM C 295	Petrographic Examination of Aggregates for Concrete
275		
276	ASTM D 75	Sampling Aggregates
277		
278	ASTM D 558	Moisture-Density Relations of Soil-Cement Mixtures
279		
280	ASTM D 560	Freezing-and-Thawing Tests of Compacted Soil-Cement Mixtures
281		
282	ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
283		
284	ASTM D 1633	Compressive Strength of Molded Soil-Cement Cylinders
285		
286	ASTM D 2167	Density of Soil in Place by the Rubber-Balloon Method
287		
288	ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods
289		
290	ASTM D 3017	Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods
291		
292	ASTM D 3665	Random Sampling of Paving Materials
293		
294	ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ITEM P-401

PLANT MIX BITUMINOUS PAVEMENTS

PART 1 GENERAL

1.01 DESCRIPTION This item shall consist of base and surface courses composed of mineral aggregate and bituminous material 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, or elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

Plant Mix Bituminous Pavements that are only 5-feet wide shall meet test section and acceptance criteria for patches.

PART 2 MATERIALS

2.01 AGGREGATE Aggregates shall consist of crushed stone with or without sand or other inert finely divided mineral aggregate. The portion of materials retained on the No. 4 sieve shall be known as coarse aggregate. The portion passing the No. 4 (4.75 mm) sieve and retained on the No. 200 (0.075 mm) sieve as fine aggregate, and the portion passing the No. 200 (0.075 mm) sieve as mineral filler.

A. Coarse Aggregate Coarse aggregate shall consist of sound, tough, durable particles, free from adherent films of matter that would prevent thorough coating with the bituminous material. The percentage of wear shall not be greater than 40 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss for base courses shall not exceed 8 percent, or the magnesium sulfate soundness loss shall not exceed 13 percent, after five cycles, when tested in accordance with ASTM C 88. The sodium sulfate soundness loss for surface courses shall not exceed 8 percent, or the magnesium sulfate soundness loss shall not exceed 10 percent, after five cycles, when tested in accordance with ASTM C 88.

Aggregate shall contain at least 70 percent by weight of crushed pieces having two or more fractured faces and 85 percent having at least one fractured face. The area of each face shall be equal to at least 75 percent 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 obtained by artificial crushing.

The aggregate shall not contain more than 8 percent, by weight, of flat or elongated pieces, a flat particle is one having a ratio of width to thickness greater than five; an elongated particle is one having a ratio of length to width greater than five, when tested in accordance with ASTM D 4791, with a value of 5:1.

B. Fine Aggregate Fine aggregate shall consist of clean, sound, durable, angular particles produced by crushing stone, slag, 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 and shall contain no clay balls. The fine aggregate, including any blended filler, shall have a plasticity index of not more than six and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.

Natural 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

57 contain more than 15 percent natural sand (not manufactured by crushing) by weight of
58 total aggregates. If used, the natural sand shall meet the requirements of ASTM D 1073
59 and shall have a plasticity index of not more than 6 and a liquid limit of not more than 25
60 when tested in accordance with ASTM D 4318.

61
62 The aggregate shall have sand equivalent values of 35 or greater when tested in
63 accordance with ASTM D 2419.

64
65 C. Sampling ASTM D 75 shall be used in sampling coarse and fine aggregate, and ASTM C
66 183 shall be used in sampling mineral filler.

67
68 2.02 MINERAL FILLER If filler, in addition to that naturally present in the aggregate, is necessary, it
69 shall meet the requirements of ASTM D 242.

70
71 2.03 BITUMINOUS MATERIAL The bituminous material shall conform to the requirements of
72 AASHTO M 320 performance graded binder designation PG 64-28. A certificate of compliance
73 from the manufacturer must be included with the mix design submittal.

74
75 The binder (RTFO) aged residue shall be tested in accordance with AASHTO T 301 for Elastic
76 Recovery tested at 25 degrees C. The recovery shall be 50% minimum.

77

Property	Min.
Toughness, Inch-Pounds	75
Tenacity, Inch-Pounds (per ASTM D 5801)	50

78
79
80
81
82 The Contractor shall furnish vendor's certified test reports for each lot of bituminous material
83 shipped to the project. The vendor's certified test report for the bituminous material can be used
84 for acceptance or tested independently by the Project Manager.

85
86
87 **Bituminous Material Certification:** The Bidder shall submit a "Bituminous Material Certification"
88 form in accordance with the Part I, Project Requirements, Bid Forms, Bid Data Forms, of these
89 contract documents. To bid this Project, the Bidder shall certify that the asphalt cement
90 specified in this section is available at bid time and that the Bidder will obtain 100 percent of the
91 product when the Notice to Proceed is issued for the contract.

92
93
94 2.04 PRELIMINARY MATERIAL ACCEPTANCE Prior to delivery of materials to the job site, the
95 Contractor shall submit certified test reports to the Project Manager for the following materials:

- 96
97 A. Coarse Aggregate
- 98 (1) Percent of wear.
 - 99 (2) Soundness.
 - 100 (3) Unit Weight of slag.
- 101
102
103 B. Fine Aggregate
- 104 (1) Liquid limit.
 - 105 (2) Plastic index.
 - 106 (3) Sand equivalent.
- 107
108
109
110
111
112

113 C. Mineral Filler

114
115 D. Bituminous Material Test results for bituminous material shall include
116 temperature/viscosity charts for mixing and compaction temperatures. The
117 certification(s) shall show the appropriate ASTM test(s) for each material, the test results,
118 and a statement that the material meets the specification requirement.

119
120 The Project Manager may request samples for testing, prior to and during production, to verify the
121 quality of the materials and to ensure conformance with the applicable specifications.

122
123 2.05 ANTI-STRIPPING AGENT Any anti-stripping agent or additive if required shall be heat stable,
124 shall not change the asphalt cement viscosity beyond specifications, shall contain no harmful
125 ingredients, shall be added in recommended proportion by approved method, and shall be a
126 material approved by the Department of Transportation.

127
128
129 **PART 3 COMPOSITION**

130
131 3.01 COMPOSITION OF MIXTURE The bituminous plant mix shall be composed of a mixture of
132 aggregate, filler if required, and bituminous material. The several aggregate fractions shall be
133 sized, handled in separate size groups, and combined in such proportions that the resulting
134 mixture meets the grading requirements of the job mix formula.

135
136 3.02 JOB MIX FORMULA No bituminous mixture for payment shall be produced until a job mix
137 formula has been approved in writing by the Project Manager. The bituminous mixture shall be
138 designed using procedures contained in Chapter III, MARSHAL METHOD OF MIX DESIGN of
139 the Asphalt Institute's Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete,
140 latest edition.

141
142 The design criteria in Table 1 are target values necessary to meet the acceptance requirements
143 contained in paragraph 401-5.2b. The criteria is based on a production process which has a
144 material variability with the following standard deviations:

145
146

Stability (lbs.)	= 270
Flow (0.01 inch)	= 1.5
Air Voids (%)	= 0.65

147
148
149

150 If material variability exceeds the standard deviations indicated, the job mix formula and
151 subsequent production targets should be based on a stability greater than shown in Table 1, and
152 the flow and air voids should be targeted close to the mid-range of the criteria in order to meet the
153 acceptance requirements.

154
155 If the index of tensile strength of the specimens of composite mixture, as determined by ASTM D
156 1075, is less than 75, the aggregates shall be rejected or the asphalt shall be treated with an
157 approved antistripping agent. The amount of antistripping agent added to the asphalt shall be
158 sufficient to produce an index of retained strength of not less than 75 with a minimum dry stability
159 of 200 psi. If an antistrip agent is required, it will be provided by the Contractor at no additional
160 cost.

161
162 The job mix formula shall be submitted in writing by the Contractor to the Project Manager at least
163 30 days prior to the start of paving operations. The job mix formula shall have been developed
164 no more than 3 months prior to submittal and shall include as a minimum:

- 165
166 A. Percent passing each sieve size for total combined gradation, individual gradation of all
167 aggregate stock piles and percentage by weight of each stockpile used in the JMF.
168 B. Percent of asphalt cement.

- 169 C. Asphalt performance, viscosity or penetration grade.
- 170 D. Number of blows of hammer compaction per side of molded specimen.
- 171 E. Mixing temperature.
- 172 F. Compaction temperature.
- 173 G. Temperature of mix when discharged from the mixer.
- 174 H. Temperature-viscosity relationship of the asphalt cement.
- 175 I. Plot of the combined gradation on the Federal Highway Administration (FHWA) 45 power
- 176 gradation curve.
- 177 J. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight
- 178 verses asphalt content.
- 179 K. Percent natural sand.
- 180 L. Percent fractured faces
- 181 M. Percent by weight of flat particles, elongated particles, and flat and elongated particles
- 182 (and criteria)
- 183 N. Tensile Strength Ratio (TSR)
- 184 O. Dry Strength
- 185 P. Antistrip agent (if required).
- 186

187 The Contractor shall submit to the Project Manager the results of verification testing of three (3)

188 asphalt samples prepared at the optimum asphalt content. The average of the results of this

189 testing shall indicate conformance with the job mix formula requirements specified in Tables 1, 2

190 and 3.

191

192 When the project requires asphalt mixtures of differing aggregate gradations, a separate job mix

193 formula and the results of job mix formula verification testing must be submitted for each mix.

194

195 The job mix formula for each mixture shall be in effect until a modification is approved in writing

196 by the Project Manager. Should a change in sources of materials be made, a new job mix

197 formula must be submitted within ten (10) days and approved by the Project Manager in writing

198 before the new material is used. After the initial production job mix formula(s) has/have been

199 approved by the Project Manager and a new or modified job mix formula is required for whatever

200 reason, the subsequent cost of the Project Manager's approval of the new or modified job mix

201 formula will be borne by the Contractor. There will be no time extension given or considerations

202 for extra costs associated with the stoppage of production paving or restart of production paving

203 due to the time needed for the Project Manager to approve the initial, new or modified job mix

204 formula.

205

206

207

TABLE 1. MARSHALL DESIGN CRITERIA

TEST PROPERTY	Pavements Designed for Aircraft Gross Weights of 60,000 lbs. or more or Tire Pressure Greater than 100 psi
Number of Blows	75
Stability, Minimum Pounds (Newtons)	2150 (9564)
Flow, 0.01 In. (0.25 mm)	10-14
Percent Air Voids	2.8-4.2
Percent Voids in Mineral Aggregate	See Table 2

208

209

TABLE 2. MINIMUM PERCENT VOIDS IN MINERAL AGGREGATE

Maximum Particle Size		Minimum Voids in Mineral Aggregate, Percent
in	mm	Percent
1/2	12.5	13
3/4	19.0	12
1	25.0	11
1-1/4	31.25	10

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Note: The nominal maximum particle size is one size larger than the first sieve to retain more than 10 percent.

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory screens, will conform to the gradation or gradations specified in Table 3 when tested in accordance with ASTM Standard C 136 and C 117.

The gradations in Table 3 represent the limits, which shall determine the suitability of aggregate for use from the sources of supply. The aggregate, as selected (and used in the JMF), shall have a gradation within the limits designated in Table 3 and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa, but shall be uniformly graded from coarse to fine.

Deviations from the final approved mix design for bitumen content and gradation of aggregates shall be within the action limits for individual measurements as specified in paragraph 401-6.5a. The limits still will apply if they fall outside the master grading band in Table 3 except for the top three sieve sizes for each aggregate gradation product starting at the 100% passing band.

The maximum size aggregate used shall not be more than one-half of the thickness of the course being constructed, except as otherwise shown on the plans or ordered by the Project Manager.

TABLE 3. AGGREGATE - BITUMINOUS PAVEMENTS

Sieve Size	Percentage by Weight Passing Sieves	
	Base Course	Surface Course
1-1/4 in. (31.25 mm)	100	---
1 in. (25.0 mm)	100	---
3/4 in. (19.0 mm)	68-93	100
1/2 in. (12.5 mm)	53-81	78-95
3/8 in. (9.5 mm)	42-69	64-88
No. 4 (4.75 mm)	24-54	44-68
No. 8 (2.36 mm)	15-42	30-53
No. 16 (1.18 mm)	10-33	20-40
No. 30 (0.60 mm)	7-24	14-30
No. 50 (0.30 mm)	5-18	8-21
No. 100 (0.15 mm)	4-12	6-14
No. 200 (0.075 mm)	3-6	3-6
Bitumen percent		
Stone or gravel	4.5-7.0	5.0-7.5
Slag	6.0-9.0	6.5-9.5

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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 Manual Series No. 2 (MS-2), Chapter 3.

3.03 RECYCLED ASPHALT CONCRETE Recycled asphalt concrete shall not be used on this project.

3.04 A. TEST SECTION – PATCHES

The test section shall consist of the first three day's paving if production is less than 500 tons placed. If 500 tons of material is placed on the first day, then the test section will be 500 tons. The Contractor's laboratory will perform three sets of tests on the test strip as outlined in 401-6.3 The Engineers QA laboratory will perform 3 sets of tests on the test strip as outlined in 401-5.1. In lieu of coring each individual lift, a full thickness core may be obtained and cut to provide tests on each lift. Joint cores are not required. The test section shall be considered acceptable if; 1) the average mat density of the test section cores is greater than or equal to 98 percent, 2) stability, flow and air voids are 90 percent or more within limits, 3) gradation and asphalt content are within the action limits specified in paragraphs 401-6.5a and 5b, and 4) the voids in mineral aggregate are within the limits of Table 2. If the initial test section should prove to be unacceptable, the necessary adjustments to the job mix formula, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the any test section also does not meet specification requirements, the 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 section has been constructed and accepted in writing by the Engineer. Once an acceptable test section has been placed, payment for the test section that meets specification requirements shall be made in accordance with paragraph 403-8.1.

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B. TEST SECTION – PAVEMENT ONLY

Prior to full production, the Contractor shall prepare a quantity of bituminous mixture according to the job mix formula. The amount of mixture should be sufficient to construct a test section 200 feet long and 20 - 30 feet wide placed in at least 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 is an exposed construction joint where the first mat is less than 185 degrees F. 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.

Three random samples shall be taken at the plant or site and tested for stability, flow, and air voids in accordance with paragraph 401-5.1a(2). Two random samples of mixture shall be taken at the plant and tested for aggregate gradation and asphalt content in accordance with paragraphs 401-6.3 and 3b and evaluated in accordance with paragraphs 401-6.5a and 5b. Three randomly selected cores shall be taken from the finished pavement mat, and three from the longitudinal joint, and tested in accordance with paragraph 401-5.1b(4). Random sampling shall be in accordance with procedures contained in ASTM D 3665.

Mat density and air voids shall be evaluated in accordance with paragraph 401-5.2f(1). Stability and flow shall be evaluated in accordance with paragraph 401-5.2f(2). Joint density shall be evaluated in accordance with paragraph 401-5.2f(3).

Voids in mineral aggregate (VMA), for each plant sample, shall be computed in accordance with procedures contained in Chapter III, MARSHALL METHOD OF MIX DESIGN, of the Asphalt Institute's Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete, latest edition.

The test section shall be considered acceptable if; 1) stability, flow, mat density, air voids, and joint density are 90 percent or more within limits, 2) gradation and asphalt content are within the action limits specified in paragraphs 401-6.5a and 5b, and 3) the voids in the mineral aggregate is within the limits of Table 2.

If the initial test section should prove to be unacceptable, the necessary adjustments to the job mix formula, plant operation, placing procedures, and/or rolling procedures shall be made. 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 test sections that are not acceptable shall be removed at the Contractor's expense. Full production shall not begin until a satisfactory section has been constructed with passing test results as specified in paragraph 5 above and accepted in writing by the Project Manager. Test sections that are unacceptable as defined above shall not be paid for by the owner. Test sections that meet specification requirements shall be paid for in accordance with paragraph 401-8.1.

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 job mix formula. It should be recognized that the aggregates produced by the plant may not satisfy the gradation requirements or produce a mix that exactly meets the JMF. In those instances, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens should be prepared and the optimum bitumen content determined in the same manner as for the original design tests.

317 Contractor will not be allowed to place the test section until the Contractor's Quality Control
 318 Program, showing conformance with the requirements of Paragraph 401-6.1, has been approved,
 319 in writing, by the Project Manager.
 320

321 3.05 JOB MIX FORMULA (JMF) LABORATORY The laboratory used to develop the job mix formula
 322 shall meet the requirements of ASTM D 3666. Accreditation shall include all test procedures
 323 required to develop the mix design. A certification signed by the manager of the laboratory
 324 stating that it meets these requirements shall be submitted to the Project Manager prior to start of
 325 construction. The certification shall contain as a minimum:
 326

- 327 A. Qualifications of personnel; including the laboratory manager, supervising technician, and
 328 testing technicians.
- 329
- 330 B. Evidence of current accreditation by a nationally recognized laboratory accreditation
 331 organization for all test methods used in determining the job mix formula.
 332
- 333

334 **PART 4 CONSTRUCTION METHODS**

335

336 4.01 WEATHER LIMITATIONS The bituminous mixture shall not be placed upon a wet surface or
 337 when the surface temperature of the underlying course is less than specified in Table 5, or the
 338 chill factor is less than 35 degrees F, as determined from Table 6. If the haul distance for the
 339 asphaltic concrete is more than 15 miles, paving operations shall not be allowed after October 1,
 340 without approval of the Project Manager. The temperature requirements may be waived, but only
 341 at the discretion of the Project Manager.
 342

TABLE 4. BASE TEMPERATURE LIMITATIONS

Mat Thickness	Base Temperature (Minimum)	
	Deg. F	Deg. C
3 in. (7.5 cm) or greater	40	4
Greater than 1 in. (2.5 cm) but less than 3 in. (7.5 cm)	45	7
1 in. (2.5 cm) or less	50	10

343
 344

WIND CHILL TABLE

WIND SPEED	AIR TEMPERATURE °F			
	45	40	35	30
MPH				
5	43	37	32	27
10	34	28	22	16
15	29	23	16	9
20	26	19	12	4

345
 346
 347
 348
 349

4.02 BITUMINOUS MIXING PLANT Plants used for the preparation of bituminous mixtures shall conform to the requirements of ASTM D 995 with the following changes:

350 A. Requirements for All Plants.
351

352 (1) Truck Scales The bituminous mixture shall be weighed on approved scales
353 furnished by the Contractor, or on public scales at the Contractor's expense.
354 Scales shall be inspected and sealed as often as the Project Manager deems
355 necessary to assure their accuracy. Scales shall conform to the requirements of
356 the Section 01025.
357

358 (2) Testing Facilities The Contractor shall provide laboratory facilities at the plant for
359 the use of the Contractor's quality control testing.
360

361 Laboratory facilities shall be kept clean, and all equipment shall be maintained in
362 proper working condition. The Project Manager shall be permitted unrestricted
363 access to inspect the Contractor's laboratory facility and witness quality control
364 activities. The Project Manager will advise the Contractor in writing of any noted
365 deficiencies concerning the laboratory facility, equipment, supplies, or testing
366 personnel and procedures. When the deficiencies are serious enough to be
367 adversely affecting the test results, the incorporation of the materials into the
368 work shall be suspended immediately and will not be permitted to resume until
369 the deficiencies are satisfactorily corrected.
370

371 (3) Inspection of Plant The Project Manager, or Project Manager's authorized
372 representative, shall have access, at all times, to all parts of the plant for
373 checking adequacy of equipment; inspecting operation of the plant: verifying
374 weights, proportions, and material properties; and checking the temperatures
375 maintained in the preparation of the mixtures.
376

377 (4) Storage Bins and Surge Bins Use of surge bins or storage bins for temporary
378 storage of hot bituminous mixtures will be permitted as follows:
379

380 (a) The bituminous mixture may be stored in surge bins for a period of time
381 not to exceed 3 hours,
382

383 (b) The bituminous mixture may be stored in insulated storage bins for a
384 period of time not to exceed 24 hours, provided an inert gas atmosphere
385 is maintained in the bin during the storage period.
386

387 The bins shall be such that mix drawn from them meets the same requirements
388 as mix loaded directly into trucks.
389

390 If the Project Manager determines that there is an excessive amount of heat loss,
391 segregation or oxidation of the mixture due to temporary storage, no temporary
392 storage will be allowed.
393

394 4.03 HAULING EQUIPMENT Trucks used for hauling bituminous mixtures shall have tight, clean, and
395 smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly
396 coated with a minimum amount of paraffin oil, lime solution, or other approved material.
397 Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable
398 cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture
399 will be delivered to the site at the specified temperature, truck beds shall be insulated or heated
400 and covers shall be securely fastened.
401

402 A. Material Transfer Machines: Material transfer machines shall be used for placing the
403 asphalt at the determination of the Contractor to prevent damage to the in-place asphalt.
404 The transfer machine shall have sufficient capability to handle enough bituminous
405 material to allow the paver to obtain a uniform spreading operation. The transfer

406 machine shall remix the material. Transfer machines shall have the capability of
407 discharging bituminous material from the side in order to maintain a fresh tack coat.
408

409 4.04 BITUMINOUS PAVERS Bituminous pavers shall be self-propelled, with an activated screed,
410 heated as necessary, and shall be capable spreading and finishing courses of bituminous plant
411 mix material which will meet the specified thickness, smoothness, and grade. The paver shall
412 have sufficient power to propel itself and the hauling equipment without adversely affecting the
413 finished surface.
414

415 The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading
416 operation. The hopper shall be equipped with a distribution system to place the mixture uniformly
417 in front of the screed without segregation. The screed shall effectively produce a finished surface
418 of the required evenness and texture without tearing, shoving, or gouging the mixture.
419

420 An automatic grade control device is to be used. The paver shall be equipped with a control
421 system capable of automatically maintaining the specified screed elevation. The control system
422 shall be automatically actuated from either a reference line and/or through a system of
423 mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver
424 screed at a predetermined transverse slope and at the proper elevation to obtain the required
425 surface. The transverse slope controller shall be capable of maintaining the screed at the desired
426 slope within plus or minus 0.1 percent.
427

428 The controls shall be capable of working in conjunction with any of the following attachments:
429

430 A. Ski-type device of not less than 30 feet (9.14 m) in length or as directed by the Project
431 Manager
432

433 B. Taut stringline (wire) set to grade
434

435 C. Short ski or shoe
436

437 D. Laser Control.
438

439 If, during construction, it is found that the delivery, spreading and finishing equipment in use
440 leaves tracks or indented areas, or produces other blemishes in the pavement that are not
441 satisfactorily corrected by the scheduled operations, the use of such equipment shall be
442 discontinued and satisfactory equipment shall be provided by the Contractor.
443

444 4.05 ROLLERS Rollers of the vibratory, steel wheel, or pneumatic-tired type shall be used. They shall
445 be in good condition, capable of operating at slow speeds to avoid displacement of the
446 bituminous mixture. The number, type, and weight of rollers shall be sufficient to compact the
447 mixture to the required density while it is still in a workable condition.
448

449 All rollers shall be specifically designed and suitable for compacting hot mix bituminous concrete
450 and shall be properly used. Rollers that impair the stability of any layer of a pavement structure
451 or underlying soils shall not be used. Depressions in pavement surfaces caused by rollers shall
452 be repaired by the Contractor at its own expense.
453

454 The use of equipment which causes excessive crushing of the aggregate will not be permitted.
455

456 A. Nuclear Densometer The Contractor shall have on site a nuclear densometer during all
457 paving operations in order to assist in the determination of the optimum rolling pattern,
458 type of roller and frequencies, as well as to monitor the effect of the rolling operations
459 during production paving. The Contractor shall also supply a qualified technician during
460 all paving operations to calibrate the nuclear densometer and obtain accurate density
461 readings for all new bituminous concrete. These densities shall be supplied to the

462 Project Manager upon request at any time during construction. No separate payment will
463 be made for supplying the density gauge and technician.
464

465 4.06 PREPARATION OF BITUMINOUS MATERIAL The bituminous material shall be heated in a
466 manner that will avoid local overheating and provide a continuous supply of the bituminous
467 material to the mixer at a uniform temperature. The temperature of the bituminous material
468 delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the
469 aggregate particles but shall not exceed 325 F (160 C), unless otherwise required by the
470 manufacturer.
471

472 4.07 PREPARATION OF MINERAL AGGREGATE The aggregate for the mixture shall be heated and
473 dried prior to introduction into the mixer. The maximum temperature and rate of heating shall be
474 such that no permanent damage occurs to the aggregates. The temperature of the aggregate
475 and mineral filler shall not exceed 350 degrees F (175 degrees C) when the asphalt is added.
476 Particular care shall be taken that aggregates high in calcium or magnesium content are not
477 damaged by overheating. The temperature shall not be lower than is required to obtain complete
478 coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory
479 workability.
480

481 4.08 PREPARATION OF BITUMINOUS MIXTURE The aggregates and the bituminous material shall
482 be weighed or metered and introduced into the mixer in the amount specified by the job mix
483 formula.
484

485 The combined materials shall be mixed until the aggregate obtains a uniform coating of bitumen
486 and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time
487 that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet
488 mixing time for all plants shall be established by the Contractor, based on the procedure for
489 determining the percentage of coated particles described in ASTM D 2489, for each individual
490 plant and for each type of aggregate used. The wet mixing time will be set to achieve 95 percent
491 of coated particles. For continuous mix plants, the minimum mixing time shall be determined by
492 dividing the weight of its contents at operating level by the weight of the mixture delivered per
493 second by the mixer. The moisture content of the mix shall not exceed 0.5 percent.
494

495 4.09 PREPARATION OF THE UNDERLYING SURFACE Immediately before placing the bituminous
496 mixture, the underlying course shall be cleaned of all dust and debris. A prime coat or tack coat
497 shall be applied in accordance with Item P-602 or P-603, if required by the contract specifications.
498

499 4.10.1 TRANSPORTING, SPREADING, AND FINISHING Prior to the placement of the bituminous
500 mixture, the Contractor shall prepare a laydown plan for approval by the Project Manager. This is
501 to minimize the number of cold joints in the pavement. The laydown plan shall include the
502 sequence of paving laydown by stations, width of lanes, temporary ramp location(s), and laydown
503 temperature. The laydown plan shall also include estimated time of completion for each portion
504 of the work (i.e. milling, paving, rolling, cooling, etc.). Modifications to the laydown plan shall be
505 approved by the Project Manager.
506

507 The area for asphalt placement shall be wide enough to accommodate a roller that can be
508 obtained the specified compaction.
509

510 The bituminous mixture shall be transported from the mixing plant to the point of use in vehicles
511 conforming to the requirements of paragraph 401-3. Deliveries shall be scheduled so that placing
512 and compacting of mixture is uniform with minimum stopping and starting of the paver. Hauling
513 over freshly placed material shall not be permitted until the material has been compacted, as
514 specified, and allowed to cool to atmospheric temperature.
515

516 For all runway, taxiway and apron pavements, Contractor shall use a stringline to place each lane
517 of each lift of bituminous surface course. However, at the Contractor's option, Contractor shall

518 use stringline for first lift of bituminous surface course and then survey the grade of that lift.
519 Provided grades of that lift of bituminous surface course meet the tolerances of paragraphs 401-
520 5.2b(6), then Contractor may place successive lifts of bituminous surface course using a long ski,
521 or laser control per paragraph 401-4.4. However, Contractor shall survey each lift of bituminous
522 surface course and certify to Project Manager that every lot of each lift meets the grade
523 tolerances of paragraph 401-5.2b(6) before the next lift can be placed without a stringline. If the
524 grades of a single lot do not meet the tolerances of 401-5.2b(6), then the Contractor shall use a
525 stringline for each entire lift. Corrective action in paragraph 401-5.2b(6) applies to the final lift of
526 surface course; however, for multiple lift construction, the Contractor shall correct to ensure the
527 final lift of surface course is a minimum of 2 ½ inches and a maximum of 3 ½ inches.

528
529 The Contractor may elect to use a material transfer vehicle to deliver mix to the paver.

530
531 Paving during nighttime construction shall require the following:

- 532
- 533 A. All paving machines, rollers, distribution trucks and other vehicles required by the
534 Contractor for his operations shall be equipped with artificial illumination sufficient to
535 safely complete the work.
 - 536 B. Minimum illumination level shall be twenty (20) horizontal foot candles and maintained in
537 the following areas:
 - 538 (1) An area of 30 feet wide by 30 feet long immediately behind the paving machines
539 during the operations of the machines.
 - 540 (2) An area 15 feet wide by 30 feet long immediately in front and back of all rolling
541 equipment, during operation of the equipment.
 - 542 (3) An area 15 feet wide by 15 feet long at any point where an area is being tack
543 coated prior to the placement of pavement.
 - 544 C. As partial fulfillment of the above requirements, the Contractor shall furnish and use,
545 complete artificial lighting units with a minimum capacity of 3,000 watt electric beam
546 lights, affixed to all equipment in such a way to direct illumination on the area under
547 construction.
 - 548 D. In addition, the Contractor shall furnish adequate portable floodlight units to provide a
549 minimum of one foot candle in the paving operation areas not defined in 4.10.B.
- 550
551
552
553
554
555
556

557 The initial placement and compaction of the mixture shall occur at a temperature suitable for
558 obtaining density, surface smoothness, and other specified requirements but not less than 250
559 degrees F (121 degrees C).

560
561 Edges of existing bituminous pavement abutting the new work shall be saw cut and carefully
562 removed as shown on the drawings and painted with bituminous tack coat before new material is
563 placed against it.

564
565 Upon arrival, the mixture shall be placed to the full width by a bituminous paver. It shall be struck
566 off in a uniform layer of such depth that, when the work is completed, it shall have the required
567 thickness and conform to the grade and contour indicated. The speed of the paver shall be
568 regulated to eliminate pulling and tearing of the bituminous mat. Unless otherwise directed,
569 placement of the mixture shall begin along the centerline of a crowned section or on the high side
570 of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having
571 a minimum width of 10 feet (3 m) except where patching and edge lanes require less width to
572 complete the area. Additional screed sections shall not be attached to widen paver to meet the
573 minimum lane width requirements specified above unless additional auger sections are added to

574 match. The longitudinal joint in one course shall offset that in the course immediately below by at
575 least 1 foot (30 cm); however, the joint in the surface top course shall be at the centerline of
576 crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from
577 transverse joints in the previous course.

578
579 Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m).

580
581 On areas where irregularities or unavoidable obstacles make the use of mechanical spreading
582 and finishing equipment impractical, the mixture may be spread and luted by hand tools.

583
584 Any areas of segregation in the surface course, as determined by the Project Manager, shall be
585 removed and replaced at the Contractor's expense. The area shall be removed by saw cutting
586 and milling a minimum of 2-inches deep. The area to be removed and replaced shall be a
587 minimum width of the paver and a minimum of 10 feet long.

588
589 4.11 COMPACTION OF MIXTURE After placing, the mixture shall be thoroughly and uniformly
590 compacted by rolling. The surface shall be rolled when the mixture has attained sufficient stability
591 so that the rolling does not cause undue displacement, cracking or shoving. The sequence of
592 rolling operations and the type of rollers used shall be at the discretion of the Contractor.

593
594 The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot
595 mixture and be effective in compaction. Any displacement occurring as a result of reversing the
596 direction of the roller, or from any other cause, shall be corrected at once.

597
598 Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until
599 the surface is of uniform texture, true to grade and cross section, and the required field density is
600 obtained.

601
602 To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened (and
603 scrapers used), but excessive water will not be permitted.

604
605 In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved
606 tampers. Tampers shall weigh not less than 275 pounds, have a tamping plate width not less
607 than 15 inches, be rated at not less than 4,200 vibrations per minute, and be suitably equipped
608 with a standard tamping plate wetting device.

609
610 Any mixture that becomes loose and broken, mixed with dirt, or in any way defective shall be
611 removed and replaced with fresh hot mixture and immediately compacted to conform to the
612 surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not
613 be allowed.

614
615 4.12 JOINTS The formation of all joints shall be made in such a manner as to ensure a continuous
616 bond between the courses and obtain the required density. All joints shall have the same texture
617 as other sections of the course and meet the requirements for smoothness and grade.

618
619 The roller shall not pass over the unprotected end of the freshly laid mixture except when
620 necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made
621 by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to
622 its full depth and width on a straight line to expose a vertical face prior to placing the adjacent
623 lane. In both methods all contact surfaces shall be given a tack coat of bituminous material before
624 placing any fresh mixture against the joint.

625
626 Longitudinal and transverse joints which are irregular, damaged, uncompacted, or otherwise
627 defective or whose surface temperature has cooled to less than 185°F shall be cut back (3 to 6-
628 inches) to expose a clean, sound surface for the full depth of the course. All contact surfaces

629 shall be given a tack coat of bituminous material prior to placing any fresh mixture against the
630 joint.
631

632

633 **PART 5 MATERIAL ACCEPTANCE**

634

635 5.01 ACCEPTANCE SAMPLING AND TESTING Unless otherwise specified, all acceptance sampling
636 and testing necessary to determine conformance with the requirements specified in this section
637 will be performed by the Project Manager at no cost to the Contractor except that coring as
638 required in this section shall be completed and paid for by the Contractor. Testing organizations
639 performing these tests will meet the requirements of ASTM D 3666.

640

641 The Contractor shall provide the Project Manager with daily production maps defining the area of
642 the placement per lift, the mix placed in each lift, and the tons placed per mix. Contractor shall
643 also provide daily sample and core locations using stationing or X, Y Z coordinates as applicable.
644

645 A. Plant-Produced Material. Plant-produced material shall be tested for stability, flow, and
646 air voids on a lot basis. Sampling shall be from material deposited into trucks at the plant,
647 from trucks at the job site, or from the pavement material. Samples will be taken in
648 accordance with ASTM D 979. A lot will consist of:

649

650 - one day's production not to exceed 2,000 tons, or

651

652 - a half day's production where a day's production is expected to consist of between
653 2,000
654 and 4,000 tons, or

655

656 - similar subdivisions for tonnages over 4,000 tons.
657

658

659 Where more than one plant is simultaneously producing material for the job, the lot sizes shall
660 apply separately for each plant.

661

662 (1) Sampling Each lot will consist of four equal sublots. A subplot shall consist of 500
663 ton or one day's paving if less than 500 ton. Sufficient material for preparation of
664 test specimens will be sampled by the Project Manager on a random basis, in
665 accordance with the procedures contained in ASTM D 3665. Samples shall be
666 taken in accordance with ASTM D 979. One set of laboratory compacted
667 specimens will be prepared for each subplot in accordance with ASTM D 6926, at
668 the number of blows required by paragraph 401-3.2, Table 1. Each set of
669 laboratory compacted specimens will consist of three test portions prepared from
670 the same sample increment.

671

672 The sample of bituminous mixture may be put in a covered metal tin and placed
673 in an oven for not less than 30 minutes nor more than 60 minutes to stabilize to
674 compaction temperature. The compaction temperature of the specimens should
675 be as specified in the job mix formula.

676

677 (2) Testing Sample specimens shall be tested for stability and flow in accordance
678 with ASTM D 6927, paragraph 5. Air voids will be determined by the Project
679 Manager in accordance with ASTM D 3203.

680

681 Prior to testing, the bulk specific gravity of each test specimen shall be measured
682 by the Project Manager in accordance with ASTM D 2726 using the procedure
683 for laboratory-prepared thoroughly dry specimens, or D 1188, whichever is
684 applicable, for use in computing air voids and pavement density.

685 For air voids determination, the theoretical maximum specific gravity of the
686 mixture shall be measured twice for each subplot in accordance with ASTM D
687 2041. The value used in the air voids computation for each subplot shall be based
688 on the average of the two maximum specific gravity measurements for the subplot.

689
690 The stability, and flow for each subplot shall be computed by averaging the results
691 of all test specimens representing that subplot.

692
693 (3) Acceptance Acceptance of plant produced material for stability, flow, and air
694 voids shall be determined by the Project Manager in accordance with the
695 requirements of paragraph 401-5.2b.

696
697 B. Field Placed Material Material placed in the field shall be tested for mat and joint density
698 on a lot basis.

699
700 (1) Mat Density The lot size shall be the same as that indicated in paragraph
701 401-5.1.a and shall be divided into four equal sublots. One core of finished,
702 compacted materials shall be taken by the Contractor from each subplot. Core
703 locations will be determined by the Project Manager on a random basis in
704 accordance with procedures contained in ASTM D 3665. Cores shall not be
705 taken closer than one foot from a transverse or longitudinal joint. The minimum
706 diameter of the sample will be 3 inches.

707
708 For Patching – In lieu of coring each individual lift within a subplot, a full thickness
709 core may be obtained and cut to provide tests on each lift.

710
711 (2) Joint Density The lot size shall be the total length of longitudinal joints
712 constructed by a lot of material as defined in paragraph 401-5.1a. The lot shall
713 be divided into four equal sublots.

714
715 One core of finished, compacted materials shall be taken by the Contractor from
716 each subplot. Core locations will be determined by the Project Manager on a
717 random basis in accordance with procedures contained in ASTM D 3665. ALL
718 CORING SHALL BE CENTERED ON THE JOINT. THE MINIMUM CORE
719 DIAMETER FOR JOINT DENSITY DETERMINATION SHALL BE 5 INCHES.

720
721 For Patching – In the event no joints are made with the new asphalt, no joint
722 cores are needed.

723
724 (3) Sampling. Samples shall be neatly cut with a core drill. The cutting edge of the
725 core drill bit shall be of hardened steel or other suitable material with diamond
726 chips embedded in the metal cutting edge. Samples that are clearly defective,
727 as a result of sampling, shall be discarded and another sample taken. The
728 Contractor shall furnish all tools, labor, and materials for cutting samples and
729 filling the cored pavement. Cored holes shall be filled in a manner acceptable to
730 the Project Manager and within one day after sampling.

731
732 (4) Testing. The bulk specific gravity of each cored sample will be measured by the
733 Project Manager in accordance with ASTM D 2726 or D 1188, whichever is
734 applicable. The percent compaction (density) of each sample will be determined
735 by dividing the bulk specific gravity of each subplot sample by the average bulk
736 specific gravity of all laboratory prepared specimens for the lot, as determined in
737 paragraph 401-5.1a(2). The bulk specific gravity used to determine the joint
738 density at joints formed between different lots shall be the lowest of the bulk
739 specific gravity values from the two different lots.

740

741 (5) Acceptance. Acceptance of field placed material for mat density will be
742 determined by the Project Manager in accordance with the requirements of
743 paragraph 401-5.2c. Acceptance for joint density will be determined in
744 accordance with the requirements of paragraph 401-5.2D.
745

746 C. Partial Lots - Plant-Produced Material. When operational conditions cause a lot to be
747 terminated before the specified number of tests have been made for the lot, or when the
748 Contractor and Project Manager agree in writing to allow overages or other minor
749 tonnage placements to be considered as partial lots, the following procedure will be used
750 to adjust the lot size and the number of tests for the lot.
751

752 The last batch produced where production is halted will be sampled and its properties
753 shall be considered as representative of the particular subplot from which it was taken. In
754 addition, an agreed to minor placement will be sampled, and its properties shall be
755 considered as representative of the particular subplot from which it was taken. Where
756 three sublots are produced, they shall constitute a lot. Where one or two sublots are
757 produced, they shall be incorporated into the next lot and the total number of sublots shall
758 be used in the acceptance plan calculation, i.e., $n = 5$ or $n = 6$, for example. Partial lots
759 at the end of the project shall be included with the previous lot. A lot or partial lot shall
760 represent only one pavement thickness or pavement type.
761

762 D. Partial Lots - Field Placed Material The lot size for field placed material shall correspond
763 to that of the plant material, except that in no cases less than (3) cored samples shall be
764 obtained, i.e., $n = 3$.
765

766 5.02 ACCEPTANCE CRITERIA
767

768 A. General Acceptance will be based on the following characteristics of the bituminous
769 mixture and completed pavement as well as the implementation of the Contractor's
770 Quality Control plan and test results:
771

- 772 (1) Stability
- 773 (2) Flow
- 774 (3) Air voids
- 775 (4) Mat density
- 776 (5) Joint density
- 777 (6) Thickness
- 778 (7) Smoothness
- 779 (8) Grade

780
781 Stability, flow, air voids, mat density, and joint density will be evaluated for acceptance on
782 a lot basis using the method of estimating percentage of material within specification
783 limits (PWL). Acceptance using PWL considers the variability (standard deviation) of the
784 material and the testing procedures, as well as the average (mean) value of the test
785 results to calculate the percentage of material that is above the lower specification
786 tolerance limit (L) or below the upper specification tolerance limit (U).
787

788 Thickness will be evaluated by the Project Manager for compliance in accordance with
789 paragraph 401-5.2.f(4). Acceptance for smoothness will be based on the criteria
790 contained in paragraph 401-5.2f(5). Acceptance for grade will be based on the criteria
791 contained in paragraph 401-5.2f(6).
792

793 The Project Manager may at any time, notwithstanding previous plant acceptance, reject
794 and require the Contractor to dispose of any batch of bituminous mixture which is
795 rendered unfit for use due to contamination, segregation, incomplete coating of
796 aggregate, or improper mix temperature. Such rejection may be based on only visual

797 inspection or temperature measurements. In the event of such rejection, the Contractor
798 may take a representative sample of the rejected material in the presence of the Project
799 Manager, and if he can demonstrate in the laboratory, in the presence of the Project
800 Manager, that such material was erroneously rejected, payment will be made for the
801 material at the contract unit price.
802

803 B. Stability, Flow, and Air Voids. Evaluation for acceptance of each lot of plant-produced
804 material for stability, flow, and air voids shall be based on PWL. The Contractor shall
805 target production quality to achieve 90 PWL or higher.
806

807 C. Mat Density. Evaluation for acceptance of each lot of in-place pavement for mat density
808 shall be based on PWL. The Contractor shall target production quality to achieve 90
809 PWL or higher.
810

811 D. Joint Density. Evaluation for acceptance of each lot of in-place pavement for joint density
812 shall be based on PWL. The Contractor shall target production quality to achieve 90
813 PWL or higher.
814

815 E. Percentage of Material Within Specification Limits (PWL). The percentage of material
816 within specification limits (PWL) shall be determined in accordance with procedures
817 specified in Section GP-110 of the General Provisions. The specification tolerance limits
818 (L) and (U) are contained in Table 5.
819

820 F. Acceptance Criteria:

821 (1) Mat Density and Air Voids If the PWL of the lot equals or exceeds 90 percent,
822 the lot shall be acceptable. Acceptance and payment for the lot shall be
823 determined in accordance with paragraph 401-8.1.
824

825 (2) Stability and Flow If the PWL of the lot equals or exceeds 90 percent, the lot
826 shall be acceptable. If the PWL is less than 90 percent, the Contractor shall
827 determine the reason and take corrective action. If the PWL is below 80 percent,
828 the Contractor must stop production and make adjustments to the mix.
829

830 (3) Joint Density If the PWL of the lot equals or exceeds 90 percent, the lot shall be
831 acceptable. If the PWL is less than 90 percent, the Contractor shall evaluate the
832 method of compacting joints. If the PWL is below 80 percent, the Contractor
833 shall stop production until the reason for poor compaction can be determined.
834

835 (4) Thickness Thickness of each lift of surface course shall be evaluated by the
836 Project Manager for compliance to the requirements shown on the plans.
837 Measurements of thickness shall be made by the Project Manager using the
838 cores extracted for each subplot for density measurement. The maximum
839 allowable deficiency at any point shall not be more than ¼ inch less than the
840 thickness indicated for the lift. Average thickness of lift, or combined lifts, shall
841 not be less than the indicated thickness. Where the thickness tolerances are not
842 met, the lot or subplot shall be corrected by the Contractor at his expense by
843 removing the deficient area and replacing with new pavement. The Contractor,
844 at his expense, may take additional cores as approved by the Project Manager to
845 circumscribe the deficient area.
846

847 (5) Smoothness The final surface shall be free from roller marks. The finished
848 surfaces of each course of the pavement, except the finished surface of the final
849 course, shall not vary more than 3/8 inch when evaluated with a 16 foot
850 straightedge. The finished surface of the final course of pavement shall not vary
851 more than ¼ inch when evaluated with a 16 foot straightedge. The lot size shall
852

853 be 2000 square yards (1650 square meters). Smoothness measurements shall
 854 be made at 50 foot intervals and as determined by the Project Manager. In the
 855 longitudinal direction, a smoothness reading shall be made at the center of each
 856 paving lane. In the transverse direction, smoothness readings shall be made
 857 continuously across the full width of the pavement. However, transverse
 858 smoothness readings shall not be made across designed grade changes. At
 859 warped transition areas, straightedge position shall be adjusted to measure
 860 surface smoothness and not design grade transitions. When more than 15
 861 percent of all measurements within a lot exceed the specified tolerance, the
 862 Contractor shall remove the deficient area to the depth of the final course of
 863 pavement and replace with new material. Skin patching shall not be permitted.
 864 Isolated high points may be ground off providing the course thickness complies
 865 with the thickness specified on the plans. High point grinding will be limited to 15
 866 square yards. Areas in excess of 15 square yards will require removal and
 867 replacement of the pavement in accordance with the limitations noted above.

868 (6) Grade The finished surface of the pavement shall not vary from the gradeline
 869 elevations and cross sections shown on the plans by more than 1/2 inch (12.70
 870 mm). The finished grade of each lot will be determined by running levels at
 871 intervals of 50 feet (15.2 m) or less longitudinally and transversely to determine
 872 the elevation of the completed pavement. The Contractor shall pay the cost of
 873 surveying of the level runs which shall be performed by a licensed surveyor. The
 874 documentation stamped and signed by a licensed surveyor, shall be provided by
 875 the Contractor to the Project Manager. The lot size shall be 2,000 square yards
 876 (1,650 square meters). When more than 15 percent of all the measurements
 877 within a lot are outside the specified tolerance, the Contractor shall remove the
 878 deficient area and replace with new material. Sufficient material shall be
 879 removed to allow at least two inches of asphalt concrete to be placed. Skin
 880 patching for correcting low areas shall not be permitted. Isolated high points may
 881 be ground off, up to a limit of grinding 15 square yards of area. Areas in excess
 882 of 15 square yards will require removal and replacement of the pavement in
 883 accordance with the limitations noted above.

884 G. Outliers All individual tests for mat density and air voids shall be checked for outliers
 885 (test criterion) in accordance with ASTM E 178, at a significance level of 5 percent.
 886 Outliers shall be discarded, and the PWL shall be determined using the remaining test
 887 values.
 888

TABLE 5. MARSHALL ACCEPTANCE LIMITS FOR
 STABILITY, FLOW, AIR VOIDS, DENSITY

TEST PROPERTY	Pavements Designed for Aircraft Gross Weights of 60,000 Lbs. or More or Tire Pressures of 100 Psi or More	
	75	
Number of Blows	75	
	Specification Tolerance Limits	
	L	U
Stability, minimum, pounds	1800	--
Flow, 0.01-inch	8	16
Air Voids Total Mix, percent	2	5
Surface Course Mat Density, percent	96.3	--
Base Course Mat Density, percent	95.5	--

889	Joint density, percent	93.3	--
-----	------------------------	------	----

890
891 The criteria in Table 5 based on production processes which have a variability with the
892 following standard deviations:

- 893
- 894 Surface Course Mat Density (%), 1.30
- 895 Base Course Mat Density (%), 1.55
- 896 Joint Density (%), 2.1
- 897

898 The Contractor should note that 90 PWL is achieved when consistently producing a
899 surface course mat density of at least 98 percent with 1.30% or less variability. 90 PWL
900 is achieved with consistently producing a base course mat density of at least 97.5
901 percent with 1.55% or less variability. 90 PWL is achieved when consistently producing a
902 joint density of at least 96 percent with 2.1% or less variability.

903
904
905 **5.03 RESAMPLING PAVEMENT FOR MAT DENSITY**

906
907 A. General Resampling of a lot of pavement for mat density will be allowed if the Contractor
908 requests, in writing, within 48 hours after receiving the written test results from the Project
909 Manager. A retest will consist of all the sampling and testing procedures contained in
910 paragraphs 401-5.1b and 401-5.2c. Only one resampling per lot will be permitted.

911
912 (1) A redefined PWL shall be calculated for the resampled lot. The number of tests
913 used to calculate the redefined PWL shall include the initial tests made for that lot
914 plus the retests.

915
916 (2) The cost for resampling and retesting shall be borne by the Contractor.

917
918 B. Payment for Resampled Lots The redefined PWL for a resampled lot shall be used to
919 calculate the payment for that lot in accordance with Table 6.

920
921 C. Outliers If the tests within a lot include a very large or a very small value which appears
922 to be outside the normal limits of variation, check for an outlier in accordance with ASTM
923 E 178, at a significance level of 5 percent, to determine if this value should be discarded
924 when computing the PWL.

925
926 **5.04 LEVELING COURSE** The leveling course is the first thin, variable thickness lift of an overlay
927 placed prior to all upper lifts. The leveling course shall not exceed a nominal thickness of 1-1/2
928 inches. The leveling course shall be compacted with the same degree of effort used to achieve
929 density of the test section. A pavement course used for truing and leveling shall meet the
930 requirements of paragraphs 401-3.2 and 5.2b. If, in the opinion of the Project Manager, the
931 leveling course's thickness is by necessity too thin or too variable to yield targeted density results,
932 the course shall not be subject to the density requirements of paragraph 401-5.2c.

933
934
935 **PART 6 CONTRACTOR QUALITY CONTROL**

936
937 **6.01 GENERAL** The Contractor shall develop a Quality Control Program in accordance with Section
938 GP-100 of the General Provisions. The program shall address all elements which effect the
939 quality of the pavement including, but not limited to:

- 940
- 941 A. Mix Design
- 942 B. Aggregate Grading
- 943 C. Quality of Materials
- 944 D. Stockpile Management

- 945 E. Proportioning
- 946 F. Mixing and Transportation
- 947 G. Placing and Finishing
- 948 H. Joints
- 949 I. Compaction
- 950 J. Surface smoothness
- 951 K. Personnel
- 952 L. Laydown Plan

953
954 The Contractor and/or Producer shall perform quality control sampling, testing and inspection
955 during all phases of the work and shall perform them at a rate sufficient to ensure that the work
956 conforms to the contract requirements including minimum test frequencies required by Paragraph
957 6.03 and Section 01403. As part of the process of approving the Contractor's plan, the Project
958 Manager may require the laboratory technicians perform testing of samples to demonstrate an
959 acceptable level of performance.

960
961 No partial payment will be made for materials that are subject to specific quality control
962 requirements without an approved plan.

963
964 6.02 TESTING LABORATORY ON SITE. Not required.

965
966 6.03 QUALITY CONTROL TESTING.

967 A. The Contractor's Independent Testing Agency and/or the Producer's Quality Control
968 Laboratory shall perform all quality control sampling and testing necessary to control the
969 project and construction processes applicable to these Specifications and as set forth in the
970 Quality Control Program. The laboratory performing the testing shall meet the requirements
971 of Section 01401 including ASTM D 3666 accreditation and have been approved through the
972 submittal process prior to performing testing.

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981
982 B. A Quality Control Testing Plan shall be developed as part of the Quality Control Program in
983 accordance with Section 01400 and shall include but not necessarily limited to tests for
984 asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction,
985 and surface smoothness.

986
987 a. Asphalt Content. A minimum of two extraction tests shall be performed per lot in
988 accordance with ASTM D 6307 for determination of asphalt content. The weight of ash
989 portion of the extraction test, as described in ASTM D 6307, shall be determined as part
990 of the first extraction test performed at the beginning of plant production; and as part of
991 every tenth extraction test performed thereafter, for the duration of plant production. The
992 last weight of ash value obtained shall be used in the calculation of the asphalt content
993 for the mixture. The asphalt content for the lot will be determined by averaging the test
994 results.

995
996 The use of the nuclear method for determining asphalt content in accordance with ASTM
997 D 4125 is permitted, provided that it is calibrated for the specific mix being used.

998
999 b. Gradation. Aggregate gradations shall be determined a minimum of twice per lot in
1000 accordance with ASTM D 5444. When asphalt content is determined by the nuclear

- 1001 method, aggregate gradation shall be determined from hot bin samples on batch plants,
1002 or from the cold feed on drum mix or continuous mix plants, and tested in accordance
1003 with ASTM D 136 (dry sieve) using actual batch weights to determine the combined
1004 aggregate gradation of the mixture.
1005
1006 d. Moisture Content of Aggregate. The moisture content of aggregate used for production
1007 shall be determined a minimum of once per lot in accordance with ASTM C 566.
1008
1009 d. Moisture Content of Mixture The moisture content of the mixture shall be determined
1010 once per lot in accordance with ASTM D 1461, or CDOT procedure CP43.
1011
1012 e. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary
1013 locations to determine the temperatures of the dryer, the bitumen in the storage tank, the
1014 mixture at the plant, and the mixture at the job site.
1015
1016 f. In-Place Density Monitoring The Contractor shall conduct any necessary testing to
1017 ensure that the specified density is being achieved. A nuclear gauge may be used to
1018 monitor the pavement density in accordance with ASTM D 2950.
1019
1020 g. Additional Testing Any additional testing that the Contractor deems necessary to control
1021 the process may be performed at the Contractor's option.
1022
1023 h. Monitoring The Project Manager reserves the right to monitor any or all of the above
1024 testing.
1025
1026 6.04 SAMPLING When directed by the Project Manager, the Contractor shall sample and test any
1027 material which appears inconsistent with similar material being sampled, unless such material is
1028 voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall
1029 be in accordance with standard procedures specified.
1030
1031 6.05 CONTROL CHARTS The Contractor shall maintain linear control charts both for individual
1032 measurements and range (i.e., difference between highest and lowest measurements) for
1033 aggregate gradation and asphalt content.
1034
1035 Control charts shall be posted in a location satisfactory to the Project Manager and shall be kept
1036 current. As a minimum, the control charts shall identify the project number, the contract item
1037 number, the test number, each test parameter, the Action and Suspension Limits applicable to
1038 each test parameter, and the Contractor's test results. The Contractor shall use the control
1039 charts as part of a process control system for identifying potential problems and assignable
1040 causes before they occur. If the Contractor's projected data during production indicates a
1041 problem and the Contractor is not taking satisfactory corrective action, the Project Manager may
1042 suspend production or acceptance of the material.
1043
1044 A. Individual Measurements Control charts for individual measurements shall be established
1045 to maintain process control within tolerance for aggregate gradation and asphalt content.
1046 The control charts shall use the job mix formula target values as indicators of central
1047 tendency for the following test parameters with associated Action and Suspension Limits:
1048

1049

CONTROL CHART LIMITS FOR INDIVIDUAL MEASUREMENTS		
Sieve	Action Limit	Suspension Limit
1 or 1-1/4 inch	0%	0%
3/4 inch (19.0 mm)	+/-6%	+/-9%
1/2 inch (12.5 mm)	+/-6%	+/-9%
3/8 inch (9.5 mm)	+/-6%	+/-9%
No. 4 (4.75 mm)	+/-6%	+/-9%
No. 16 (1.18 mm)	+/-5%	+/-7.5%
No. 50 (0.30 mm)	+/-3%	+/-4.5%
No. 200 (0.075 mm)	+/-2%	+/-3%
Asphalt Content	+/-0.45%	+/-0.70%

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When 1/2 inch (12.5 mm) maximum size aggregate is specified, the 3/4 inch (19.0 mm) and 1 inch (25.0 mm) sieves should be deleted from the Individual Measurements Chart and the 1/2 inch (12.5 mm) sieve Action and Suspension Limits should be changed to 0%. For the 1/2 inch (12.5 mm) gradation, the 1/2 inch sieve should be deleted from the Range Chart.

- 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 (12.5 mm)	11 percent
3/8 inch (9.5 mm)	11 percent
No. 4 (4.75 mm)	11 percent
No. 16 (1.18 mm)	9 percent
No. 50 (0.30 mm)	6 percent
No. 200 (0.075 mm)	3.5 percent
Asphalt Content	0.8 percent

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- C. Corrective Action The Quality Control Plan 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.

6.06 QUALITY CONTROL REPORTS The Contractor shall maintain records and shall submit reports of quality control activities and test results daily, in accordance with the Quality Control Plan described in General Provisions, Section 01403 Contractor Quality Control Program.

1081
 1082 **PART 7 METHOD OF MEASUREMENT**

1083
 1084 7.01 Refer to Appendix A for Method of Measurement.
 1085

1086
 1087 **PART 8 BASIS OF PAYMENT**
 1088

1089 8.01 Payment for an accepted lot of bituminous concrete pavement meeting all acceptance criteria as
 1090 specified in Paragraph 401-5.02 shall be made at the contract unit price per ton per the specified
 1091 depth for bituminous mixture adjusted according to paragraph 401-8.1a below, subject to the
 1092 limitation that:

1093 The total project payment for plant mix bituminous concrete pavement shall not exceed 100
 1094 percent of the product of the contract unit price and the total number of tons of bituminous mixture
 1095 used in the accepted work (See Note 1 under Table 6).

1096 The price shall be compensation for furnishing all materials, for all preparation, mixing, and
 1097 placing of these materials, and for all labor, equipment, tools, and incidentals required to
 1098 complete the work as specified herein and on the drawings, minus the daily waster factor. Both
 1099 Quality Assurance and Quality Control Representatives will agree on a daily basis as to the
 1100 percent of material that is considered waste. This factor will be used when calculating the actual
 1101 amount of material placed each day.

1102 A. Basis of Adjusted Payment. The pay factor for each individual lot shall be calculated in
 1103 accordance with Table 6. A pay factor shall be calculated for both the mat density and air
 1104 voids. The lot pay factor shall be the higher of the two values when calculations for both
 1105 mat density and air voids are 100 percent or higher. The lot pay factor shall be the
 1106 product of the two values when only one of the calculations for either mat density or air
 1107 voids is 100 percent or higher. The lot pay factor shall be the lower of the two values
 1108 when calculations for both the mat density and air voids are less than 100 percent

TABLE 6: PRICE ADJUSTMENT SCHEDULE ¹

Percentage of Material Within the Specification Limit (PWL)	Percent of Contract Unit Price to be Paid
96-100	106
90 – 95	PWL + 10
75 – 89	0.5 PWL + 55
55 – 74	1.4PWL – 12
Below 55	Reject ²

1109
 1110 ¹ ALTHOUGH IT IS THEORETICALLY POSSIBLE TO ACHIEVE A PAY FACTOR OF
 1111 106 PERCENT FOR EACH LOT, ACTUAL PAYMENT ABOVE 100 PERCENT SHALL
 1112 BE SUBJECT TO THE TOTAL PROJECT PAYMENT LIMITATION SPECIFIED IN
 1113 PARAGRAPH 401-8.01.

1114 ² THE LOT SHALL BE REMOVED AND REPLACED. HOWEVER, THE PROJECT
 1115 MANAGER MAY DECIDE TO ALLOW THE REJECTED LOT TO REMAIN. IN THAT
 1116 CASE, IF THE PROJECT MANAGER AND THE CONTRACTOR AGREE IN WRITING
 1117 THAT THE LOT SHALL NOT BE REMOVED, IT SHALL BE PAID FOR AT 50 PERCENT
 1118 OF THE CONTRACT UNIT PRICE AND THE TOTAL PROJECT PAYMENT LIMITATION
 1119 SHALL BE REDUCED BY THE AMOUNT WITHHELD FOR THE REJECTED LOT.

1120 For each lot accepted, the adjusted contract unit price shall be the product of the lot pay
 1121 factor for the lot and the contract unit price. Payment shall be subject to the total project

1122 payment limitation specified in paragraph 401-8.01. Payment in excess of 100 percent
1123 for accepted lots of bituminous concrete pavement shall be used to offset pavement for
1124 accepted lots of bituminous concrete pavement that achieve a lot pay factor less than
1125 100 percent.

1126

1127 Refer to Appendix A for Basis of Payment.

1128

1129

1130 **PART 9 TESTING REQUIREMENTS**

1131

1132 ASTM C 29 Unit Weight of Aggregate

1133

1134 ASTM D 75 Sampling Aggregates

1135

1136 ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

1137

1138 ASTM C 117 Test Method for Materials Finer than 75-um (No.200) Sieve in Mineral
1139 Aggregates by Washing

1140

1141 ASTM C 127 Specific Gravity and Absorption of Course Aggregate

1142

1143 ASTM C 131 Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los
1144 Angeles Machine

1145

1146 ASTM C 136 Sieve or Screen Analysis of Fine and Coarse Aggregates

1147

1148

1149

1150

1151 ASTM C 566 Total Moisture Content of Aggregate by Drying

1152

1153 ASTM D 995 Requirements for Mixing Plants for Hot-Mixed Hot-Laid Bituminous Paving
1154 Mixtures

1155

1156 ASTM D 979 Standard Practice for Sampling Bituminous Mixtures

1157

1158 ASTM D 1073 Fine Aggregate for bituminous Paving mixtures

1159

1160 ASTM D 1074 Compressive Strength of Bituminous Mixtures

1161

1162 ASTM D 1188 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-
1163 Coated Specimens

1164

1165 ASTM D 1461 Moisture or Volatile Distillates in
1166 Bituminous Paving Mixtures

1167

1168 ASTM D 1559 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus

1169

1170 ASTM D 2041 Theoretical Maximum Specific Gravity and Density of Bituminous Paving
1171 Mixtures

1172

1173 ASTM D 2419 Sand Equivalent Value of Soils and Fine Aggregate

1174

1175 ASTM D 2489 Degree of Particle Coating of Bituminous-Aggregate Mixtures

1176

1177	ASTM D 2726	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
1178		
1179		
1180	ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
1181		
1182		
1183	ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Method
1184		
1185	ASTM D 3665	Random Sampling of Paving Materials
1186		
1187	ASTM D 3666	Inspection and Testing Agencies for Bituminous Paving Materials
1188		
1189	ASTM D 4125	Asphalt Content of Bituminous Mixtures by the Nuclear Method
1190		
1191	ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
1192		
1193	ASTM D 4791	Flat or Elongated Particles in Coarse Aggregate
1194		
1195	ASTM D 4867	Effect of Moisture on Asphalt Concrete Paving Mixtures
1196		
1197	ASTM D 5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
1198		
1199	ASTM D 6307	Asphalt Content of Hot-Mix Asphalt by Ignition Method
1200		
1201	ASTM D 6926	Standard Practice for preparation of Bituminous Specimens Using MARSHALL Apparatus
1202		
1203		
1204	ASTM D 6927	Standard Test Method for MARSHALL Stability and Flow of Bituminous Mixtures
1205		
1206		
1207	ASTME E 11	Wire-Cloth Sieves for Testing Purposes
1208		
1209	ASTM E 178	Practice for Dealing With Outlying Observations
1210		
1211	AASHTO T 30	Mechanical Analysis of Extracted Aggregate
1212		
1213	ASSHTO T 110	Moisture of Volatile Distillates in Bituminous Paving Mixtures
1214		
1215	The Asphalt Institute's	Mix Design Methods for Asphalt Concrete
1216	Manual No. 2 (MS-2)	
1217		
1218	The Asphalt Institute's	Hot-Mix Recycling
1219	Manual No. 20 (MS-20)	
1220		
1221	CDOT Procedure CP43	Moisture Content of Bituminous Mixtures
1222		

PART 10 MATERIAL REQUIREMENTS

1223		
1224		
1225	ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
1226		
1227	ASTM D 946	Asphalt Cement for Use in Pavement Construction
1228		
1229	ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
1230		
1231	ASTM D 4552	Classifying Hot-Mix Recycling Agents
1232		

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1234
1235
1236

AASHTO MP 320 Specification for Performance graded Asphalt Binders

END OF ITEM P-401

ITEM P-403

ASPHALT-TREATED PERMEABLE BASE

PART 1 GENERAL

1.01 DESCRIPTION This work shall consist of the construction of an asphalt-treated permeable base (ATPB) course, composed of mineral aggregate and bituminous material 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.

PART 2 MATERIALS

2.01 AGGREGATE Aggregates shall consist of crushed stone or crushed gravel with or without sand or other inert finely divided mineral aggregate. The portion of materials retained on the No. 4 sieve shall be known as the coarse aggregate. The portion passing the No. 4 sieve and retained on the No. 200 sieve shall be known as the fine aggregate, and the portion passing the No. 200 sieve as mineral filler.

A. Coarse Aggregate Coarse aggregate shall consist of sound, tough, durable particles, free from coatings of clay, organic matter and other deleterious substances that would prevent thorough coating with the bituminous material. The percentage of wear shall not be greater than 40 percent when tested in accordance with ASTM C 131 (aggregates below 1-1/2 inches). The sodium sulfate soundness loss shall not exceed 20 percent, or the magnesium sulfate soundness loss shall not exceed 13 percent, after five cycles, when tested in accordance with ASTM C 88.

The source of coarse aggregate shall be from quarried rock or river gravel. No slag shall be permitted. All aggregates shall have demonstrated a satisfactory service record of at least 10 years duration under similar conditions of service and exposure.

Aggregate shall contain at least 90 percent by weight of crushed pieces having two or more fractured faces and shall contain at least 75 percent by weight of crushed pieces having two or more fractured faces with the area of each face being equal to at least 75 percent of the smallest mid-sectional 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 obtained by artificial crushing.

The aggregate shall not contain more than 8 percent, by weight, of flat or elongated pieces, a flat particle is one having a ratio of width to thickness greater than five; an elongated particle is one having a ratio of length to width greater than five.

B. Fine Aggregate Fine aggregate shall consist of clean, sound, durable, angular 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 and shall contain no clay balls. The fine aggregate, including any blended filler, shall have a plasticity index of not more than six and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.

Natural 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 percentage of natural sand (not manufactured by crushing) shall be kept below 15

57 percent to obtain optimum pavement properties as the addition of natural sand tends to
58 decrease stability of pavement. If used, the natural sand shall meet the requirements of
59 ASTM D 1073 and shall have a plasticity index of not more than 6 and a liquid limit of not
60 more than 25 when tested in accordance with ASMT D 4318.

61
62 The aggregate shall have sand equivalent values of 30 or greater when tested in
63 accordance with ASTM D 2419.

64
65 C. Sampling and Testing ASTM D 75 shall be used in sampling coarse aggregate and
66 ASTM C 183 shall be used in sampling mineral filler. All aggregate samples required for
67 testing shall be furnished by the Contractor and tested by an independent certified
68 laboratory chosen by the Contractor and approved by the Project Manager. No
69 aggregate shall be used in the production of mixtures without prior approval.

70
71

72 2.02 BITUMINOUS MATERIAL Bituminous material shall conform to the following requirements:

73
74 Type and Grade Asphalt Cement: PG 64-22 (AC-20)

75
76 Specification: ASTM D 3381, Table 2

77
78 A mixing temperature for the bituminous material shall be established where the viscosity is
79 between 150 and 300 centistokes. A tolerance of plus or minus 15 degrees F will be permitted if
80 the application of these tolerances to the mixing temperature maintains the viscosity between 150
81 and 300 centistokes. In no case will mixing be permitted at a temperature of less than
82 275 degrees or greater than 325 degrees F.

83
84 The Contractor shall furnish vendor's certified test reports for each tankload of bitumen shipped to
85 the project. The report shall be delivered to the Project Manager before permission is granted for
86 use of the material. The furnishing of the vendor's certified test report for the bituminous material
87 shall be the basis for final acceptance.

88
89 A Bituminous Material Certification The Bidder shall submit a "Bituminous Material
90 Certification"
91 form in accordance with the Part I, Project Requirements, Bid Forms, Bid Data Forms, of
92 these contract documents. To bid this Project, the Bidder shall certify that the asphalt cement
93 specified in this section is available at bid time and that the Bidder will obtain 100 percent of
94 the product when the Notice to Proceed is issued for the contract.

95
96

97 **PART 3 COMPOSITION**

98
99 3.01 COMPOSITION OF MIXTURE The bituminous plant mix shall be composed of a mixture of
100 aggregate and bituminous material. The several aggregate fractions shall be sized, uniformly
101 graded, and combined in such proportions that the resulting mixture meets the grading
102 requirements of the job mix formula.

103
104 3.02.1 JOB MIX FORMULA No bituminous mixture for payment shall be produced until a job mix
105 formula has been approved by the Project Manager. The formula shall be submitted in writing by
106 the Contractor to the Project Manager at least 10 days prior to the start of paving operations and
107 shall indicate the definite percentage of each sieve fraction of aggregate, the percentage of

108
109 bitumen, and the temperature of the completed mixture when discharged from the mixer. All test
110 data used to develop the job mix formula shall also be submitted. The job mix formula for each
111 mixture shall be in effect until modified in writing by the Project Manager. Should a change in
112 sources of materials be made, a new job mix formula must be established before the new
113 material is used.

114

115 For the ATPB, the bituminous mixture shall be a combination of aggregate and bituminous
 116 material conforming to the gradation and bitumen content limits specified in Table 1.
 117

TABLE 1. AGGREGATE GRADATION AND
 BITUMEN FOR ATPB

Sieve Size	Percentage by Weight Passing Sieves
1-1/2 inch	100
1 inch	95-100
1/2-inch	25-60
No. 4	0-10
No. 8	0-5
No. 200	0-2
Bitumen Content	2.0 - 3.5 percent

118 The Contractor shall establish the percent of bitumen to be used in the ATPB based on the
 119 results of his tests of aggregate and based on the observed performance and plant and field tests
 120 on the ATPB during the test section specified hereinafter. Further, the Project Manager reserves
 121 the right to vary the percent of bitumen of all bituminous mixtures during production as necessary
 122 to provide for full coating of all aggregate particles yet provide minimum drain down of bitumen.
 123 The bitumen content may be adjusted within the limits of Table 1 without adjustments in the
 124 Contract unit price.
 125

126 The Contractor shall use an approved heat-stable anti-stripping additive. The anti-stripping
 127 additive shall meet the approval of the Project Manager based on the results of laboratory tests.
 128 The additive shall be added to the asphalt tank at the recommended dosage (0.5 to 1.0 percent
 129 by weight of asphalt cement) and shall be thoroughly mixed by circulation of the asphalt for at
 130 least 4 hours prior to being incorporated into the mix. The exact amount of additive to be used
 131 shall be determined based on laboratory tests and submitted with the mix design.
 132

133 The job mix tolerances shown in Table 2 shall be applied to the job mix formula to establish a job
 134 control grading band. The full tolerances still will apply if application of the job mix tolerances
 135 results in a job control grading band outside the master grading band based on Table 1, except
 136 the upper three sieve sizes in each column shall be within the master band.
 137

TABLE 2. JOB MIX FORMULA TOLERANCES
 (Based on a Single Test)

Material	Tolerance- plus or minus
Aggregate passing No. 4 sieve or larger	7 percent
Aggregate passing No. 8 and 16 sieves	6 percent
Aggregate passing No. 30 and 50 sieves	5 percent
Aggregate Passing No. 100 and 200 sieves	3 percent
Bitumen Content (Individual Tests)	0.45 percent
Bitumen Content (Moving average of last 5)	0.25 percent variation
Temperature of mix	20 degrees F

139 The aggregate gradation may be adjusted within the limits of Table 2 as directed, without
 140 adjustments in the contract unit prices.
 141

142 Deviation from the final approved design for bitumen content and gradation of aggregates shall
 143 not be greater than the tolerances permitted and shall be based on daily plant extraction. Should
 144 a change in sources of materials be made, a new job mix formula shall be established before the
 145

new material is used and a new test section shall be required.

3.03 JOB MIX (JMF) LABORATORY The laboratory used to develop the job mix formula shall meet the requirements of ASTM D 3666 including accreditation. Accreditation shall include all test procedures required to develop the mix design. A certification signed by the manager of the laboratory stating it meets these requirements shall be submitted to the Project Manager. The certification shall contain as a minimum:

- A. Qualifications of personnel; including the laboratory manager, supervising technician, and testing technicians.
- B. Evidence of accreditation by a nationally recognized laboratory accreditation organization for all test methods used in developing the asphalt-treated permeable base job mix formula.

3.04 TEST SECTION Prior to full production, the Contractor shall prepare a quantity of bituminous mixture according to the job mix formula. The amount of mixture should be sufficient to construct a test section 100 feet long by 10 feet wide and shall be of the same depth specified for the construction of the course which it represents. 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.

For the ATPB, plant material and field cores will be taken to perform aggregate gradation, bitumen content, permeability, and temperature. Density and Marshall Stability Tests need not be performed. In no case will the plant-produced mix be considered acceptable if the mix properties of the test section do not meet the requirements of the mix design criteria.

If the test section should prove to be unsatisfactory, the necessary adjustments to the mix design, plant operation, and/or rolling procedures shall be made. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. When test sections do not conform to specification requirements, the pavement shall be removed and replaced at the Contractor's expense. A marginal quality test section that has been placed in an area of little or no traffic may be left in place. If a second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Full production shall not begin without the Project Manager's approval. Test sections will be paid for in accordance with Section 403-7.1.

PART 4 QUALITY CONTROL

4.01 GENERAL The Contractor will provide and maintain a quality control system that will require the Contractor to provide reasonable assurance that all materials and completed construction submitted for acceptance conform to the Contract requirements whether manufactured or processed by the Contractor, or procured from subcontractors or vendors.

A job mix shall be required by Section 3.2 of this specification prior to start of production, and whenever a change in materials warrants retesting.

4.02 QUALITY CONTROL DEFICIENCIES The Contractor shall take prompt action to correct any errors, equipment malfunction, process changes, or other assignable causes which have resulted

204 or could result in submission of materials and completed construction which do not conform to the
205 requirements of the specifications.
206

207 4.03 TOLERANCES After the job mix formula is approved, the Contractor shall control the aggregate
208 gradations, the percent bitumen, and the mix temperature within the tolerances specified herein.
209 Failure to meet the control tolerances will be cause to suspend production until the Contractor
210 has identified and corrected the operation to within the job mix tolerances. Continued production
211 without correction may result in rejection and removal of the material.
212

213 4.04 TESTING LABORATORY The Contractor or Producer shall provide a testing laboratory to
214 perform all quality control tests necessary to control the production and construction processes
215 applicable to these specifications and as set forth in the Quality Control program. The laboratory
216 performing the testing shall meet the requirements of Section 01401 including ASTM D 3666
217 accreditation and have been approved through the submittal process prior to performing testing.
218

219 4.05 QUALITY CONTROL TESTING Extraction tests for bitumen content and aggregate gradation will
220 be made at least twice daily. Sample aggregate for gradation in accordance with ASTM D 979 or
221 D 75, as applicable. The mixture will be tested for bitumen content in strict conformance with
222 ASTM D 2172, D 4125, or D 6307. If methods D 2172 or D 6307 are used, test aggregate for
223 gradation in accordance with ASTM D 5444. If method D 4125 is used, test aggregate for
224 gradation in accordance with ASTM C 136 and C 117.
225
226
227

228 PART 5 CONSTRUCTION METHODS

229
230 5.01 WEATHER LIMITATIONS The bituminous mixture shall not be placed upon a wet surface or
231 when the surface temperature of the underlying course is less than specified in Table 3. The
232 temperature requirements may be waived, but only at the discretion of the Project Manager.
233

TABLE 3. BASE TEMPERATURE LIMITATIONS

Mat Thickness	Base Temperature (Minimum) degrees F
3 inches or greater	40
Greater than 1 inch but less than 3 inches	45
1 inch or less	50

234
235 A. Other limitations The excavation of this material is temperature and light sensitive. Due to
236 this, methods of trenching and placing conduit shall be developed.
237
238

239 5.02 BITUMINOUS MIXING PLANT Plants used for the preparation of bituminous mixtures shall
240 conform to the requirements of ASTM D 995 with the following changes:
241

242 A. Requirements for All Plants.

243
244 (1) Truck Scales The bituminous mixture shall be weighed on approved scales
245 furnished by the Contractor, or on public scales at the Contractor's expense.
246 Such scales shall be inspected and sealed as often as the Project Manager
247 deems necessary to assure their accuracy. Scales shall conform to the
248 requirements of Section 90.
249

250 (2) Inspection of Plant The Project Manager, or his/her authorized representative,
251 shall have access, at all times, to all parts of the plant for checking adequacy of
252 equipment; inspecting operation of the plant; verifying weights, proportions, and
253 character of materials; and checking the temperatures maintained in the

254 preparation of the mixtures.

255
256 (3) Storage Bins and Surge Bins Paragraph 3.9 of ASTM D 995 is deleted. Instead,
257 the following applies. Use of surge bins or storage bins for temporary storage of
258 hot bituminous mixtures will be permitted as follows:

259
260 (a) The bituminous mixture may be stored in surge bins as directed by the
261 Project Manager for period of time not to exceed 3 hours,

262
263 (b) The bituminous mixture may NOT be stored in insulated storage bins.

264
265
266 5.03 TRUCKS Trucks used for hauling bituminous mixtures shall have tight, clean, and smooth metal
267 beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a
268 minimum amount of paraffin oil, lime solution, or other approved material. Each truck shall have a
269 suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the
270 mixture will be delivered to the site at the specified temperature, truck beds shall be insulated and
271 covers shall be securely fastened.

272
273
274 5.04 BITUMINOUS PAVERS Bituminous pavers shall be self-contained, power-propelled units with an
275 activated screed or strike-off assembly, heated if necessary, and shall be capable spreading and
276 finishing courses of bituminous plant mix material which will meet the specified thickness,
277 smoothness, and grade. Pavers used for shoulders and similar construction shall be capable of
278 spreading and finishing courses of bituminous plant mix material in widths shown on the Plans.

279
280 The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading
281 operation. The hopper shall be equipped with a distribution system to place the mixture uniformly
282 in front of the screed. The screed or strike-off assembly shall effectively produce a finished
283 surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

284
285 The paver shall be capable of operating at forward speeds consistent with satisfactory laying of
286 the mixture.

287
288 The paver shall be equipped with a control system capable of automatically maintaining the
289 specified screed elevation. The control system shall be automatically actuated from either a
290 reference line or surface through a system of mechanical sensors or sensor-directed mechanisms
291 or devices which will maintain the paver screed at a predetermined transverse slope and at the
292 proper elevation to obtain the required surface. The transverse slope controller shall be capable
293 of maintaining the screed at the desired slope within plus or minus 0.1 percent.

294
295 The controls shall be capable of working in conjunction with any of the following attachments:

296
297 A. Ski-type device of not less than 30 feet (9.14 m) in length or as directed by the Project
298 Manager

299
300 B. Taut stringline (wire) set to grade

301
302 C. Short ski or shoe

303
304
305 5.05 ROLLERS An approved steel wheel roller, weighing not less than 8 tons nor more than 12 tons
306 and having a unit compression on the drive wheels of not less than 250 nor more than
307 400 pounds per inch of roller width, shall be used to compact the mix. Vibratory rollers meeting
308 the above requirements may be used to compact the ATPB provided the vibratory unit is turned
309 off. Rollers shall be in good condition, capable of operating at slow speeds to avoid displacement
310 of the bituminous mixture. The number, type, and weight of rollers shall be sufficient to compact
311 the mixture to the required density while it is still in a workable condition.

- 312
313 The use of equipment which causes excessive crushing of the aggregate will not be permitted.
314
315
- 316 5.06 PREPARATION OF BITUMINOUS MATERIAL The bituminous material shall be heated in a
317 manner that will avoid local overheating and provide a continuous supply of the bituminous
318 material to the mixer at a uniform temperature. The temperature of the bituminous material
319 delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the
320 aggregate particles but shall not exceed 325 degrees F (160 degrees C).
321
322
- 323 5.07 PREPARATION OF MINERAL AGGREGATE The aggregate for the mixture shall be dried and
324 heated to the temperature designated by the job formula within the job tolerance specified. The
325 maximum temperature and rate of heating shall be such that no permanent damage occurs to the
326 aggregates. Particular care shall be taken that aggregates high in calcium or magnesium content
327 are not damaged by overheating. The temperature shall not be lower than is required to obtain
328 complete coating and uniform distribution on the aggregate particles and to provide a mixture of
329 satisfactory workability.
330
331
- 332 5.08 PREPARATION OF BITUMINOUS MIXTURE The aggregates and the bituminous material shall
333 be weighed or metered and introduced into the mixer in the amount specified by the job mix
334 formula.
335
336 The combined materials shall be mixed until the aggregate obtains a uniform coating of bitumen
337 and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time
338 that will produce a satisfactory mixture. It shall be established by the Contractor, based on the
339 procedure for determining the percentage of coated particles described in ASTM D 2489, and
340 approved by the Project Manager for each individual plant and for each type of aggregate used.
341 The minimum mixing time shall be 25 seconds. The mixing time will be set to achieve 95 percent
342 of coated particles. For continuous mix plants, the minimum mixing time shall be determined by
343 dividing the weight of its contents at operating level by the weight of the mixture delivered per
344 second by the mixer. The moisture content of the mix shall not exceed 1.0 percent.
345
346
- 347 5.09 TRANSPORTING, SPREADING, AND FINISHING The mixture shall be transported from the
348 mixing plant to the point of use in vehicles conforming to the requirements of Section 403-5.3.
349 Deliveries shall be scheduled so that spreading and rolling of all mixture prepared for 1 day's run
350 can be completed during daylight, unless adequate artificial lighting is provided. Hauling over
351 freshly placed material shall not be permitted until the material has been compacted, as specified,
352 and allowed to cool to atmospheric temperature.
353
354 Immediately before placing the bituminous mixture, the underlying course shall be cleared of all
355 debris with power blowers, power brooms, or hand brooms as directed.
356
357 The mix shall be placed at a temperature of not less than 250 degrees F (107 degrees C). In
358 addition, the ATPB shall be spread only when the atmospheric temperature is above
359 40 degrees F.
360
361 Upon arrival, the ATPB shall be spread to the full width by an approved bituminous paver. The
362 ATPB shall be placed and compacted in a single layer thickness of 6 inches and will conform to
363 the grade and contour indicated on the Plans. Automatic grade control shall be used for
364 placement of the permeable base. Grade control shall be wire or string reference lines for
365 elevation and alignment. When string lines are required, they shall consist of piano wire or other
366 approved material. The string lines shall be supported at a minimum of 25 foot centers. Additional
367 supports shall be installed to prevent sag, if required. The horizontal alignment of the string lines
368 shall be within plus or minus 1/4-inch per 10 feet. The Contractor shall provide a satisfactory
369 method of securing the string line where vertical curves are constructed to maintain the proper

370 grade.

371
372 After the first lane is constructed, the joint matcher (short ski) shall be used on the previously laid
373 lane. The free edge shall be controlled as specified herein before. The automatic transverse
374 grade control device shall be used only when one paving lane of each side of the high point of the
375 pavement is to be constructed. Example: One lane pavement or two lane crowned pavement.

376
377 The control system shall be automatically actuated from the reference line through a system of
378 mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver
379 screed at a predetermined transverse slope and at the proper elevation to obtain the required
380 surface. The speed of the paver shall be regulated to eliminate pulling and tearing of the
381 bituminous mat. Unless otherwise directed, placement of the mixture shall begin along the
382 centerline of a crowned section or on the high side of areas with a one-way slope. The mixture
383 shall be placed in consecutive adjacent strips having a minimum width of 12 feet except where
384 edge lanes require less width to complete the area. Transverse joints in adjacent lanes shall be
385 offset a minimum of 10 feet (3 m).

386
387 On areas where irregularities or unavoidable obstacles make the use of mechanical spreading
388 and finishing equipment impractical, the mixture may be spread, raked, and luted by hand tools.

389
390
391 5.10 COMPACTION OF MIXTURE After spreading, the mixture shall be thoroughly and uniformly
392 compacted by rolling. The surface shall be rolled when the mixture has attained sufficient stability
393 so that the rolling does not cause undue displacement, cracking or shoving. Rolling of the ATPB
394 shall begin when the temperature of the mixture is less than 150 degrees F and shall be
395 completed before the mixture is less than 100 degrees F. The sequence of rolling operations and
396 the type of rollers used shall be at the discretion of the Contractor.

397
398 The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot
399 mixture. Any displacement occurring as a result of reversing the direction of the roller, or from any
400 other cause, shall be corrected at once. To prevent adhesion of the mixture to the roller, the
401 wheels shall be kept properly moistened, but excessive water will not be permitted. Water shall
402 not be used to cool the mixture.

403
404 Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until all
405 roller marks are eliminated, the surface is of uniform texture and true to grade and cross section,
406 and the required field density obtained by the test section evaluation is obtained. In areas not
407 accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers.

408
409 Rolling shall be by three complete coverages of the specified static roller. The Project Manager
410 reserves the right to increase or decrease the specified number of roller coverages and the
411 specified temperature limits for rolling during construction based on test data and observed
412 performance from the test section or production placement of the ATPB.

413
414 Any mixture that becomes loose and broken, mixed with dirt, or in any way defective shall be
415 removed and replaced with fresh hot mixture and immediately compacted to conform to the
416 surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be
417 allowed.

418
419
420 5.11 JOINTS The formation of all joints shall be made in such a manner as to ensure a continuous
421 bond between old and new sections of the course. All joints shall have the same texture, density,
422 and smoothness as other sections of the course.

423
424 The roller shall not pass over the unprotected end of the freshly laid mixture except when
425 necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made
426 by means of placing a bulkhead or by tapering the course, in which case the edge shall be cut
427 back to its full depth and width on a straight line to expose a vertical face. In both methods, all

428 contact surfaces shall be given a tack coat of bituminous material before placing any fresh
429 mixture against the joint.

430
431 Longitudinal joints which are irregular, damaged, or otherwise defective shall be cut back to
432 expose a clean, sound surface for the full depth of the course. All contact surfaces shall be given
433 a tack coat of bituminous material prior to placing any fresh mixture against the joint.

434
435
436 5.12 SURFACE TESTS Tests for conformity with the specified crown and grade shall be made by the
437 Contractor immediately after initial compaction. Any variation shall be corrected by the removal or
438 addition of materials and by continuous rolling as described in this section. Tabular summary of
439 straight edge records and location will be given to the Project Manager.

440
441 After the ATPB has been compacted, the surface shall be tested by the Contractor and furnished
442 to the Project Manager for smoothness and conformance to the elevations shown on the Plans.
443 The finished surface shall not vary more than 3/8-inch from the surface course when tested with a
444 16-foot (4.8 m) straightedge applied parallel with and at right angles to the centerline, nor more
445 than plus zero to minus 1/2 inch from the elevations shown on the Plans. This tolerance shall be
446 maintained prior to the installation of the edge light cans.

447
448 ATPB with a surface higher than design elevation or with a surface variation exceeding the
449 specified tolerances shall be removed and replaced with ATPB which complies with these
450 specifications. If approved by the Project Manager, the high spots may be removed to within
451 specified tolerance by any method that does not produce contaminating fines nor damage the
452 ATPB to remain in place. Grinding shall not be permitted.

453
454 Hardened ATPB with a surface lower than 1/2 inch below elevations shown shall be removed and
455 replaced with ATPB which complies with these specifications. If approved by the Project
456 Manager, the low areas may be filled with bituminous course conforming to the requirements for
457 the overlying course. This shall be done as a separate operation prior to placement of the
458 overlying course. No additional compensation will be allowed for additional bituminous course
459 depth resulting from ATPB elevations being too low.

460
461
462 5.13 PROTECTION OF ATPB

463
464 Care shall be exercised to prevent contamination or damage to previously completed ATPB. The
465 Contractor will only place an amount of ATPB that can be covered by the overlying course in a
466 reasonable amount of time.

467
468 Construction equipment other than hauling and paving equipment necessary for placement of the
469 overlying course and electrical installation shall not operate on the finished ATPB. Route and
470 operate material hauling trucks and other equipment in a manner to minimize the amount of mud
471 and dirt carried onto the ATPB. If necessary, clean equipment of mud and dirt prior to operation
472 on the ATPB. Contractor has the option to construct the electrical directly on the ATPB or after
473 the placement of the first lift of P-401 asphalt base course.

474
475 Operate equipment in a manner to prevent damage to the completed ATPB. Equipment shall
476 avoid rapid acceleration, hard braking, or sharp turning.

477
478 Any ATPB which, in the opinion of the Project Manager, has become contaminated or damaged
479 shall be removed and replaced by the Contractor with ATPB which conforms to these
480 specification requirements, at the Contractor's sole expense.

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483 PART 6 METHOD OF MEASUREMENT

484
485 6.01 Refer to Appendix A for Method of Measurement.

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PART 7 BASIS OF PAYMENT

7.01 Refer to Appendix A for Basis of Payment.

PART 8 TESTING REQUIREMENTS

- ASTM C 29 Unit Weight of Aggregate
- ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- ASTM C 131 Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
- ASTM C 136 Sieve or Screen Analysis of Fine and Coarse Aggregates
- ASTM C 183 Sampling Hydraulic Cement
- ASTM D 75 Sampling Aggregates
- ASTM D 995 Requirements for Mixing Plants for Hot-Mixed Hot-Laid Bituminous Paving Mixtures
- ASTM D 1075 Effect of Water on Cohesion of Compacted Bituminous Mixtures
- ASTM D 1188 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
- ASTM D 1559 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
- ASTM D 2172 Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
- ASTM D 2489 Degree of Particle Coating of Bituminous-Aggregate Mixtures
- ASTM D 2726 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
- ASTM D 3665 Random Sampling of Paving Materials
- ASTM D 3666 Inspection and Testing Agencies for Bituminous Paving Materials
- ASTM D 4125 Asphalt Content of Bituminous Mixtures by the Nuclear Method
- ASTM D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D 6307 Asphalt Content of Hot-Mix Asphalt by the Ignition Method
- AASHTO T 30 Mechanical Analysis of Extracted Aggregate
- The Asphalt Institute's Manual No. 2 (MS-2) Mix Design Methods for Asphalt Concrete

PART 9 MATERIAL REQUIREMENTS

544		
545	ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
546		
547	ASTM D 946	Asphalt Cement for Use in Pavement Construction
548		
549	ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
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END OF ITEM P-403

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ITEM P-501

PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 GENERAL

1.01 DESCRIPTION This work shall consist of pavement composed of portland cement concrete, with and 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.

PART 2 MATERIALS

2.01 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 ASTM C 1260, Potential Alkali Reactivity of Aggregates (Mortar-Bar Method). The laboratory conducting the tests shall be accredited under ASTM C 1077. Fine and coarse aggregates shall be evaluated separately. In addition each aggregate source shall be evaluated separately and if the aggregate source changes, aggregates from the new source require testing. Acceptance of aggregates shall be based on satisfactory evidence furnished by the aggregate producer that the aggregates do not produce expansion in excess of 0.10%.

The aggregates shall also be tested for deleterious reactivity with alkalis in the proposed concrete mix using a sodium hydroxide soak solution and a potassium acetate soak solution in accordance with modified ASTM C 1567, Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method). Acceptance of the aggregates shall be based upon satisfactory evidence furnished by the concrete supplier that the aggregates, combined with the proposed low alkali Portland cement and class F fly ash do not produce expansion in excess of 0.10% at 28 days with the sodium hydroxide soak solution and expansion in excess of 0.08% with the potassium acetate soak solution. This evidence shall include certified records of tests by a testing laboratory accredited under ASTM C 1077. Should any of the test data indicate an expansion of greater than that specified, the aggregates shall be rejected. A new source for the aggregates shall be found and the new mix retested with the modified ASTM C 1567. This shall be repeated until satisfactory test results are achieved. If any changes of any kind are made to the approved mix design, either to aggregate sources, Portland cement or fly ash, then the new mix shall be tested in accordance with modified ASTM C 1567 and submitted for approval prior to use. All testing is to be performed by the contractor at the Contractor's expense.

ASTM C 1567 shall be modified as follows: The modified test requires at least one comparator reading every 3 or 4 days and a comparator reading at 28 days after the zero reading. The report shall include a graph of percent length change data at each reading from the time of the zero reading to the end of the 28-day period.

Utilize the Contractor's proposed Portland cement with class F fly ash for the test proportioning. The laboratory shall use the Contractor's proposed percentage of Portland cement and class F fly ash. The quantity shall be determined that will meet all the requirements of these specifications and that which will lower the expansion to 0.10 percent or less at 28 days with the sodium hydroxide soak solution and 0.08% or less with

56 the potassium acetate soak solution . Class F fly ash shall be used at a rate of 20
 57 percent to 30 percent of the total cementitious mass.
 58

59 Proportioning of Mortar. Utilize the Contractor’s proposed Portland cement and class F fly
 60 ash in combination for the test proportioning. The laboratory shall use 1 part of
 61 cementitious materials (Contractor’s proposed percentage of Portland cement plus fly
 62 ash) to 2.25 parts of graded aggregate (Contractor’s proposed combination percentage of
 63 coarse and fine aggregate by mass). Use a water-cementitious materials ratio equal to
 64 0.47 by mass. The cementitious material combination shall be determined that will meet
 65 all the requirements of these specifications and that which will lower the expansion to less
 66 0.10 percent at 28 days. Class F fly ash shall be used at a minimum rate of 20 percent of
 67 the total cementitious material by mass.
 68

69 The Contractor’s QC shall employ a professional Geologist with five ~~one~~ years of
 70 documented petrographic experience. Prior to production the Geologist, accompanied by
 71 the Project Manager, shall inspect and qualify that the material at the gravel pit is the
 72 material used for the ASTM C 1567 tests. The Geologist shall submit a report to the
 73 Project Manager that meets the requirements of ASTM C 295, paragraph 16 and includes
 74 a map indicating the location of the pit, the area of the pit where the inspected materials
 75 are located, and types of aggregates encountered.
 76

77 The Contractor’s QC shall sample the aggregates stockpiled at the batch plant every
 78 week during hauling. The samples shall be submitted to the Geologist for inspection. The
 79 Geologist shall submit the results of the inspections to the Project Manager. If at any time
 80 during visual inspection of the samples, the material changes and is no longer
 81 represented by the original modified ASTM C 1567 test a new modified ASTM C 1567 test
 82 shall be required.
 83

- 84 B. Fine Aggregate - Fine aggregate shall conform to the requirements of ASTM C 33.
 85 Gradation shall meet the requirements of Table 1 when tested in accordance with ASTM
 86 C 136, except as may otherwise be qualified under Section 65 of ASTM C 33. The
 87 amount of deleterious material in the fine aggregate shall not exceed the following limits
 88 by mass:
 89

	Material Percentage by Mass
Clay lumps and friable particles ASTM C 142	1.0
Material finer than 0.075 mm (No. 200 sieve) ASTM C 117	3.0
Lightweight particles ASTM C 123 using a medium with a density of 2.0 Mg/cubic meter (Sp. Gr. of 2.0))	0.5
Total of all above	3.0

90
 91
 92 **TABLE 1. GRADATION FOR FINE AGGREGATE**
 93

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95-100
No. 8 (2.36 mm)	80-100
No. 16 (1.18 mm)	50-85
No. 30 (600 micro-m)	25-60
No. 50 (300 micro-m)	10-30
No. 100 (150 micro-m)	2-10

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- C. Coarse Aggregate Coarse aggregate shall conform to the requirements of ASTM C 33. Gradation, within the separated size groups, shall meet the requirements of Table 2 when tested in accordance with ASTM C 136. When the nominal maximum size of the aggregate is greater than 1 inch, 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 blast furnace slag, or a combination thereof. The aggregate shall be composed of clean, hard, uncoated particles and shall meet the requirements for deleterious substances contained in ASTM C 33, Class 5S with the exceptions of 40 percent for abrasion and 12 percent for magnesium sulfate soundness. Dust, particles produced during crushing and mining, and other coatings shall be thoroughly removed from the aggregates by washing. Aggregate that visually contains dust, particles produced during crushing and mining, or other coatings shall not be used in the mix. If used, the material shall not be paid for by the City. The aggregate in any size group shall not contain more than 8 percent by weight of flat or elongated pieces when tested in accordance with ASTM D 4791. A flat or elongated particle is one having a ratio between the maximum and the minimum dimensions of a circumscribing rectangular prism exceeding 5 to 1.

The percentage of wear shall be no more than 40 percent when tested in accordance with ASTM C 131 or ASTM C 535.

LIMITS OF DELETERIOUS MATERIALS IN COARSE AGGREGATE
FOR AIRFIELD PAVEMENTS

	Maximum Percentage by Mass
Clay lumps and friable particles (ASTM C 142)	0.2
Shale (a) (ASTM C 295)	0.1
Material finer than 0.075 mm (No. 200 sieve) (b) (ASTM C 117)	0.5
Lightweight particles (c) (ASTM C 123)	0.2
Clay ironstone (d) (ASTM C 295)	0.1
Chert and cherty stone (less than 2.40 Mg/cubic meter density SSD (2.40 Sp. Gr.)) (e) (ASTM C 123 followed by ASTM C 295)	0.1
Claystone, mudstone, and siltstone (f) (ASTM C 295)	0.1
Shaly and argillaceous limestone (g) (ASTM C 295)	0.2
Other soft particles COE CRD-C 130	1.0
Total of all deleterious substances exclusive of material finer than 0.075 mm (No. 200 sieve)	1.0

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a. Shale is defined as a fine-grained, thinly laminated or fissile sedimentary rock. It is commonly composed of clay or silt or both. It has been indurated by compaction or by cementation, but not so much as to have become slate.

b. Limit for material finer than 0.075 mm (No. 200 sieve) will be increased to 1.5 percent for crushed aggregates if the fine material consists of crusher dust that is essentially free from clay or shale.

135 c. The separation medium shall have a density of 2.0 Mg/cubic meter (Sp. Gr. of 2.0).
 136 This limit does not apply to coarse aggregate manufactured from blast-furnace slag
 137 unless contamination is evident.
 138 d. Clay ironstone is defined as an impure variety of iron carbonate, iron oxide, hydrous
 139 iron oxide, or combinations thereof, commonly mixed with clay, silt, or sand. It commonly
 140 occurs as dull, earthy particles, homogeneous concretionary masses, or hard-shell
 141 particles with soft interiors. Other names commonly used for clay ironstone are "chocolate
 142 bars" and limonite concretions.
 143 e. Chert is defined as a rock composed of quartz, chalcedony or opal, or any mixture of
 144 these forms of silica. It is variable in color. The texture is so fine that the individual mineral
 145 grains are too small to be distinguished by the unaided eye. Its hardness is such that it
 146 scratches glass but is not scratched by a knife blade. It may contain impurities such as
 147 clay, carbonates, iron oxides, and other minerals. Cherty stone is defined as any type of
 148 rock (generally limestone) that contains chert as lenses and nodules, or irregular masses
 149 partially or completely replacing the original stone.
 150 f. Claystone, mudstone, or siltstone, is defined as a massive fine-grained sedimentary
 151 rock that consists predominantly of indurated clay or silt without laminations or fissility. It
 152 may be indurated either by compaction or by cementation.
 153 g. Shaly limestone is defined as limestone in which shale occurs as one or more thin beds
 154 or laminae. These laminae may be regular or very irregular and may be spaced from a
 155 few inches down to minute fractions of an inch. Argillaceous limestone is defined as a
 156 limestone in which clay minerals occur disseminated in the stone in the amount of 10 to
 157 50 percent by weight of the rock; when these make up from 50 to 90 percent, the rock is
 158 known as calcareous (or dolomitic) shale (or claystone, mudstone, or siltstone).
 159
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TABLE 2. GRADATION FOR COARSE AGGREGATE
 ASTM C 33

Sieve Designations (square openings)		Percentage by Weight Passing Sieves From 1-1/2" to No.4 (38.1mm-4.75mm)	
in.	mm	#4 1-1/2"-3/4"	#67 3/4"-No.4
2	50.8	100	---
1-1/2	38.1	90-100	---
1	25.0	20-55	100
3/4	19.0	0-15	90-100
1/2	12.5	---	---
3/8	9.5	0-5	20-55
No. 4	4.75	---	0-10
No. 8	2.36	---	0-5

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 163
 164
 165 D. Aggregate susceptibility to Disintegration (D) Cracking. Aggregates that have a history of
 166 D-cracking shall not be used. Prior to approval of the aggregate, the Contractor shall
 167 submit written certification that the aggregate does not have a history of D-cracking. If the
 168 aggregates have previously been used at DIA, provide the project name, project number,
 169 mix design number, and current condition of the concrete.
 170
 171 2.02 CEMENT: Cement shall conform to the requirements of ASTM C 150, Type V, or equivalent.
 172 If for any reason, cement becomes partially set or contains lumps of caked cement, it shall be
 173 rejected. Cement salvaged from discarded or used bags shall not be used.
 174

175 A Type I/II cement may be substituted for Type V providing it meets the following
 176 requirements:
 177

178	• Magnesium Oxide (MgO), max, %	6.0	ASTM C 114
179	• Sulfur trioxide (SO ₃), ^A max, %	2.3	ASTM C 114
180	• Loss on Ignition, max, %	3.0	ASTM C 114
181	• Insoluble residue, max, %	0.75	ASTM C 114
182	• Equivalent alkalis (Na ₂ O + 0.658K ₂ O), max, %	0.60	ASTM
183	C 114		
184	• Air content of mortar, max volume, %	12	ASTM C 185
185	• Fineness ^B , specific surface, m ² /kg		
186	(alternative methods):		
187	Turbidimeter test:		
188	average value, min	160	ASTM C 115
189	any one sample, min	150	ASTM C 115
190	or		
191	Air permeability test (Blain)		
192	average value, min	280	ASTM C 204
193	any one sample, min	260	ASTM C 204
194	• Autoclave expansion, max, %	0.80	ASTM C 151
195	• Strength, not less than the values shown		
196	for the ages indicated as follows:		
197	Compressive strength, MPa (psi) @ 3 days	10.0 (1450)	ASTM C 109/ C 109M
198			
199	Compressive strength, MPa (psi) @ 7 days	17.0 (2470)	ASTM C 109/ C 109M
200			
201	Compressive strength, MPa (psi) @ 28 days	21.0 (3050)	ASTM C 109/ C 109M
202			
203	• Time of setting; Vicat test: ^C		
204	Time of setting, min, not less than	45	ASTM C 191
205	Time of setting, min, not more than	375	ASTM C 191
206	•		
207	• Sulfate Resistance ^D , 14 days, max, %		
208	expansion	0.040	ASTM C 452
209			

210
 211 ^A If the (SO₃) requirement can not be met, exceeding values will be acceptable provided it
 212 has been demonstrated by Test Method C 1038 that the cement with the increased SO₃
 213 will not develop expansion in water exceeding 0.020% at 14 days. Supporting test data
 214 must be provided.
 215

216 ^B The testing laboratory shall select the fineness method to be used. However, when the
 217 sample fails to meet the requirements of the air-permeability test, the Turbidimeter test
 218 shall be used, and the requirements for the turbidimetric method shall govern.
 219

220 ^C The time of setting is that described as initial setting time in Test Method C 191.
 221

222 ^D ASTM C 1012 "Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate
 223 Solution" test may be substituted for ASTM C 452 "Potential Expansion of Portland
 224 Cement Mortars Exposed to Sulfate" test. For acceptance of the C 1012 results
 225 expansion shall be less than 0.05% at 6 months or less than 0.1% at 1 year.
 226
 227
 228

229 Total Alkalis (Na₂O + 0.658 K₂O) shall be independently verified in accordance with ASTM C114.
 230 Total equivalent alkalis shall be less than 0.6%.

- 231
232 The Contractor shall furnish vendors' certified test reports for each carload, or equivalent, of
233 cement shipped to the project. The report shall be delivered to the Engineer before permission to
234 use the cement is granted. All such test reports shall be subject to verification by testing sample
235 materials received for use on the project.
236
- 237 2.03 CEMENTITIOUS MATERIALS Fly ash shall meet the requirements of ASTM C 618, class F with
238 the exception of loss on ignition, where the maximum shall be less than 6 percent for class F.
239 The supplementary optional chemical and physical properties for Increase of Drying Shrinkage in
240 Mortar Bars, Effectiveness in Controlling Alkali-Silica Reaction, and Effectiveness in Controlling
241 Sulfate Resistance of Table 3 contained in ASTM C618 shall apply. The available alkalis, as
242 equivalent, as Na₂O shall be a maximum of 1.5%. The limit of CaO content shall be 13.0% or
243 less. Fly ash such as is produced in furnace operations utilizing liming materials or soda ash
244 (sodium carbonate) as an additive shall not be acceptable. A certificate of compliance shall be
245 submitted for each source of Fly Ash. ASTM C 618 Tables 1 and 2 test results shall not be greater
246 than 60 days old and the Increase of Drying Shrinkage in Mortar Bars, Effectiveness in Controlling
247 Alkali-Silica Reaction, and Effectiveness in Controlling Sulfate Resistance test results of Table 3
248 shall not be greater than 18 months old.
249
- 250 2.04 PREMOLDED JOINT FILLER Premolded joint filler for expansion joints shall conform to the
251 requirements of ASTM D 1752, Type I and shall be punched to admit the dowels where called for
252 on the plans. The filler for each joint shall be furnished in a single piece for the full depth and
253 width required for the joint, unless otherwise specified by the Project Manager. When the use of
254 more than one piece is required for a joint, the abutting ends shall be fastened securely and held
255 accurately to shape by stapling or other positive fastening means satisfactory to the Project
256 Manager. This pre-molded joint filler must be removed full depth of joint prior to sealing the joint.
257
- 258 2.05 JOINT SEALER The joint sealer for the joints in the concrete pavement shall meet the
259 requirements of Item P-604A, P-604B, and P-605 and shall be of the type(s) specified in the
260 plans.
261
- 262 2.06 STEEL REINFORCEMENT Reinforcing shall consist of welded deformed steel fabric conforming
263 to the requirements of ASTM A 497 or deformed Reinforcing steel as shown in the Contract
264 Drawings. Support devices shall be constructed such that they do not transfer oxidation or
265 corrosion to the reinforcement. Support devices shall be of the correct height and width to support
266 the reinforcement as indicated on the contract documents without modification.
267
- 268 2.07 DOWEL AND TIE BARS Tie bars shall be deformed steel bars and conform to the requirements
269 of ASTM A 615, ASTM A 616, or ASTM A 617, except that rail steel bars, Grade 50 or 60, shall
270 not be used for tie bars that are to be bent or re-straightened during construction. Tie bars
271 designated as Grade 40 in ASTM A 615 can be used for construction requiring bent bars.
272
- 273 Dowel bars shall be plain steel bars conforming to ASTM A 615, ASTM A 616 or ASTM A 617 and
274 shall be free from burring or other deformation restricting slippage in the concrete. High strength
275 dowel bars shall conform to ASTM A 714, Class 2, Type S, Grade I, II or III, Bare Finish. Before
276 delivery to the construction site each dowel bar shall be epoxy coated in conformance with ASTM
277 A 775/A 775M. Metal or plastic collars shall be full circular device supporting the dowel until the
278 epoxy hardens.
279
- 280 The sleeves for dowel bars used in expansion joints shall be metal or other type of an approved
281 design to cover 2 to 3 inches (50 mm to 75 mm) of the dowel, with a closed end and with a
282 suitable stop to hold the end of the bar at least 1 inch (25 mm) from the closed end of the sleeve.
283 Sleeves shall be of such design that they will not collapse during construction.
284
- 285 Support devices shall be constructed such that they do not transfer oxidation or corrosion to the
286 dowel and tie bars.

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- 2.08 WATER Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water will be tested in accordance with the requirements of AASHTO T 26. Water known to be of potable quality may be used without testing.
- 2.09 COVER MATERIAL FOR CURING 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 C 309, Type 2, Class B.
 - B. White polyethylene film for curing concrete shall conform to the requirements of ASTM C 171.
 - C. White burlap-polyethylene sheeting for curing concrete shall conform to the requirements of ASTM C 171.
 - D. Waterproof paper for curing concrete shall conform to the requirements of ASTM C 171.
 - E. Product must be stored as per Manufacturer's guidelines.
- 2.10 ADMIXTURES The use of any material added to the concrete mix shall be approved by the Project Manager. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Contractor will 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 Project Manager from the supply of 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 C 260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any chemical admixtures shall be compatible.
 - B. Chemical Admixtures. Water-reducing, set retarding, and set-accelerating admixtures shall meet the requirements of ASTM C 494, including the flexural strength test.
- 2.11 EPOXY-RESIN Epoxy-resin used to anchor dowels and tie bars in pavements shall conform to the requirements of ASTM C 881, Type I, Grade 3, Class C. Class A or B shall be used when the surface temperature of the hardened concrete is below 60 degrees F (16 degrees C). Epoxy samples shall be taken by the Contractor twice daily, or as requested by the Project Manager or his representative, during placement to confirm the material sets properly.
- 2.12 MATERIAL ACCEPTANCE Prior to use of materials, the Contractor shall submit certified test reports to the Project Manager for those materials proposed for use during construction. The certification shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material passed or failed.
- The Project Manager 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.

341 **PART 3 MIX DESIGN**

342
343 3.01 PROPORTIONS

344
345 A. Concrete shall be designed to achieve a 28-day flexural strength that meets or exceeds the
346 acceptance criteria contained in paragraph 501-5.02 E(1) for a flexural strength of 700 psi.
347 The mix shall be designed using the procedures contained in Chapter 9 of the Portland
348 Cement Association's manual, "Design and Control of Concrete Mixtures."

349
350 B. Concrete shall be designed to achieve a 72 hour flexural strength that meets or exceeds the
351 acceptance criteria contained in paragraph 501-5.02 E (1) for a flexural strength of 550 psi.
352 The mix shall be designed using the procedures contained in Chapter 9 of the Portland
353 Cement Association's manual, "Design and Control of Concrete Mixtures". The PWL
354 calculation in P-501-8.01 shall use the 28 day strength for the evaluation.
355

356 The Contractor shall note that to ensure that the concrete actually produced will meet or exceed
357 the acceptance criteria for the specified strength, the mix design average strength must be higher
358 than the specified strength. The amount of over-design necessary to meet specification
359 requirements depends on the producer's standard deviation of flexural test results and the
360 accuracy which that value can be estimated from historic data for the same or similar materials.
361

362 The minimum cementitious material (cement plus fly ash) shall be 564 pounds per cubic yard
363 (227 kg per cubic meter). Class "F" fly ash shall make up 20 to 30 percent of the total weight.
364 The ratio of water to cementitious material, including free surface moisture on the aggregates but
365 not including moisture absorbed by the aggregates shall not be more than 0.45 by weight.
366

367 Prior to the start of paving operations and after approval of all material to be used in the concrete,
368 the Contractor shall submit a mix design showing the proportions and flexural strength obtained
369 from the concrete at 7 and 28 days. The mix design shall include copies of test reports, including
370 test dates, and a complete list of materials including type, brand, source, and amount of; cement,
371 fly ash, ground slag, coarse aggregate, fine aggregate, water, and admixtures. The fineness
372 modulus of the fine aggregate and the air content shall also be shown. The mix design shall be
373 submitted to the Project Manager at least 10 days prior to the start of operations. The submitted
374 mix design shall not be more than 90 days old. Production shall not begin until the mix design is
375 approved in writing by the Project Manager.
376

377 Should a change in sources be made, changes in the amounts of cementitious material,
378 admixtures added or deleted from the mix, or any other changes made in the approved mix, a
379 new mix design shall be submitted to the Project Manager for approval. Any material placed
380 without an approved mix shall be removed at the contractor's expense.
381

382 Flexural strength test specimens shall be prepared in accordance with ASTM C 31 and tested in
383 accordance with ASTM C 78. The mix determined shall be workable concrete having a target
384 slump for side-form concrete of 1½ inches, (38 mm) as determined by ASTM C 143. For vibrated
385 slip-form concrete, the target slump shall be 1½ inches (38 mm). For the action and Suspension
386 limits see section 501-6.03, Control Charts.
387

388 3.02 CEMENTITIOUS MATERIALS

389
390 Fly Ash. Fly ash shall be used in the mix design. The minimum cement content shall be met by
391 considering portland cement plus fly ash as the total cementitious material. The rate shall be 20
392 to 30 percent by weight of the total cementitious material.
393
394
395
396

- 397 3.03 ADMIXTURES
398
399 A. Air-Entraining Air-entraining admixture shall be added in such a manner that will insure
400 uniform distribution of the agent throughout the batch. The air content of freshly mix
401 air-entrained concrete shall be based upon trial mixes with the materials to be used in the
402 work adjusted to produce concrete of the required plasticity and workability. The
403 percentage of air in the mix shall be 5.5 percent. Air content shall be determined by
404 testing in accordance with ASTM C 231 for gravel and stone coarse aggregate and ASTM
405 C 173 for slag and other highly porous coarse aggregate.
406
407 B. Chemical Water-reducing, set-controlling, and other approved admixtures shall be added
408 to the mix in the manner recommended by the manufacturer and in the amount necessary
409 to comply with the specification requirements. Tests shall be conducted on trial mixes,
410 with the materials to be used in the work, in accordance with ASTM C 494.
411
- 412 3.04 TESTING LABORATORY The laboratory used to develop the mix design shall meet the
413 requirements of ASTM C 1077 including accreditation. Accreditation shall include all test
414 procedures required to develop the mix design. A certification signed by the manager of the
415 laboratory stating it meets these requirements shall be submitted to the Project Manager prior to
416 the start of mix design and shall contain as a minimum:
417
418 A. Qualifications of personnel; including the laboratory manager, supervising technician, and
419 testing technicians involved in developing the mix design.
420
421 B. Evidence of current accreditation by a nationally recognized laboratory accreditation
422 program for all test methods used in developing the mix design. The evidence shall
423 include the results of the last inspection including responses to deficiencies.
424
425
- 426 3.05 TOTAL ALKALI The total alkali in the mix shall be in accordance with ASTM C 114, total alkalis
427 ($\text{Na}_2\text{O} + 0.658 \text{K}_2\text{O}$) shall not exceed 5 pounds per cubic yard with all components. The amount
428 of total alkali shall be documented in all mix design submittals.
429
- 430 3.06 MIX MATERIALS AND MIX DESIGN SUBMITTALS The Contractor shall submit mix materials
431 and a mix design submittal to the Project Manager for the PCCP at least 30 days prior to use. The
432 Mix Design will not be approved when the laboratory trial mix is greater than 90 days old and the
433 aggregate, cement and fly ash data are the results from tests performed more than one year in
434 the past.
435
436 A. Fine Aggregate – Individual submittals shall be provided for each source of fine aggregate.
437 The submittal packages shall include the source of the fine aggregate and Certified
438 Certificates of Compliance including actual test results showing that the fine aggregate meets
439 the requirements of 2.01 B. ASTM C 1260 test results and proof of accreditation under ASTM
440 C 1077 of the laboratory performing the ASTM C 1260 tests shall also be included in the
441 submittal.
442
443 B. Coarse Aggregate – Individual submittals shall be provided for each source of coarse
444 aggregate. The submittal packages shall include the source of the coarse aggregate and
445 Certified Certificates of Compliance including actual test results showing that the coarse
446 aggregate meets the requirements of 2.01 B. ASTM C 1260 test results and proof of
447 accreditation under ASTM C 1077 of the laboratory performing the ASTM C 1260 tests shall
448 also be included in the submittal.
449
450 C. Cement – Individual submittals shall be provided for each source and each Type of cement.
451 The submittal packages shall include the source, type and Certified Certificates of

- 452 Compliance including actual test results showing that the cement meets the requirements of
453 2.02.
454
455 D. Fly Ash - Individual submittals shall be provided for each source of fly ash. The submittal
456 packages shall include the source, class and Certified Certificates of Compliance including
457 actual test results showing that the fly ash meets the requirements of 2.03.
458
459 E. Admixtures - Individual submittals shall be provided for each admixture including brand and/or
460 manufacturer, Certified Certificates of Compliance, the manufacturer's recommended
461 procedures for use and storage showing and that the admixtures meet the requirements of
462 2.10.
463
464 F. Mix Design – Individual submittals shall be provided for each mix design and shall include:
465
466 a. The weights and sources of all ingredients including cement, fly ash, aggregates,
467 water, and admixtures.
468 b. The laboratory trial mix data:
469 • mix identification number
470 • date mix was developed
471 • developer of the mix
472 • water/cement ratio (w/c); include the theoretical and trial batch water/cement
473 ratios. Note: the trial batch water/cement ratio shall not be exceeded during
474 production.
475 • yield
476 • coarse aggregate gradation
477 • fine aggregate gradation
478 • fineness modulus of the fine aggregate
479 • consistency
480 • air content
481 • flexural strength; at least 2 specimens at 7 days and three specimens at 28 days
482 • ASTM C 1567 test results
483
484 G. Testing Laboratory Qualifications – Individual submittals shall be provided for each laboratory
485 designing PCCP mixtures. All information required in 3.04 shall be provided.
486
487

488 PART 4 CONSTRUCTION METHODS

- 489
490 4.01 EQUIPMENT: Equipment necessary for handling materials and performing all parts of the work,
491 shall be approved by the Project Manager or their designated representative as to design,
492 capacity, mechanical conditions and cleanliness. The equipment shall be at the jobsite sufficiently
493 ahead of the start of paving operations to be examined thoroughly and approved.
494
495 A. Batch Plant and Equipment The batch plant and equipment shall conform to the
496 requirements of ASTM C 94. In addition, dry-batch batching plants will not be allowed
497 and central-mixed concrete will be the required method of producing concrete.
498
499 B. Mixers and Transportation Equipment.
500
501 (1) General - Concrete shall be mixed at a central plant. Each mixer shall have
502 attached in a prominent place a manufacturer's nameplate showing the capacity
503 of the drum in terms of volume of mixed concrete and the speed of rotation of the
504 mixing drum or blades.
505

506 (2) Central Plant Mixer - Central plant mixers shall conform to the requirements of
507 ASTM C 94.
508

509 The mixer shall be examined daily by the Project Manager or assigned
510 representative for changes in condition due to accumulation of hard concrete or
511 mortar or wear of blades. The pickup and throwover blades shall be replaced
512 when they have worn down 3/4 inch (19 mm) or more. The Contractor shall have
513 a copy of the manufacturer's design on hand showing dimensions and
514 arrangement of blades in reference to original height and depth.
515

516 (3) Truck Agitators Truck agitators used for hauling central-mixed concrete shall
517 conform to the requirements of ASTM C 94.
518

519 (4) Nonagitator Trucks. Nonagitator hauling equipment shall conform to the
520 requirements of ASTM C 94.
521

522 C. Finishing Equipment. The standard method of constructing concrete pavements on FAA
523 projects shall be with an approved slip-form paving equipment designed to spread,
524 consolidate, screed, and float-finish the freshly placed concrete in one complete pass of
525 the machine so a dense and homogeneous pavement is achieved with a minimum of
526 hand finishing. The paver-finisher shall be a heavy duty, self propelled machine designed
527 specifically for paving and finishing high quality concrete pavements. It shall weigh at
528 least 2,200 pounds per foot of paving lane width and be powered by an engine having at
529 least 6.0 horsepower per foot of lane width. On projects requiring less than 500 square
530 yards of cement concrete pavement or requiring individual placement areas of less than
531 500 square yards, or irregular areas at locations inaccessible to slip-form paving
532 equipment, cement concrete pavement may be placed with approved placement and
533 finishing equipment utilizing stationary side forms. Hand screeding and float finishing may
534 only be utilized on small irregular areas as allowed by the DIA Project Manager.
535

536 D. Vibrators Vibrators shall be the internal type. Operating frequency for internal vibrators
537 shall be between 8,000 and 12,000 vibrations per minute. Average amplitude for internal
538 vibrators shall be 0.025-0.05 inches (0.06-0.13 cm). The number, spacing, and frequency
539 shall be as necessary to provide a dense and homogeneous pavement. Adequate power
540 to operate all vibrators shall be available on the paver. The vibrators shall be
541 automatically controlled so that they shall be stopped as forward motion ceases.
542

543 Hand held vibrators shall be used in irregular areas and as directed by the Project
544 Manager.
545

546 Verification of operational frequencies of all vibrators shall be documented by Quality
547 Control personnel at the beginning of each paving shift.
548

549 E. Concrete Saws The Contractor shall provide sawing equipment adequate in number of
550 units and power to complete the sawing to the required dimensions. The Contractor shall
551 provide at least one standby saw in good working order and a supply of saw blades at the
552 site of the work at all times during sawing operations.
553

554 F. Side Forms Straight side forms shall be made of steel and shall be furnished in sections
555 not less than 10 feet (3 m) in length. Forms shall have a depth equal to the pavement
556 thickness at the edge. Flexible or curved forms of proper radius shall be used for curves
557 of 100-foot (31 m) radius or less. Forms shall be provided with adequate devices for
558 secure settings so that when in place they will withstand, without visible spring or
559 settlement, the impact and vibration of the consolidating and finishing equipment. Forms
560 with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up
561 forms shall not be used. The top face of the form shall not vary from a true plane more

562 than 1/8 inch (3 mm) in 10 feet (3 m), and the upstanding leg shall not vary more than 1/4
563 inch (6 mm). The forms shall contain provisions for locking the ends of abutting sections
564 together tightly for secure setting. Wood forms may be used under special conditions,
565 when approved by the Project Manager. Forms shall have a depth equal to the pavement
566 thickness at the edge, and a base width equal to or greater than the depth.. Forms shall
567 be continuous from the base material to the finished surface of the pavement with no
568 voids.

569
570 G. Pavers The paver shall be fully energized, self-propelled, and designed for the specific
571 purpose of placing, consolidating, and finishing the concrete pavement, true to grade,
572 tolerances, and cross section. It shall be of sufficient weight and power to construct the
573 maximum specified concrete paving lane width as shown in the plans, at adequate
574 forward speed, without transverse, longitudinal or vertical instability or without
575 displacement. The paver shall be equipped with electronic or hydraulic horizontal and
576 vertical control devices.

577
578 4.02 FORM SETTING Forms shall be set sufficiently in advance of the concrete placement to insure
579 continuous paving operation. After the forms have been set to correct grade, the underlying
580 surface shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside
581 edges of the base of the forms. Forms shall be staked into place sufficiently to maintain the form
582 in position for the method of placement.

583
584 Form sections shall be tightly locked and shall be free from play or movement in any direction.
585 The forms shall not deviate from true line by more than 1/8 inch (3 mm) at any joint. Forms shall
586 be so set that they will withstand, without visible spring or settlement, the impact and vibration of
587 the consolidating and finishing equipment. Forms shall be cleaned and oiled prior to the placing
588 of concrete.

589
590 The alignment and grade elevations of the forms shall be checked and corrections made by the
591 Contractor before concrete placement has began.

592
593 4.03 CONDITIONING OF UNDERLYING SURFACE The compacted underlying surface on which the
594 pavement will be placed shall be widened approximately 3 feet (1 m) to extend beyond the paving
595 machine track to support the paver without any noticeable displacement. After the underlying
596 surface has been placed and compacted to the required density, the areas which will support the
597 paving machine and the area to be paved shall be trimmed or graded to the plan grade elevation
598 and profile by means of a properly designed machine. The grade of the underlying surface shall
599 be controlled by a positive grade control system using lasers, stringlines, or guide wires. If the
600 density of the underlying surface is disturbed by the trimming operations, it shall be corrected by
601 additional compaction and retested at the option of the Project Manager before the concrete is
602 placed except when stabilized subbases are being constructed. If damage occurs on a stabilized
603 subbase, it shall be corrected full depth by the Contractor. If traffic is allowed to use the prepared
604 grade, the grade shall be checked and corrected immediately before the placement of concrete.
605 The prepared grade shall be moistened with water, without saturating, immediately ahead of
606 concrete placement to prevent rapid loss of moisture from concrete. The underlying surface shall
607 be protected so that it will be entirely free of frost when concrete is placed.

608
609 4.04 CONDITIONING OF UNDERLYING SURFACE, SIDE-FORM AND FILL-IN LANE
610 CONSTRUCTION The prepared underlying surface shall be moistened with water, without
611 saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from the
612 concrete. Damage caused by hauling or usage of other equipment shall be corrected and
613 retested at the option of the Project Manager. If damage occurs to a stabilized subbase, it shall
614 be corrected full depth by the Contractor. A template shall be provided and operated on the forms
615 immediately in advance of the placing of all concrete. The template shall be propelled only by
616 hand and not attached to a tractor or other power unit. Templates shall be adjustable so that they
617 may be set and maintained at the correct contour of the underlying surface. The adjustment and

618 operation of the templates shall be such as will provide an accurate retest of the grade before
619 placing the concrete thereon. All excess material shall be removed and wasted. Low areas shall
620 be filled and compacted to a condition similar to that of the surrounding grade. Any standing
621 water shall be completely removed from the underlying surface prior to the installation of concrete.
622 Displacement of excess water is not permitted during the installation of concrete. The underlying
623 surface shall be protected so that it will be entirely free from frost when the concrete is placed.
624 The use of chemicals to eliminate frost in the underlying surface shall not be permitted.
625

626 The template shall be maintained in accurate adjustment, at all times by the Contractor, and shall
627 be checked daily.
628

629 4.05 HANDLING, MEASURING, AND BATCHING MATERIAL The batch plant site, layout, equipment,
630 and provisions for transporting material shall assure a continuous supply of material to the work.
631 Stockpiles shall be constructed in such a manner that prevents segregation and intermixing of
632 deleterious materials. Aggregates from different sources shall be stockpiled, weighed and
633 batched separately at the concrete batch plant.
634

635 Aggregates that have become segregated or mixed with earth or foreign material shall not be
636 used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall
637 be stockpiled or binned for draining at least 12 hours before being batched. Rail shipments
638 requiring more than 12 hours will be accepted as adequate binning only if the car bodies permit
639 free drainage.
640

641 Batching plants shall be equipped to proportion aggregates and bulk cement, by weight,
642 automatically using interlocked proportioning devices of an approved type. When bulk cement is
643 used, the Contractor shall use a suitable method of handling the cement from weighing hopper to
644 transporting container or into the batch itself for transportation to the mixer, such as a chute, boot,
645 or other approved device, to prevent loss of cement. The device shall be arranged to provide
646 positive assurance that the cement content specified is present in each batch.
647

648 A copy of the proposed batch ticket shall be submitted to the Project Manager for approval. Batch
649 tickets shall include as a minimum the information required in ASTM C 94. Two copies of the
650 batch tickets shall also be provided to the Project Manager or his representative for each batch of
651 concrete prior to unloading at the site.
652

653 4.06 MIXING CONCRETE The concrete will be mixed at the central mix plant. The mixer shall be of
654 an approved type and capacity. Mixing time shall be measured from the time all materials, except
655 water, are emptied into the drum. All concrete shall be mixed and delivered to the site in
656 accordance with the requirements of ASTM C 94. Mixed concrete from the central mixing plant
657 shall be transported in truck mixers, truck agitators, or nonagitating trucks. The elapsed time from
658 the addition of cementitious material to the mix until the concrete is deposited in place at the work
659 site shall not exceed 30 minutes when the concrete is hauled in nonagitating trucks, nor 90
660 minutes when the concrete is hauled in truck mixers or truck agitators. Retempering concrete by
661 adding water or by other means will not be permitted. With transit mixers additional water may be
662 added to the batch materials and additional mixing performed to increase the slump to meet the
663 specified requirements provided the addition of water is performed prior to placement and within
664 45 minutes after the initial mixing operations and the water/cementitious ratio specified in the mix
665 design is not exceeded, and approved by the Project Manager.
666

667 4.07 LIMITATIONS ON MIXING AND PLACING. No concrete shall be mixed, placed, or finished when
668 the natural light is insufficient, unless an adequate and approved artificial lighting system is
669 operated.
670

671 A. Cold Weather. Unless authorized in writing by the Project Manager, mixing and
672 concreting operations shall be discontinued when a descending air temperature in the
673 shade and away from artificial heat reaches 40 degrees F (4 degrees C) and shall not be

674 resumed until an ascending air temperature in the shade and away from artificial heat
675 reaches 40degrees F (4 degrees C).
676

677 The aggregate shall be free of ice, snow, and frozen lumps before entering the mixer.
678 The temperature of the mixed concrete shall not be less than 50 degrees F (10 degrees
679 C) at the time of placement. Concrete shall not be placed on frozen material nor shall
680 frozen aggregates be used in the concrete.
681

682 When concreting is authorized during cold weather, water and/or the aggregates may be
683 heated to not more than 150 degrees F (66 degrees C). The apparatus used shall heat
684 the mass uniformly and shall be arranged to preclude the possible occurrence of
685 overheated areas which might be detrimental to the materials.
686

- 687 B. Hot Weather. During periods of hot weather when the maximum daily air temperature
688 exceeds 85 degrees F (30 degrees C), the following precautions shall be taken.
689

690 The forms and/or the underlying surface shall be sprinkled with water immediately before
691 placing the concrete. The concrete shall be placed at the coolest temperature
692 practicable, and in no case shall the temperature of the concrete when placed exceed 90
693 degrees F (35 degrees C). The aggregates and/or mixing water shall be cooled as
694 necessary to maintain the concrete temperature at or not more than the specified
695 maximum.
696

697 The finished surfaces of the newly laid pavement shall be kept damp by applying a
698 water-fog or mist with approved spraying equipment until the pavement is covered by the
699 curing medium. If necessary, wind screens shall be provided to protect the concrete from
700 an evaporation rate in excess of 0.2 psf per hour as determined in accordance with Figure
701 2.1.5 in ACI 305R, Hot Weather Concreting, which takes into consideration relative
702 humidity, wind velocity, and air temperature.
703

704 When conditions are such that problems with plastic cracking can be expected, and
705 particularly if any plastic cracking begins to occur, the Contractor shall immediately take
706 such additional measures as necessary to protect the concrete surface. Such measures
707 shall consist of wind screens, more effective fog sprays, and similar measures
708 commencing immediately behind the paver. If these measures are not effective in
709 preventing plastic cracking, paving operations shall be immediately stopped.
710

- 711 C. Prior to the start of paving operation for each day of paving, the Contractor shall provide
712 the Project Manager with a Temperature Management Program for the concrete to be
713 placed to assure that uncontrolled cracking is avoided. As a minimum the program shall
714 address the following items:
715

716 (1) Anticipated tensile strains in the fresh concrete as related to heating and cooling
717 of the concrete material.
718

719 (2) Anticipated weather conditions such as ambient temperatures, wind velocity, and
720 relative humidity.
721

722 (3) Anticipated timing of initial sawing of joint.
723

724 4.08 PLACING CONCRETE The Contractor has the option of side (fixed) form or slip-form paving. At
725 any point in concrete conveyance, the free vertical drop of the concrete from one point to another
726 or to the underlying surface shall not exceed 3 feet (1 m) or as approved by the Project Manager
727 or their representative provided the aggregate and mortar are not separated during placement.
728 Concrete may be dumped on grade from the hauling equipment provided that the dumping does
729 not increase the segregation of the material. Backhoes and Grading equipment shall not be used

730 to distribute the concrete in front of the paver. Front-end loaders will not be used unless the
731 contractor demonstrates that they can be used without contaminating the concrete and base
732 course and it is approved by the DIA Project Manager.

733
734 Hauling equipment or other mechanical equipment can be permitted on adjoining previously
735 constructed pavement when the concrete strength reaches a flexural strength of 550 psi, based
736 on the average of four field cured specimens per 2,000 cubic yards of concrete placed. Subgrade
737 and subbase planers, concrete pavers, and concrete finishing equipment may be permitted to ride
738 upon the edges of previously constructed pavement when the concrete has attained a minimum
739 flexural strength of 400 psi. Results of the field cured specimens shall be provided to the Project
740 Manager prior to the pavement receiving any traffic.

741
742 A. Slip-Form Construction. The concrete shall be distributed uniformly into final position by a
743 self propelled slip-form paver without delay. The alignment and elevation of the paver
744 shall be regulated from outside reference lines established for this purpose. The paver
745 shall vibrate the concrete for the full width and depth of the strip of pavement being placed
746 and the vibration shall be adequate to provide a consistency of concrete that will stand
747 normal to the surface with sharp well defined edges. The sliding forms shall be rigidly
748 held together laterally to prevent spreading of the forms.

749
750 The plastic concrete shall be effectively consolidated by internal vibration with transverse
751 vibrating units for the full width of the pavement and/or a series of equally placed
752 longitudinal vibrating units. The space from the outer edge of the pavement to
753 longitudinal unit shall not exceed 9 inches for slip-form and at the end of the dowels for
754 the fill-in lanes. The spacing of internal units shall be uniform and shall not exceed 18
755 inches.

756
757 The Area around light cans, block outs, ect shall be consolidated with hand vibrators to
758 assure proper consolidation.

759
760 The term internal vibration means vibrating units located within the specified thickness of
761 pavement section.

762
763 The rate of vibration of each vibrating unit shall be within 8000 to 12000 cycles per minute
764 and the amplitude of vibration shall be sufficient to be perceptible on the surface of the
765 concrete along the entire length of the vibrating unit and for a distance of at least one foot.
766 The frequency of vibration or amplitude shall vary proportionately with the rate of travel to
767 result in a uniform density and air content. The paving machine shall be equipped with a
768 tachometer or other suitable device for measuring and indicating the actual frequency of
769 vibrations. If at any point pavement consolidation becomes questionable, operations shall
770 be halted, and all vibrators verified for frequency.

771
772 The concrete shall be held at a uniform consistency. The slip-form paver shall be
773 operated with as nearly a continuous forward movement as possible. And all operations
774 of mixing, delivering, and spreading concrete shall be coordinated to provide uniform
775 progress with stopping and starting of the paver held to a minimum. If for any reason, it is
776 necessary to stop the forward movement of the paver, the vibratory and tamping
777 elements shall also be stopped immediately. No tractive force shall be applied to the
778 machine, except that which is controlled from the machine.

779
780 When concrete is being placed adjacent to an existing pavement, that part of the
781 equipment which is supported on the existing pavement shall be equipped with protective
782 pads on crawler tracks or rubber-tired wheels on which the bearing surface is offset to run
783 a sufficient distance from the edge of the pavement to avoid breaking the pavement edge.

784

785 B. Side-Form Construction Side form sections shall be straight, free from warps, bends,
786 indentations, or other defects. Defective forms shall be removed from the work. Metal
787 side forms shall be used except at end closures and transverse construction joints where
788 straight forms of other suitable material may be used.

789
790 Side forms may be built up by rigidly attaching a section to either top or bottom of forms.
791 If such build-up is attached to the top of metal forms, the build-up shall also be metal.

792
793 Side forms shall be of sufficient rigidity, both in the form and in the interlocking connection
794 with adjoining forms, that springing will not occur under the weight of subgrading and
795 paving equipment or from the pressure of the concrete. The Contractor shall provide
796 sufficient forms so that there will be no delay in placing concrete due to lack of forms.

797
798 Before placing side forms, the underlying material shall be at the proper grade. Side
799 forms shall have full bearing upon the foundation throughout their length and width of
800 base and shall be placed to the required grade and alignment of the finished pavement.
801 They shall be firmly supported during the entire operation of placing, compacting, and
802 finishing the pavement.

803
804 Forms shall be drilled in advance of being placed to line and grade to accommodate tie
805 bars where these are specified.

806
807 Immediately in advance of placing concrete and after all subbase operations are
808 completed, side forms shall be trued and maintained to the required line and grade for a
809 distance sufficient to prevent delay in placing.

810
811 Side forms shall remain in place at least 12 hours after the concrete has been placed, and
812 in all cases until the edge of pavement no longer requires the protection of the forms.
813 Curing compound shall be applied to the concrete immediately after the forms have been
814 removed.

815
816 Side forms shall be thoroughly cleaned and oiled each time they are used and before
817 concrete is placed against them.

818
819 Concrete shall be spread, screeded, shaped and consolidated by one or more self-
820 propelled machines. These machines shall uniformly distribute and consolidate concrete
821 without segregation so that the completed pavement will conform to the required cross
822 section with a minimum of handwork.

823
824 The number and capacity of machines furnished shall be adequate to perform the work
825 required at a rate equal to that concrete delivery.

826
827 Concrete for the full paving width shall be effectively consolidated by internal vibrators
828 without causing segregation. Internal type vibrator's rate of vibration shall be not less
829 than 8,000 cycles per minute. Amplitude of vibration shall be sufficient to be perceptible
830 on the surface of concrete more than one foot from the vibrating element. The Contractor
831 shall furnish a tachometer or other suitable device for measuring and indicating frequency
832 of vibration.

833
834 Power to vibrators shall be connected so that vibration ceases when forward or backward
835 motion of the machine is stopped.

836
837 The Contractor shall be responsible for providing sufficient frequency and amplitude
838 above the minimum specified to ensure adequate density in the hardened concrete.

839

840 C. Consolidation Testing The provisions relating to the frequency and amplitude of internal
841 vibration shall be considered the minimum requirements and are intended to ensure
842 adequate density in the hardened concrete. If a lack of consolidation of the concrete is
843 suspected by the Project Manager, additional referee testing may be required. Referee
844 testing of hardened concrete will be performed by cutting cores from the finished
845 pavement after a minimum of 24 hours curing. Density determinations will be made
846 based on the water content of the core as taken. ASTM C 642 shall be used for the
847 determination of core density in the saturated-surface dry condition. Referee cores will be
848 taken at the minimum rate of one for each 500 cubic yards of pavement, or fraction there
849 of.

850
851 The average density of the cores shall be at least 97 percent of the original mix design
852 density, with no cores having a density of less than 96 percent of the original mix design
853 density.

854
855 Failure to meet the above requirements will be considered as evidence that the minimum
856 requirements for vibration are inadequate for the job conditions, and additional vibrating
857 units or other means of increasing the effect of vibration shall be employed so that the
858 density of the hardened concrete as indicated by further referee testing shall conform to
859 the above listed requirements. All failing concrete shall be removed and replaced.

860
861 4.09 STRIKE-OFF OF CONCRETE AND PLACEMENT OF REINFORCEMENT Following the placing
862 of the concrete, it shall be struck off to conform to the cross section shown on the plans and to an
863 elevation such that when the concrete is properly consolidated and finished, the surface of the
864 pavement shall be at the elevation shown on the plans. When reinforced concrete pavement is
865 placed in two layers, the bottom layer shall be struck off to such length and depth that the sheet of
866 reinforcing steel fabric or bar mat may be laid full length on the concrete in its final position without
867 further manipulation. The reinforcement shall then be placed directly upon the concrete, after
868 which the top layer of the concrete shall be placed, struck off, and screeded. If any portion of the
869 bottom layer of concrete has been placed more than 30 minutes without being covered with the
870 top layer or if initial set has taken place, it shall be removed and replaced with freshly mixed
871 concrete at the Contractor's expense. When reinforced concrete is placed in one layer, the
872 reinforcement shall be positioned in advance of concrete placement and placed on chairs or
873 stands that are epoxy coated on the bottom to prevent corrosion.

874
875 Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter
876 that may adversely affect or reduce bond. Reinforcing steel with rust, mill scale or a combination
877 of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile
878 properties of a hand wire-brushed test specimen are not less than the applicable ASTM
879 specification requirements.

880
881 4.10 JOINTS Joints shall be constructed as shown on the plans and in accordance with these
882 requirements. All joints shall be constructed with their faces perpendicular to the surface of the
883 pavement and finished or edged as shown on the plans. Joints shall not vary more than 1/2 inch
884 (13 mm) from their designated position and shall be true to line with not more than 1/4-inch (6
885 mm) variation in 10 feet (3 m). Any effected portion of pavement in which the installed joint varies
886 by more than 1/2 inch (13 mm) from the designated location or a 1/4 inch (6 mm) in 10 feet (3 m)
887 shall be immediately removed and replaced as described herein at the sole expense of the
888 Contractor. The surface across the joints shall be tested with a Contractor furnished 10-foot (3 m)
889 straightedge as the joints are finished and any irregularities in excess of 1/4 inch (6 mm) shall be
890 corrected before the concrete has hardened. All joints shall be so prepared, finished, or cut to
891 provide a groove of uniform width and depth as shown on the plans.

892
893 A. Construction. Longitudinal construction joints shall be slip-formed or formed against side
894 forms without keyways, as shown in the plans.

895

896 Transverse construction joints shall be installed at the end of each day's placing
897 operations and at any other points within a paving lane when concrete placement is
898 interrupted for more than 30 minutes or it appears that the concrete will obtain its initial
899 set before fresh concrete arrives. The installation of the joint shall be located at a
900 planned contraction or expansion joint. If placing of the concrete is stopped, the
901 Contractor shall remove the excess concrete back to the previous planned joint.
902

903 B. Contraction. Contraction joints shall be installed at the locations and spacing as shown
904 on the plans. Contraction joints shall be installed to the dimensions required by forming a
905 groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove
906 into the concrete surface after the concrete has hardened. When the groove is formed in
907 plastic concrete the sides of the grooves shall be finished even and smooth with an
908 edging tool. If an insert material is used, the installation and edge finish shall be
909 according to the manufacturer's instructions. The groove shall be finished or cut clean so
910 that spalling will be avoided at intersections with other joints. Grooving or sawing shall
911 produce a slot at least 1/8 inch (3 mm) wide and to the depth shown on the plans.
912

913 C. Expansion. Expansion joints shall be installed as shown on the plans. The premolded
914 filler of the thickness as shown on the plans, shall extend for the full depth and width of
915 the slab at the joint, except for space for sealant at the top of the slab. The filler shall be
916 securely staked or fastened into position perpendicular to the proposed finished surface.
917 A cap shall be provided to protect the top edge of the filler and to permit the concrete to
918 be placed and finished. After the concrete has been placed and struck off, the cap shall
919 be carefully withdrawn leaving the space over the premolded filler. The edges of the joint
920 shall be finished and tooled while the concrete is still plastic. Any concrete bridging the
921 joint space shall be removed for the full width and depth of the joint. Premolded filler shall
922 be removed full depth of joint before sealant is placed.
923

924 D. Keyways are not permitted.
925

926 E. Tie Bars - Tie bars shall consist of deformed bars installed in joints as shown on the
927 plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and
928 shall be spaced at intervals shown on the plans. They shall be held in position parallel
929 to the pavement surface and in the middle of the slab depth. When tie bars extend into an
930 unpaved lane, they may be bent against the form at longitudinal construction joints, unless
931 threaded bolt or other assembled tie bars are specified. These bars shall not be painted,
932 greased, or enclosed in sleeves.
933

934 F. Dowel Bars - Dowel bars or other load-transfer units of an approved type shall be placed
935 across joints in the manner as shown on the plans. They shall be of the dimensions and
936 spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal
937 and vertical alignment by an approved assembly device to be left permanently in place.
938 The dowel or load-transfer and joint devices shall be rigid enough to permit complete
939 assembly as a unit ready to be lifted and placed into position. A metal, or other type,
940 dowel expansion cap or sleeve shall be furnished for each dowel bar used with expansion
941 joints. These caps shall be substantial enough to prevent collapse and shall be placed on
942 the ends of the dowels as shown on the plans. The caps or sleeves shall fit the dowel bar
943 tightly and the closed end shall be watertight. The portion of each dowel epoxy coated, as
944 required under paragraph 501-2.7, and as shown on the plans to receive a debonding
945 lubricant, shall be thoroughly coated with asphalt MC-70, or an approved lubricant, to
946 prevent the concrete from bonding to that portion of the dowel. Where butt-type joints
947 with dowels are designated, the exposed end of the dowel shall be oiled.
948
949
950

951 G. Installation of Joint Devices All joint devices shall be approved by the Project Manager.
952 The top of an assembled joint device shall be set at the proper distance below the
953 pavement surface and the elevation shall be checked. Such devices shall be set to the
954 required position and line and shall be securely held in place by stakes or other means to
955 the maximum permissible tolerances during the placing and finishing of the concrete.
956 Where premolded joint material is used, it shall be placed and held in a vertical position; if
957 constructed in sections, there shall be no offsets between adjacent units.
958

959 Dowel bars and assemblies shall be checked for position and alignment. The maximum
960 permissible tolerances on dowel bar alignment shall be in accordance with paragraph
961 501-5.2e(6). During the concrete placement operation, it is advisable to place plastic
962 concrete directly on dowel assemblies immediately prior to passage of the paver to help
963 maintain dowel position and alignment within maximum permissible tolerances. Grout
964 disks may be necessary to retain the epoxy in the hole until it hardens.
965

966 When concrete is placed using slip-form pavers, dowels and tie bars shall be placed in
967 longitudinal construction joints by bonding the dowels or tie bars into holes drilled into the
968 hardened concrete. Holes approximately 1/8-inch to 1/4-inch (3 to 6 mm) greater in
969 diameter than the dowel or tie bar shall be drilled with rotary-type core drills that must be
970 held securely in place to drill perpendicularly into the vertical face of the pavement slab.
971 Rotary-type percussion drills may be used provided that spalling of concrete does not
972 occur. In the event new light can installation will interfere with the drilling and installation
973 of dowels, drilling shall be completed prior to the installation of light cans. Any damage of
974 the concrete shall be repaired by the Contractor in a method approved by the Project
975 Manager. Dowels or tie bars shall be bonded in the drilled holes using an epoxy resin
976 material. Installation procedures shall be adequate to insure that the area around dowels
977 is completely filled with epoxy grout. Epoxy shall be injected into the back of the hole and
978 displaced by the insertion of the dowel bar. Bars shall be completely inserted into the
979 hole and shall not be withdrawn and reinserted creating air pockets in the epoxy around
980 the bar. The Contractor shall furnish a template for checking the position and alignment
981 of the dowels. Dowel bars shall not be less than 10 inches (25 cm) from a transverse
982 joint and shall not interfere with dowels in the transverse direction.
983

984 H. Sawing of Joints - Joints shall be cut as shown on the plans. Equipment shall be as
985 described in paragraph 501-4.1. The circular cutter shall be capable of cutting a groove in
986 a straight line and shall produce a slot at least 1/8 inch (3 mm) wide and to the depth
987 shown on the plans. The top portion of the slot shall be widened by sawing to provide
988 adequate space for joint sealers as shown on the plans. Sawing shall commence as
989 soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling,
990 or tearing and before uncontrolled shrinkage cracking of the pavement occurs. Sawing
991 shall be carried on both during the day and night as required. The joints shall be sawed at
992 the required spacing, consecutively in sequence of the concrete placement. Joints shall
993 be cleaned using high pressure water or a vacuum immediately after sawing. Curing
994 compound, if being used as the cure type, shall be reapplied in the initial sawcut and
995 maintained for the remaining cure period.
996

997 4.11 FINAL STRIKE-OFF, CONSOLIDATION, AND FINISHING
998

999 A. Sequence The sequence of operations shall be the strike-off, floating and removal of
1000 laitance, straightedging, and final surface finish. The addition of superficial water to the
1001 surface of the concrete to assist in finishing operations will not be permitted.
1002

1003 B. Finishing at Joints The concrete adjacent to joints shall be compacted or firmly placed
1004 without voids or segregation against the joint material; it shall be firmly placed without
1005 voids or segregation under and around all load-transfer devices, joint assembly units, and
1006 other features designed to extend into the pavement. Concrete adjacent to joints shall be

1007 mechanically vibrated as required in paragraph 501-4.8a. After the concrete has been
1008 placed and vibrated adjacent to the joints, the finishing machine shall be operated in a
1009 manner to avoid damage or misalignment of joints. If uninterrupted operations of the
1010 finishing machine, to, over, and beyond the joints, cause segregation of concrete,
1011 damage to, or misalignment of the joints, the finishing machine shall be stopped when the
1012 screed is approximately 8 inches (20 cm) from the joint. Segregated concrete shall be
1013 removed from the front of and off the joint; and the forward motion of the finishing
1014 machine shall be resumed. Thereafter, the finishing machine may be run over the joint
1015 without lifting the screed, provided there is no segregated concrete immediately between
1016 the joint and the screed or on top of the joint.
1017

1018 C. Machine Finishing The concrete shall be spread as soon as it is placed, and it shall be
1019 struck off and screeded by a finishing machine. The machine shall go over each area as
1020 many times and at such intervals as necessary to give to proper consolidation and to
1021 leave a surface of uniform texture. Excessive operation over a given area shall be
1022 avoided. When side forms are used, the tops of the forms shall be kept clean by an
1023 effective device attached to the machine, and the travel of the machine on the forms shall
1024 be maintained true without lift, wobbling, or other variation tending to affect the precision
1025 finish. During the first pass of the finishing machine, a uniform ridge of concrete shall be
1026 maintained ahead of the front screed for its entire length. When in operation, the screed
1027 shall be moved forward with a combined longitudinal and transverse shearing motion,
1028 always moving in the direction in which the work is progressing, and so manipulated that
1029 neither end is raised from the side forms during the striking-off process. If necessary, this
1030 shall be repeated until the surface is of uniform texture, true to grade and cross section,
1031 and free from porous areas.
1032

1033 D. Hand Finishing - Hand finishing methods will not be permitted, except under the following
1034 conditions: in the event of breakdown of the mechanical equipment, hand methods may
1035 be used to finish the concrete already deposited on the grade; in areas of narrow widths
1036 or of irregular dimensions where operation of the mechanical equipment is impractical.
1037 Concrete, as soon as placed, shall be struck off and screeded. An approved portable
1038 screed shall be used. A second screed shall be provided for striking off the bottom layer
1039 of concrete when reinforcement is used.
1040

1041 The screed for the surface shall be a least 2 feet (0.6 m) longer than the maximum width
1042 of the slab to be struck off. It shall be of approved design, sufficiently rigid to retain its
1043 shape, and shall be constructed either of metal or of other suitable material covered with
1044 metal. Consolidation shall be attained by the use of suitable vibrators.
1045

1046 E. Floating After the concrete has been struck off and consolidated, it shall be further
1047 smoothed and trued by means of a longitudinal float using one of the following methods:
1048

1049 (1) Hand Method Long-handled floats shall not be less than 12 feet (3.6 m) in length
1050 and 6 inches (15 cm) in width, stiffened to prevent flexibility and warping. The
1051 float shall be operated from foot bridges spanning but not touching the concrete
1052 or from the edge of the pavement. Floating shall pass gradually from one side of
1053 the pavement to the other. Forward movement along the centerline of the
1054 pavement shall be in successive advances of not more than one-half the length of
1055 the float. Any excess water or laitance in excess of 1/8-inch (3 mm) thick shall be
1056 removed and wasted.
1057

1058 (2) Mechanical Method The Contractor may use a machine composed of a cutting
1059 and smoothing float(s), suspended from and guided by a rigid frame and
1060 constantly in contact with, the side forms or underlying surface. If necessary,
1061 long-handled floats having blades not less than 5 feet (1.5 m) in length and 6
1062 inches (15 cm) in width may be used to smooth and fill in open-textured areas in

1063 the pavement. When the crown of the pavement will not permit the use of the
1064 mechanical float, the surface shall be floated transversely by means of a
1065 long-handled float. Care shall be taken not to work the crown out of the
1066 pavement during the operation. After floating, any excess water and laitance in
1067 excess of 1/8-inch (3 mm) thick shall be removed and wasted. Successive drags
1068 shall be lapped one-half the length of the blade.
1069

1070 F. Straight-edge Testing and Surface Correction After the pavement has been struck off
1071 and while the concrete is still plastic, it shall be tested for trueness with a Contractor
1072 furnished 16-foot (4.8 m) straightedge swung from handles 3 feet (1 m) longer than
1073 one-half the width of the slab. The straightedge shall be held in contact with the surface
1074 in successive positions parallel to the centerline and the whole area gone over from one
1075 side of the slab to the other, as necessary. Advancing shall be in successive stages of
1076 not more than one-half the length of the straightedge. Any excess water and laitance in
1077 excess of 1/8-inch (3 mm) thick shall be removed from the surface of the pavement and
1078 wasted. Any depressions, including areas around light cans, shall be immediately filled
1079 with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be
1080 cut down and refinished. Special attention shall be given to assure that the surface
1081 across joints meets the smoothness requirements of paragraph 501-5.2e(3).
1082 Straightedge testing and surface corrections shall continue until the entire surface is
1083 found to be free from observable departures from the straightedge and until the slab
1084 conforms to the required grade and cross section. The use of long-handled wood floats
1085 shall be confined to a minimum; they may be used only in emergencies and in areas not
1086 accessible to finishing equipment.
1087

1088 4.12 SURFACE TEXTURE The surface of the pavement shall be finished with either a broom, burlap
1089 drag, or artificial turf finish for all newly constructed concrete pavements. It is important that the
1090 texturing equipment not tear or unduly roughen the pavement surface during the operation. Any
1091 imperfections resulting from the texturing operation shall be corrected.
1092

1093 A. Brush or Broom Finish If the pavement surface texture is to be a type of brush or broom
1094 finish, it shall be applied when the water sheen has practically disappeared. The
1095 equipment shall operate transversely across the pavement surface, providing
1096 corrugations that are uniform in appearance and approximately 1/16 of an inch (2 mm) in
1097 depth.
1098

1099 B. Burlap Drag Finish If a burlap drag is used to texture the pavement surface, it shall be at
1100 least 15 ounces per square yard (555 grams per square meter). To obtain a textured
1101 surface, the transverse threads of the burlap shall be removed approximately 1 foot (0.3
1102 m) from the trailing edge. A heavy buildup of grout on the burlap threads produces the
1103 desired wide sweeping longitudinal striations on the pavement surface. The corrugations
1104 shall be uniform in appearance and approximately 1/16 of an inch (2 mm) in depth.
1105

1106 C. Artificial Turf Finish If artificial turf is used to texture the surface, it shall be applied by
1107 dragging the surface of the pavement in the direction of concrete placement with an
1108 approved full-width drag made with artificial turf. The leading transverse edge of the
1109 artificial turf drag will be securely fastened to a lightweight pole on a traveling bridge. At
1110 least 2 feet of the artificial turf shall be in contact with the concrete surface during
1111 dragging operations. A variety of different types of artificial turf are available and approval
1112 of any one type will be done only after it has been demonstrated by the Contractor to
1113 provide a satisfactory texture. One type that has provided satisfactory texture consists of
1114 7,200 approximately 0.85-inches-long polyethylene turf blades per square foot. The
1115 corrugations shall be uniform in appearance and approximately 1/16 of an inch (2 mm) in
1116 depth.
1117

- 1118 4.13 SAW-CUT GROOVES Grooving shall not commence until all grinding has been completed, the
1119 final profile completed, and the pavement surface has been accepted for smoothness in writing by
1120 the Project Manger. At locations shown on the plans, new concrete pavements that have hard-
1121 ened, transverse grooves shall be saw-cut in the pavement forming a 1/4 inch (6 mm) by 1/4 inch
1122 (6 mm) deep by 1-1/2 inches (37 mm) center to center configuration. The grooves shall be
1123 continuous for the entire pavement length. They shall be saw-cut transversely in the pavement to
1124 within 10 feet (3 m) of the pavement edge to allow adequate space for equipment operation. The
1125 maximum transverse saw-cut grooves shall not exceed 130 feet (40 m). The tolerances for the
1126 saw-cut grooves shall meet the following:
1127
1128 Alignment tolerance
1129
1130 Plus or minus 1-1/2 inches (37 mm) in alignment for 75 feet (23 m)
1131
1132 Groove tolerance
1133
1134 Minimum depth 3/16 inch (5 mm), except that not more than 60 percent of the grooves shall
1135 be less than 1/4 inch (6 mm)
1136
1137 Maximum depth 5/16 inch (8 mm)
1138
1139 Minimum width ¼ inch (6mm)
1140
1141 Maximum width 5/16 inch (8 mm)
1142
1143 Center-to-center spacing
1144
1145 Minimum spacing 1-3/8 inches (35 mm)
1146
1147 Maximum spacing 1-5/8 inches (38 mm).
1148
1149 Saw-cut grooves shall not be closer than 3 inches (76 mm) or more than 9 inches (229 mm) to
1150 transverse paving joints. Grooves shall not be closer than 6 inches (152 mm) and no more than
1151 18 inches (457 mm) from in-pavement light fixtures. If grooving damages in-pavement light cans
1152 the can shall be replaced by removing the complete panel as detailed in 501-4.19 f. Grooves may
1153 shall be continued through longitudinal construction joints. Cleanup of waste material shall be
1154 continuous during the grooving operation. Waste material shall be disposed of in an approved
1155 manner. Waste material shall not be allowed to enter the airport storm or sanitary sewer system.
1156
1157 4.14 CURING Immediately after finishing operations are completed and marring of the concrete will
1158 not occur, the entire surface of the newly placed concrete shall be cured in accordance with one
1159 of the methods below. Failure to provide sufficient cover material of whatever kind the Contractor
1160 may elect to use, or lack of water to adequately take care of both curing and other requirements,
1161 shall be cause for immediate suspension of concreting operations. The concrete shall not be left
1162 exposed for more than 1/2 hour during the curing period of 7 days. The use of fly ash or set-
1163 retarding admixtures may delay the occurrence of bleed water. Curing shall be applied after the
1164 bleed water is gone from the surface.
1165
1166 The sealant reservoir shall not be sawed until after the curing period has been completed. .
1167
1168 A. Impervious Membrane Method The entire surface of the pavement shall be sprayed
1169 uniformly with white pigmented curing compound immediately after the finishing of the
1170 surface and before the set of the concrete has taken place. The curing compound shall
1171 not be applied during rainfall. Curing compound shall be applied by mechanical sprayers
1172 under pressure at the rate of 1 gallon (4 liters) to not more than 150 square feet (14
1173 square meters). The spraying equipment shall be of the fully atomizing type equipped

- 1174 with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed
1175 condition with the pigment uniformly dispersed throughout the vehicle. During application
1176 the compound shall be stirred continuously by mechanical means. Hand spraying of odd
1177 widths or shapes and concrete surfaces exposed by the removal of forms will be
1178 permitted. The curing compound shall be of such character that the film will harden within
1179 30 minutes after application. Should the film become damaged from any cause, including
1180 sawing operations, within the required curing period, the damaged portions shall be
1181 repaired immediately with additional compound or other approved means. Upon removal
1182 of side forms, the sides of the exposed slabs shall be protected immediately to provide a
1183 curing treatment equal to that provided for the surface.
1184
1185 B. Polyethylene Films The top surface and sides of the pavement shall be entirely covered
1186 with polyethylene sheeting. The units shall be lapped at least 18 inches (457 mm). The
1187 sheeting shall be placed and weighted to cause it to remain in contact with the surface
1188 and sides. The sheeting shall have dimensions that will extend at least twice the
1189 thickness of the pavement beyond the edges of the pavement. Unless otherwise
1190 specified, the sheeting shall be maintained in place for 7 days after the concrete has been
1191 placed.
1192
1193 C. Waterproof Paper The top surface and sides of the pavement shall be entirely covered
1194 with waterproofed paper. The units shall be lapped at least 18 inches (457 mm). The
1195 paper shall be placed and weighted to cause it to remain in contact with the surface
1196 covered. The paper shall have dimensions that will extend at least twice the thickness of
1197 the pavement beyond the edges of the slab. The surface of the pavement shall be
1198 thoroughly saturated prior to placing of the paper. Unless otherwise specified, the paper
1199 shall be maintained in place for 7 days after the concrete has been placed.
1200
1201 D. White Burlap-Polyethylene Sheets. The surface of the pavement shall be entirely covered
1202 with the sheeting. The sheeting used shall be such length (or width) that it will extend at
1203 least twice the thickness of the pavement beyond the edges of the slab. The sheeting
1204 shall be placed so that the entire surface and both edges of the slab are completely
1205 covered. The sheeting shall be placed and weighted to remain in contact with the surface
1206 covered, and the covering shall be maintained fully saturated and in position for 7 days
1207 after the concrete has been placed.
1208
1209 E. Water Method The entire area shall be covered with burlap or other water absorbing
1210 material. The material shall be of sufficient thickness to retain water for adequate curing
1211 without excessive runoff. The material shall be kept wet at all times for 7 days after the
1212 concrete has been placed. When the forms are stripped, the vertical walls shall also be
1213 kept moist. It shall be the responsibility of the Contractor to prevent ponding of the curing
1214 water on the subbase.
1215
1216 4.15 REMOVING FORMS Unless otherwise specified, forms shall not be removed from freshly placed
1217 concrete until it has hardened sufficiently to permit removal without chipping, spalling, or tearing.
1218 After the forms have been removed, the sides of the slab shall be cured as outlined in one of the
1219 methods indicated in paragraph 501-4.14. Major honeycombed areas shall be considered as
1220 defective work and shall be removed and replaced in accordance with paragraph 501-5.2(f).
1221
1222 4.16 SEALING JOINTS The joints in the pavement shall be sealed in accordance with the applicable
1223 specifications.
1224
1225 4.17 PROTECTION OF PAVEMENT The Contractor shall protect the pavement and its
1226 appurtenances against both public traffic and traffic caused by the Contractor's employees and
1227 agents. This shall include workers to direct traffic and the erection and maintenance of warning
1228 signs, lights, pavement bridges, crossovers, and protection of unsealed joints from intrusion of
1229 foreign material, etc. Any damage to the pavement occurring prior to final acceptance shall be

1230 repaired or the pavement replaced at the Contractor's expense. The Contractor shall have
1231 available at all times, materials for the protection of the edges and surface of the unhardened
1232 concrete. Such protective materials shall consist of rolled polyethylene sheeting at least 4 mils
1233 (0.1 mm) thick of sufficient length and width to cover the plastic concrete slab and any edges.
1234 The sheeting may be mounted on either the paver or a separate movable bridge from which it can
1235 be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all
1236 paving operations shall stop and all available personnel shall begin covering the surface of the
1237 unhardened concrete with the protective covering. Damaged pavements shall be removed and
1238 replaced at the Contractor's expense. Slabs shall be removed to the full depth, width, and length
1239 of the slab. The Project Manager may evaluate the damage to determine if diamond grinding can
1240 correct the surface and provide the required smoothness, grade, and thickness required by the
1241 Contract.

1242
1243 All embedments in the pavement surface shall be made by diamond coring or sawing in a manner
1244 that will not chip or spall the surface.

1245
1246 A. Curing in Cold Weather The concrete shall be maintained at a temperature of at least 50
1247 degrees F (10 degrees C) for a period of 72 hours after placing and at a temperature
1248 above freezing for the remainder of the curing time. The Contractor shall be responsible
1249 for the quality and strength of the concrete placed during cold weather, and any concrete
1250 injured by frost action shall be removed and replaced at the Contractor's expense.
1251 Additional requirements for cold weather concreting can be found in ACI 306 R.

1252
1253 B. Protection in Hot Weather Requirements for hot weather concreting can be found in ACI
1254 305 R.

1255
1256 4.18 OPENING TO TRAFFIC The pavement shall not be opened to traffic until test specimens molded
1257 and cured in accordance with ASTM C 31 have attained a flexural strength of 550 pounds per
1258 square inch (3792 kPa) on Taxiways and around boarding gates and a flexural strength of 700
1259 pounds per square inch on all runways when tested in accordance with ASTM C 78. Prior to
1260 opening the pavement to construction or aircraft traffic the pavement shall be cleaned, and all
1261 joints shall either be sealed or protected from damage to the joint edge and intrusion of foreign
1262 materials into the joint. As a minimum, backer rod or tape may be used to protect the joints from
1263 foreign matter intrusion. The pavement shall be cleaned before opening for normal operations.

1264
1265 4.19 REPAIR, REMOVAL, REPLACEMENT OF SLABS

1266
1267 A. General New pavement slabs that are broken or contain cracks shall be removed and
1268 replaced or repaired, as specified hereinafter at no cost to the Owner. Spalls along joints
1269 shall be repaired as specified. Removal of partial slabs is not permitted. Removal and
1270 replacement shall be full depth, shall be full width of the slab, and the limit of removal
1271 shall be normal to the paving lane and to each original joint. The Project Manager shall
1272 determine whether cracks extend full depth of the pavement and shall require cores to be
1273 drilled on the crack to determine depth of cracking. Such cores shall be 4-inch (100 mm)
1274 diameter, shall be drilled by the Contractor and shall be filled by the Contractor with a well
1275 consolidated concrete mixture bonded to the walls of the hole with epoxy resin, using
1276 approved procedures. Drilling of cores and refilling holes shall be at no expense to the
1277 Owner. All epoxy resin used in this work shall conform to ASTM C 881, Type V.

1278
1279 (1) Cracks That Do Not Exceed 4 inches in depth (including plastic shrinkage
1280 cracks). Cracks that do not exceed 4 inches deep shall be cleaned and then
1281 pressure injected with epoxy resin, Type IV, Grade 1, using procedures as
1282 approved. Care shall be taken to assure that the crack is not widened during
1283 epoxy resin injection. All epoxy resin injection shall take place in the presence of
1284 the Project Manager. Cracks that are greater than 4 inches deep shall be treated
1285 in accordance with paragraphs 4.19b and 4.19c.

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- B. Slabs With Cracks through Interior Areas Interior area is defined as that area more than 6 inches (600 mm) from any designed joint location. Slabs with any cracks greater than 4 inches deep, that extend into the interior area, regardless of direction, shall be removed and replaced as specified in paragraph 501-4.19 d.
- (1) Cracks That Do Not Extend Full Depth of Slab These cracks, and similar cracks within the areas 6 inches (600 mm) each side of transverse joints, shall be cleaned and then pressure injected with epoxy resin, Type IV, Grade 1, using procedures as approved by the Project Manager. 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 Project Manager. Any crack or spall repairs on newly placed concrete shall have an extended warranty of seven (7) years.
- (2) Cracks That Extend Full Depth of Slab Where there is any full depth crack, the full slab shall be removed and replaced at no cost to the Owner.
- C. Cracks Close To and Parallel To Transverse Joints. All cracks essentially parallel to original joints, extending deeper than 4 inches, and lying wholly within 6 inches either side of the joint shall be treated as specified in the following subparagraphs. Any crack extending more than 6 inches (600 mm) from the transverse joint shall be treated as specified above in subparagraph "Slabs With Cracks Through Interior Area." Any cracks which do not extend 4 inches deep shall be treated as specified above in subparagraph 4.19 a. (1). Any slab containing a crack greater than 4 inches deep is to be removed and replaced, regardless of location, when P-605 Compression Joint seals are used or if the joint is reinforced.
- (1) Cracks Greater Than 4-inches in Depth Present, Original Joint Not Opened. When the original uncracked joint has not opened, the crack shall be routed and sealed, and the original joint filled with epoxy resin as specified below. The crack shall be routed with an easily guided, wheel mounted, vertical shaft, powered rotary router designed so the routing spindle will caster as it moves along the crack. The reservoir for joint sealant in the crack shall be formed by routing to a depth of 3/4 inch, plus or minus 1/16 inch, and to a width of 5/8 inch, plus or minus 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 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 remainder 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) Cracks Greater Than 4-inches in Depth 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.

1342 D. Removal and Replacement of Full Slabs Where it is necessary to remove full slabs,
1343 unless there are keys or dowels present, all edges of the slab shall be cut full depth with a
1344 concrete saw. All saw cuts shall be perpendicular to the slab surface. If keys, dowels, or
1345 tie bars are present along any edges, these edges shall be sawed full depth 24 inches
1346 from the edge if only keys are present, or just beyond the end of the dowels or tie bars if
1347 they are present. These joints shall then be carefully sawed on the joint line to within 1
1348 inch of the depth of the dowel or key. The main slab shall be further divided by sawing full
1349 depth, at appropriate locations, and each piece lifted out and removed. Suitable
1350 equipment shall be used to provide a truly vertical lift, and approved safe lifting devices
1351 used for attachment to the slabs. The narrow strips along keyed or doweled edges shall
1352 be carefully broken up and removed using light, hand-held jackhammers, 30 LB (14 kg) or
1353 less, or other approved similar equipment. Care shall be taken to prevent damage to the
1354 dowels, tie bars, or keys or to concrete to remain in place. The joint face below keys or
1355 dowels shall be suitably trimmed so that there is not abrupt offset in any direction greater
1356 than 1/2 inch and no gradual offset greater than 1 inch when tested in a horizontal
1357 direction with a 12 foot straightedge. No mechanical impact breakers, other than the
1358 above hand-held equipment shall be used for any removal of slabs. If underbreak
1359 between 1-1/2 and 4 inches deep occurs at any point along any edge, the area shall be
1360 repaired as directed before replacing the removed slab. Procedures directed will be
1361 similar to those specified for surface spalls, modified as necessary. If underbreak over 4
1362 inches deep occurs, the entire slab containing the underbreak shall be removed and
1363 replaced. Where there are no dowels, tie bars, or keys on an edge, or where they have
1364 been damaged, dowels of the size and spacing as specified for other joints in similar
1365 pavement shall be installed by epoxy grouting them into holes drilled into the existing
1366 concrete using procedures as specified. Original damaged dowels or tie bars shall be cut
1367 off flush with the joint face. Protruding portions of dowels shall be painted and lightly
1368 oiled. All four edges of the new slab shall contain dowels. Placement of concrete shall be
1369 as specified for original construction. Prior to placement of new concrete, the underlying
1370 material (unless it is stabilized) shall be recompacted and shaped as specified in the
1371 appropriate SECTION of these specifications. The surfaces of all four joint faces shall be
1372 cleaned of all loose material and contaminants and coated with a double application of
1373 membrane forming curing compound as bond breaker. Care shall be taken to prevent any
1374 curing compound from contacting dowels or tie bars. The resulting joints around the new
1375 slab shall be prepared and sealed as specified.
1376

1377 E. Repairing Spalls Along Joints Spall repair material shall consist of either a cementitious
1378 BASF 10-60, BASF 10-61, Seka 2500, or approved equal, or epoxy Silspec Flexpatch or
1379 approved equal as directed in the field. Materials delivered in the field shall be
1380 accompanied by the manufacturers' certification stating the material meets the
1381 requirements of the specifications. All material shall be stored per the manufacturers'
1382 recommendations. Where directed, spalls along joints of new slabs, and along parallel
1383 cracks used as replacement joints, shall be repaired by first making a vertical saw cut at
1384 least 1 inch (25 mm) outside the spalled area and to a minimum depth of 4 inches (50
1385 mm) or as recommended by the Manufacturer, if more stringent. Saw cuts shall be
1386 straight lines forming rectangular areas. The concrete between the saw cut and the joint,
1387 or crack, shall be chipped out to remove all unsound concrete and at least 1/2 inch (12
1388 mm) of visually sound concrete. The cavity thus formed shall be thoroughly cleaned with
1389 high pressure water jets supplemented with compressed air to remove all loose material.
1390 The cavity will be filled based on the manufacturers instructions for bonding agent, mixing,
1391 and finishing. Any repair material on the surrounding surfaces of the existing concrete
1392 shall be removed before it hardens. Where the spalled area abuts a joint, an insert or
1393 other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir
1394 for the joint sealant shall be sawed to the dimensions required for other joints, or as
1395 required to be routed for cracks. The reservoir shall be thoroughly cleaned and sealed in
1396 accordance with the appropriate materials as specified within these contract documents.
1397 A Manufacturers representative must be present during the first days production. . If any

1398 spall penetrates half the depth of the slab or more, the entire slab shall be removed and
1399 replaced as previously specified. Any spalls greater than 1 square foot in area must be
1400 reinforced.

1401
1402 F. Slabs with unacceptable light cans. If an installed light can is found to be out of tolerance
1403 in the horizontal or vertical position, or any other problem is found that would require
1404 replacement, the complete panel shall be removed and replaced as specified in section
1405 501-4.19 d. Prior to replacing the panel all grounding, conduit, subgrade, and any other
1406 items damaged in the removal will be repaired and brought within specified tolerances
1407 and inspected and approved by the Project Manager.

1408
1409 4.20 EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR

1410
1411 All operations shall be carefully controlled to prevent damage to the concrete pavement and to the
1412 underlying material to remain in place. All saw cuts shall be made perpendicular to the slab
1413 surface.

1414
1415 A. Removal of Existing Pavement Slab When it is necessary to remove existing concrete
1416 pavement and leave adjacent concrete in place the joint between the removal area and
1417 adjoining pavement to stay in place shall first be cut full depth with a standard diamond-
1418 type concrete saw. Next, a full depth saw cut shall be made parallel to the joint at least 24
1419 inches from the joint and at least 12 inches from the end of any dowels. All pavement
1420 between this last saw cut and the joint line shall be carefully broken up and removed
1421 using hand-held jackhammers, 30 lb. (14 kg) or less, or the approved light-duty
1422 equipment which will not cause stress to propagate across the joint saw cut and cause
1423 distress in the pavement which is to remain in place. Dowels of the size and spacing
1424 indicated shall be installed as shown on the drawings by epoxy resin bonding them in
1425 holes drilled in the joint face as specified in paragraph "Placing Dowels and Tie Bars".
1426 The joint face shall be sawed or otherwise trimmed so that there is no abrupt offset in any
1427 direction greater than 1/2-inch and no gradual offset greater than 1 inch when tested in a
1428 horizontal direction with a 12 ft. straightedge.

1429
1430 B. Edge Repair The edge of existing concrete pavement against which new pavement abuts
1431 shall be protected from damage at all times. Areas which are damaged during
1432 construction shall be repaired at not cost to the Owner; repair of previously existing
1433 damage areas will be paid for as listed in the bid schedule.

1434
1435 (1) Spall Repair Spalls shall be repaired where indicated and where directed. Repair
1436 materials and procedures shall be as previously specified in subparagraph
1437 "Repairing Spalls Along Joints."

1438
1439 (2) Underbreak Repair All areas that have underbreak shall be removed and
1440 replaced at no cost to the owner.

1441
1442 (3) Underlying Material The underlying material adjacent to the edge of an under the
1443 existing pavement which is to remain in place shall be protected from damage or
1444 disturbance during removal operations and until placement of new concrete, and
1445 shall be shaped as shown on the drawings or as directed. Sufficient material
1446 shall be kept in place outside the joint line to prevent disturbance (or sloughing) of
1447 material under the pavement which is to remain in place. Any material under the
1448 portion of the concrete pavement to remain in place which is disturbed or loses its
1449 compaction shall be carefully removed and replaced with concrete as specified in
1450 paragraph "Underbreak Repair." The underlying material outside the joint line
1451 shall be thoroughly compacted and moist when new concrete is placed.

1452
1453

PART 5 MATERIAL ACCEPTANCE

5.01 ACCEPTANCE SAMPLING AND TESTING All acceptance sampling and testing, with the exception of coring for thickness determination, necessary to determine conformance with the requirements specified in this section will be performed by the Project Manager. Concrete shall be accepted for strength and thickness on a lot basis.

A lot shall consist of a day's production not to exceed 4235 square yards and shall represent only one pavement type, i.e. Portland Cement Concrete Pavement (Non-Reinforced)(17") or Portland Cement Concrete Pavement (Reinforced)(17"). All 17" to 21" tapered pavement shall be included in the appropriate reinforced or non-reinforced 17" PCC lots and bid items.

Testing organizations performing these tests shall meet the requirements of ASTM C 1077 including accreditation. The accreditation will include ASTM C 78. The Contractor shall bear the cost of coring and filling operations, per paragraph 5.01.B(1).

A prework meeting will be held between the Contractor, QC lab, QA lab, and Project Manager to discuss the sampling and testing of the strength specimens. The meeting shall include, but not limited to, procedures for sampling, fabrication, handling, initial and final curing, and testing of the strength specimens (beams).

A. Flexural Strength

(1) Sampling Each lot shall be divided into four equal sublots. One sample shall be taken for each subplot from the plastic concrete delivered to the job site. Sampling locations shall be determined by the Project Manager in accordance with random sampling procedures contained in ASTM D 3665. The concrete shall be sampled in accordance with ASTM C 172.

(2) Testing Three (3) flexural strength specimens shall be made from each sample. The flexural strength specimens shall be fabricated in steel molds in accordance with ASTM C 31. If the flexural strength specimens are initially cured in the field, they shall be transported to the laboratory (for final curing and testing) while in the molds. The flexural strength specimens shall be standard cured including storage, initial curing, and final curing (for beams) in accordance with ASTM C 31 and tested for flexural strength in accordance with ASTM C 78. The flexural strength for each subplot shall be computed by averaging the results of the two test specimens representing that subplot. If a specimen tests abnormally low in strength indicating possible damage to that specimen, the hold specimen shall be tested and its results used in the average. Slump, air content, and temperature tests in accordance with ASTM C 143, C 231, and C 1064 will also be conducted by the quality assurance laboratory for each set of flexural strength test samples.

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 tenth of an 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 unit weight by the volume of the sample. This information shall be reported as companion information to the measured flexural strength for each specimen.

(3) Acceptance. Acceptance of pavement for flexural strength will be determined by the Project Manager in accordance with paragraph 5.02.

- 1510 B. Pavement Thickness
1511
1512 (1) Sampling Each lot shall be divided into four equal sublots and one core shall be
1513 taken by the Contractor for each sublot. Sampling locations shall be determined
1514 by the Project Manager in accordance with random sampling procedures
1515 contained in ASTM D 3665. Areas, such as thickened edges or transitional
1516 thickness areas, with planned variable thickness, shall be excluded from sample
1517 locations.
1518
1519 Cores shall be neatly cut with a core drill. The Contractor shall furnish all tools,
1520 labor, and materials for cutting samples and filling the cored hole. Core holes
1521 shall be filled by the Contractor with a non-shrink grout approved by the Project
1522 Manager within one day after sampling.
1523
1524 (2) Testing The thickness of the cores shall be determined by the Project Manager
1525 by the average caliper measurement in accordance with ASTM C 174.
1526
1527 (3) Acceptance Acceptance of pavement for thickness shall be determined by the
1528 Project Manager in accordance with paragraph 5.02C.
1529
1530 C. Partial Lots When operational conditions cause a lot to be terminated before the
1531 specified number of tests have been made for the lot, or when the Contractor and Project
1532 Manager agree in writing to allow overages or minor placements to be considered as
1533 partial lots, the following procedure will be used to adjust the lot size and the number of
1534 tests for the lot.
1535
1536 Where three sublots have been produced, they shall constitute a lot. Where one or two
1537 sublots have been produced, they shall be incorporated into the next lot or the previous lot
1538 and the total number of sublots shall be used in the acceptance criteria calculation, i.e.,
1539 n=5 or n=6.
1540
1541 D. Outliers All individual flexural strength tests within a lot shall be checked for an outlier
1542 (test criterion) in accordance with ASTM E 178, at a significance level of 5 percent.
1543 Outliers shall be discarded, and the PWL shall be determined using the remaining test
1544 values.
1545

1546 5.02 ACCEPTANCE CRITERIA
1547

- 1548 A. General. Acceptance will be based on the following characteristics of the completed
1549 pavement:
1550
1551 (1) Flexural strength
1552 (2) Thickness
1553 (3) Smoothness
1554 (4) Grade
1555 (5) Edge slump
1556 (6) Dowel bar alignment
1557
1558 Flexural strength and thickness shall be evaluated for acceptance on a lot basis using the
1559 method of estimating percentage of material within specification limits (PWL).
1560 Acceptance using PWL considers the variability (standard deviation) of the material and
1561 the testing procedures, as well as the average (mean) value of the test results to calculate
1562 the percentage of material that is above the lower specification tolerance limit (L).
1563
1564 Acceptance for flexural strength will be based on the criteria contained in paragraph
1565 5.02E(1). Acceptance for thickness will be based on the criteria contained in paragraph

1566 5.02E(2). Acceptance for smoothness will be based on the criteria contained in
1567 paragraph 5.02E(3). Acceptance for grade will be based on the criteria contained in
1568 paragraph 5.02E(4).
1569

1570 The Project Manager may at any time, notwithstanding previous plant acceptance, reject
1571 and require the Contractor to dispose of any batch of concrete mixture which is rendered
1572 unfit for use due to contamination, segregation, or improper slump. Such rejection may
1573 be based on only visual inspection. In the event of such rejection, the Contractor may
1574 take a representative sample of the rejected material in the presence of the Project
1575 Manager, and if he can demonstrate in the laboratory, in the presence of the Project
1576 Manager, that such material was erroneously rejected, payment will be made for the
1577 material at the contract unit price.
1578

1579 B. Flexural Strength Acceptance of each lot of in-place pavement for flexural strength shall
1580 be based on PWL. The Contractor shall target production quality to achieve 90 PWL or
1581 higher.
1582

1583 C. Pavement Thickness Acceptance of each lot of in-place pavement shall be based on
1584 PWL. The Contractor shall target production quality to achieve 90 PWL or higher.
1585

1586 D. Percentage of Material Within Specification Limits (PWL) The percentage of material
1587 within specification limits shall be determined in accordance with procedures specified in
1588 Section 110 of the General Provisions.
1589

1590 The lower specification limit (L) for flexural strength and thickness shall be:

1591 Lower Specification Limit (L)

1592 Flexural Strength = $0.93 \times$ strength specified in paragraph 3.01.
1593

1594 Thickness = Lot Plan Thickness in inches - 0.50 inches
1595

1596 E. Acceptance Criteria
1597

1600 (1) Flexural Strength. If the PWL of the lot equals or exceeds 90 percent, the lot
1601 shall be acceptable. Acceptance and payment for the lot shall be determined in
1602 accordance with paragraph 8.01.
1603

1604 (2) Thickness. If the PWL of the lot equals or exceeds 90 percent, the lot shall be
1605 acceptable. Acceptance and payment for the lot shall be determined in
1606 accordance with paragraph 8.01.
1607

1608 (3) Smoothness. As soon as the concrete has hardened sufficiently, the pavement
1609 surface shall be tested in the transverse direction with a 16 foot straightedge or
1610 other specified device. Surface smoothness deviations shall not exceed 1/4 inch
1611 from a 16 foot straightedge at any location, including placement along and
1612 spanning any pavement joint or edge.
1613

1614 Areas in the slab showing high spots of more than 1/4 inch but not exceeding 1/2
1615 inch in 16 feet shall be marked and immediately ground down with an approved
1616 grinding machine to an elevation that falls within the tolerance of 1/4 inch or less.

1617 Where the departure from the correct cross section exceeds 1/2 inch, the
1618 pavement shall be removed and replaced at the expense of the Contractor when
1619 so directed by the Project Manager.
1620

- 1621 The surface of the ground pavement shall have a texture consisting of grooves
1622 between 0.090 and 0.130 inches wide. The peaks and ridges shall be
1623 approximately 1/32 inch higher than the bottom of the grooves. The pavement
1624 shall be left in a clean condition. The removal of all of the slurry resulting from the
1625 grinding operation shall be continuous. The grinding operation should be
1626 controlled so the residue from the operation does not flow across other lanes of
1627 pavement.
1628
- 1629 The Contractor shall perform straight edge testing, maintain all records, and
1630 provide measurements with deviations to the Project Manager on a daily basis.
1631
- 1632 In addition to the 16 foot straight edge, the Contractor shall furnish a 25' wheel
1633 base California type profilograph and competent operator to be used to measure
1634 longitudinal pavement surface deviations. The profilograph shall be operated in a
1635 manner acceptable to the Project Manager and in accordance with the
1636 manufacturers instructions. The profilograph shall be operated at a speed no
1637 greater than a normal walk. Original profilograms for the appropriate locations
1638 interpreted in accordance with ASTM E 1274 shall be furnished to the Project
1639 Manager. The profilograms shall be recorded on a scale of one inch equal to 25
1640 feet longitudinally and one inch equal to one inch or full scale vertically. If
1641 additional profilograms are required to verify corrections have been made, the
1642 additional data shall be presented in such a format that the original and final
1643 profilograms may be viewed on the same sheet of paper.
1644
- 1645 (a) The surface of Runway and Taxiway pavements of continuous placement
1646 of 50 feet or more shall be tested and evaluated as described herein.
1647 Two passes shall be made in each paving lane 20 feet or greater in
1648 width; each pass shall be six feet from and parallel with the centerline of
1649 the paving lane. The average of the two passes shall be considered as
1650 the profilograph result for the paving lane. For paving lanes less than 20
1651 feet in width, one pass along the centerline shall be required. Tests shall
1652 be run the next working day following concrete placement. Runs shall be
1653 continuous through the days production. Each trace shall be completely
1654 labeled to show paving lane, wheel pass, and stationing.
1655
- 1656 (b) The Contractor shall furnish paving equipment and employ methods that
1657 produce a surface for each section of pavement having an average
1658 profile index meeting the requirements of paragraph 8.01C. A typical
1659 subsection will be considered to be the width of the paving lane and 1/10
1660 mile long. The profile index will be determined in accordance with ASTM
1661 E 1274. A blanking band of 0.20 inches shall be used. Within each 1/10
1662 mile subsection, all areas represented by high points having a deviation
1663 in excess of 0.4 inch in 25 feet or less shall be removed by the contractor
1664 using an approved grinding device or a device consisting of multiple
1665 diamond blades. The use of a bush hammer or other impact devices will
1666 not be permitted. After removing all individual deviations in excess of 0.4
1667 inch, additional corrective work shall be performed if necessary to
1668 achieve the quality. All corrective work shall be completed prior to
1669 determination of pavement thickness.
1670
- 1671 (c) On those pavement subsections where corrections were necessary,
1672 second profilograph runs will be performed to verify that the corrections
1673 have produced an average profile index of 15 inches per mile or less. If
1674 the initial average profile index was less than 15, only those areas
1675 representing greater than 0.4 inch deviation will be re-profiled for
1676 correction verification.

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- (d) When the average profile index does not exceed 7 inches per mile, payment will be made for that section at the contract unit price for the completed pavement. When the average profile index exceeds 7 inches per mile, but does not exceed fifteen inches per mile, the Contractor may elect to accept a contract unit price adjustment in lieu of reducing the profile index.
 - (e) Individual sections shorter than 50 feet, the last 15 feet of any section where the Contractor is not responsible for the adjoining section, and 15 feet from any edge where the contractor is not responsible for the adjoining section shall be straightedged in accordance with Section 5.02E(3).
 - (f) If there is a section of 250 feet or less, the profilogram for that section shall be included in the evaluation of the previous section. If there is an independently placed section of 50 to 250 feet in length, a profilogram shall be made for that section and the pay adjustment factors for short sections of paragraph 8.01B shall apply.
 - (g) Any corrective work required shall be performed prior to joint sealing and grooving operations.
 - (h) All cost necessary to provide the profilograph and related to furnishing the appropriate profilograms as required in this provision are incidental to concrete pavement construction and no direct compensation will be made therefore.
- Grade. Grade shall be evaluated on the first day of placement and every 5 days or less so adjustments can be made to paving operations if measurements do not meet specification requirements. The Project Manager must compare the surveyed grades with the grades shown on the contract drawings and document the analysis.
- An evaluation of the surface grade shall be made by the Project Manager for compliance to the tolerances contained below. The Contractor shall perform the survey and provide a comparison of as-built grades with the design grades for the Project Manager to analyze. Records shall be maintained showing all grade measurements.
- Lateral Deviation. Lateral deviation from established alignment of the pavement edge shall not exceed plus or minus 0.10 foot (30 mm) in any lane.
- Vertical Deviation. Vertical deviation from established grade shall not exceed plus or minus 0.04 foot (12 mm) at any point. Vertical survey shall be conducted on the high point of each joint intersection and compared to the plan elevations to determine the vertical deviation. The finished grade of each lot will be determined by running levels at all joint intersections to determine the elevation of the completed pavement. The Contractor shall pay the cost of surveying and shall be performed by a licensed surveyor. The documentation, stamped and signed by a licensed surveyor, shall be provided by the Contractor to the Project Manager. When more than 15 percent of all the measurements within a lot are outside the specified tolerance, or if any one shot within the lot deviates $\frac{3}{4}$ inch or more from planned grade, the Contractor shall remove and replace the deficient slabs to the full width, length and depth of the slab. Patching shall not be permitted. Isolated

- 1732 high points may be ground off provided that the course thickness is not greater
1733 than ¼ inch deficient in the design thickness.
1734
1735 (5) Edge Slump. When slip-form paving is used, not more than 15 percent of the
1736 total free edge of each five hundred feet (500) (152 m) of pavement, or fraction
1737 thereof, shall have an edge slump exceeding 1/4-inch (6 mm), and none of the
1738 free edge of the pavement shall have an edge slump exceeding 3/8-inch (10
1739 mm). (The total free edge of 500 feet (152 m) of pavement will be considered the
1740 cumulative total linear measurement of pavement edge originally constructed as
1741 nonadjacent to any existing pavement; i.e., 500 feet (152 m) of paving lane
1742 originally constructed as a separate lane will have 1,000 feet (305 m) of free
1743 edge, 500 feet (152 m) of fill-in lane will have no free edge, etc.) The area
1744 affected by the downward movement of the concrete along the pavement edge
1745 shall be limited to not more than 18 inches (457 mm) from the edge. When
1746 excessive edge slump cannot be corrected before the concrete has hardened,
1747 the area with excessive edge slump shall be removed and replaced at the
1748 expense of the Contractor when so directed by the Project Manager.
1749
1750 (6) Dowel Bar Alignment. Dowel bars and assemblies shall be checked for position
1751 and alignment. Vertical alignment of dowels shall be measured parallel to the
1752 designed top surface of the pavement, except for those across the crown or other
1753 grade change joints. Dowels across crowns and other joints at grade changes,
1754 shall be measured to a level surface. Horizontal alignment shall be checked
1755 perpendicular to the joint edge. The maximum permissible tolerance on dowel
1756 bar alignment in each plane, horizontal and vertical, shall not exceed 2 percent or
1757 1/4 inch (6 mm) per foot of dowel bar.
1758
1759 F. Removal and Replacement of Concrete. Any area or section of concrete that is removed
1760 and replaced shall be removed and replaced back to planned joints. The Contractor shall
1761 replace damaged dowels and the requirements for doweled longitudinal construction
1762 joints in paragraph 4.10 shall apply to all contraction joints exposed by concrete removal.
1763
1764

1765 PART 6 CONTRACTOR QUALITY CONTROL

- 1766
1767 6.01 QUALITY CONTROL PROGRAM The Contractor shall develop a Quality Control Program in
1768 accordance with Section GP-100 of the General Provisions. Paving operations shall not
1769 commence until the quality control program is approved by the Project Manager. The program
1770 shall address all elements which effect the quality of the pavement including, but not limited to:
1771
1772 A. Mix Design
1773 B. Aggregate Gradation
1774 C. Quality of Materials
1775 D. Stockpile Management
1776 E. Proportioning
1777 F. Mixing and Transportation
1778 G. Placing and Consolidation
1779 H. Joints
1780 I. Dowel Placement and Alignment
1781 J. Flexural or Compressive Strength
1782 K. Finishing and Curing
1783 L. Surface Smoothness
1784
1785 6.02 QUALITY CONTROL TESTING The Contractor's Independent Testing Agency shall perform all
1786 quality control tests necessary to control the production and construction processes applicable to
1787 this specification and as set forth in the Quality Control Program. The Independent Testing

1788 Agency shall meet the requirements of Section 01401 including ASTM C 1077 and have been
1789 approved through the submittal process prior to performing testing. The testing program shall
1790 include, but not necessarily be limited to, tests for aggregate gradation, aggregate moisture
1791 content, slump, and air content.

1792 A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

1793
1794 A. Fine Aggregate

1795
1796
1797 (1) Gradation A sieve analysis shall be made at least twice daily in accordance with
1798 ASTM C 136 from randomly sampled material taken from the discharge gate of
1799 storage bins or from the conveyor belt.

1800
1801 (2) Moisture Content. If an electric moisture meter is used, at least two direct
1802 measurements of moisture content shall be made per week to check the
1803 calibration. If direct measurements are made in lieu of using an electric meter,
1804 two tests shall be made per day. Tests shall be made in accordance with ASTM
1805 C 70 or ASTM C 566.

1806
1807 B. Coarse Aggregate

1808
1809 (1) Gradation A sieve analysis shall be made at least twice daily for each size of
1810 aggregate. Tests shall be made in accordance with ASTM C 136 from randomly
1811 sampled material taken from the discharge gate of storage bins or from the
1812 conveyor belt.

1813
1814 (2) Moisture Content If an electric moisture meter is used, at least two direct
1815 measurements of moisture content shall be made per week to check the
1816 calibration. If direct measurements are made in lieu of using an electric meter,
1817 two tests shall be made per day. Tests shall be made in accordance with ASTM
1818 C 566.

1819
1820 C. Slump After the start of each day's production and after batch plant shut down, the first
1821 three truck loads of concrete shall be tested for slump until three consecutive loads meet
1822 the project requirements. In addition, slump tests shall be performed at a minimum
1823 frequency of one test for every 100 cubic. Slump tests shall also be performed in
1824 conjunction with the Project Manager's Quality Assurance Lab's sampling for flexural
1825 strength. The samples shall be obtained in accordance with ASTM C 172 from material
1826 discharged from trucks at the paving site and tested accordance with ASTM C 143.

1827
1828 D. Air Content After the start of each day's production and after batch plant shut down, the
1829 first three truck loads of concrete shall be tested for air content until three consecutive
1830 loads meet the project requirements. In addition, air content tests shall be performed at a
1831 minimum frequency of one test for every 100 cubic yards. Air content tests shall also be
1832 performed in conjunction with the Project Manager's Quality Assurance Lab's sampling
1833 for flexural strength. The samples shall be obtained in accordance with ASTM C 172
1834 from material discharged from trucks at the paving site and tested in accordance with
1835 ASTM C 231 for gravel and stone coarse aggregate and ASTM C 173 for slag or other
1836 porous coarse aggregate.

1837
1838 E. Unit weight and yield tests shall be made in conjunction with slump and air content tests.
1839 The samples shall be obtained in accordance with ASTM C 172 from material
1840 discharged from trucks at the paving site and tested in accordance with ASTM C 138.

1841
1842 F. Percent cement and fly ash shall be calculated in accordance with ASTM C 138 at the
1843 start of each day's production for the first three truck loads delivered until three

1844 consecutive loads meet slump and air content specifications, in conjunction with each yield
 1845 test, and when material falls outside Suspension and Action limits for slump or air content.
 1846 The samples shall be obtained in accordance with ASTM C 172.

1847
 1848 6.03 CONTROL CHARTS The Contractor shall maintain linear control charts for fine and course
 1849 aggregate, gradation, slump, and air content. If an electronic moisture meter is used, a control
 1850 chart shall be produced indicating moisture readings and calibration reports entered for the project
 1851 records.

1852
 1853 Control charts shall be posted in a location satisfactory to the Project Manager and shall be kept
 1854 up to date at all times. As a minimum, the control charts shall identify the project number, the
 1855 contract item number, the test number, each test parameter, the Action and Suspension Limits, or
 1856 Specification limits, applicable to each test parameter, and the Contractor's test results. The
 1857 Contractor shall use the control charts as part of a process control system for identifying potential
 1858 problems and assignable causes before they occur. If the Contractor's projected data during
 1859 production indicates a potential problem and the Contractor is not taking satisfactory corrective
 1860 action, the Project Manager may halt production or acceptance of the material.

1861
 1862 A. Fine and Coarse Aggregate Gradation The Contractor shall record the running average
 1863 of the last five gradation tests for each control sieve on linear control charts. Specification
 1864 limits contained in Tables 1 and 2 shall be superimposed on the Control Chart for job
 1865 control.

1866
 1867 B. Slump and Air Content. The Contractor shall maintain linear control charts both for
 1868 individual measurements and range (i.e., difference between highest and lowest of 2
 1869 consecutive test measurements) for slump and air content in accordance with the
 1870 following Action and Suspension Limits.

1871
 1872

CONTROL CHART LIMITS
 Individual Measurements

Control Parameter	Action Limit	Suspension Limit	Range Suspension Limit (Between Two Consecutive Tests)
Slip Form Paving: Slump	+0/-1 inch (0-25mm)	+0.5/-1.5 inch (13-38mm)	1.5 inch (38mm)
Air Content	+/- 1.2%	+/- 1.8%	2.5%
Fixed Form: Slump	+0.5/-1 inch (13-25mm)	+1/-1.5 inch (25-38mm)	1.5 inch (38mm)
Air Content	+/- 1.2%	+/- 1.8%	2.5%

1873
 1874
 1875 6.04 CORRECTIVE ACTION The Quality Control Plan shall indicate that appropriate action shall be
 1876 taken when a process is believed to be out of control. The Plan shall detail what action will be
 1877 taken to bring a process into control and shall contain sets of rules to gauge when a process is
 1878 out of control. As a minimum, a process shall be deemed out of control and corrective action
 1879 taken if any one of the following conditions exists.

1880
 1881 A. Fine and Coarse Aggregate Gradation. When two consecutive averages of five tests are
 1882 outside of the Tables 1 or 2 specification limits, immediate steps, including a halt to
 1883 production, shall be taken to correct the gradation.

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B. Fine and Coarse Aggregate Moisture Content. Whenever the moisture content of the fine or coarse aggregate changes by more than 0.5 percent, the scale settings for the aggregate batcher(s) and water batcher shall be adjusted.

C. Slump The Contractor shall make appropriate adjustments whenever:

(1) one point falls outside the Action Limit line for individual measurements. The next load shall be tested. If it's test falls outside the Action and Suspension Limits this load may be placed however; production is in Suspension and the process shall be brought into control in accordance with the Quality Control Plan. As a minimum testing during Suspension shall be performed at both the batch plant and at the point of placement until three (3) subsequent loads in succession meet the slump specifications at the point of placement. Any load not meeting slump specifications under Suspension shall not be placed.

(2) one point falls outside the Suspension Limit line for individual measurements or range. This load may remain in place. The process shall be brought into control in accordance with the Quality Control Plan. As a minimum testing during Suspension shall be performed at both the batch plant and at the point of placement until three (3) subsequent loads in succession meet the slump specifications at the point of placement. Any load not meeting slump specifications under Suspension shall not be placed.

D. Air Content The Contractor shall adjust the amount of air-entraining admixture whenever:

(1) one point falls outside the Action Limit line for individual measurements. The next load shall be tested. If it's test falls outside the Action and Suspension Limit this load may be placed however; production is in Suspension and the process shall be brought into control in accordance with the Quality Control Plan. As a minimum testing during Suspension shall be performed at both the batch plant and at the point of placement until three (3) subsequent loads in succession meet the air content specifications at the point of placement. Any load not meeting air content specifications under Suspension shall not be placed.

(2) one point falls outside the Suspension Limit line for individual measurements or range. This load may remain in place. The process shall be brought into control in accordance with the Quality Control Plan. As a minimum testing during Suspension shall be performed at both the batch plant and at the point of placement until three (3) subsequent loads in succession meet the air content specifications at the point of placement. Any load not meeting air content specifications under Suspension shall not be placed.

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.

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PART 7 METHOD OF MEASUREMENT

7.01 Refer to Appendix A for Method of Measurement.

PART 8 BASIS OF PAYMENT

8.01 GENERAL Payment for accepted concrete pavement shall be made at the contract unit price per square yard (square meter) adjusted in accordance with paragraph 501-8.01A, subject to the limitation that:

The total project payment for concrete pavement shall not exceed 100 percent of the product of the contract unit price and the total number of cubic yards (cubic meters) of concrete pavement used in the accepted work (See Note ² under Table 3).

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, except for saw-cut grooving.

- A. Basis of Adjusted Payment The pay factor for each individual lot shall be calculated in accordance with Table 3. A pay factor shall be calculated for both flexural strength and thickness. The lot pay factor shall be the higher of the two values when calculations for both flexural strength and thickness are 100 percent or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either flexural strength or thickness is 100 percent or higher. The lot pay factor shall be the lower of the two values when calculations for both flexural strength and thickness are less than 100 percent.

TABLE 3. PRICE ADJUSTMENT SCHEDULE ¹

Percentage of Material Within Specification Limits (PWL)	Lot Pay Factor (Percent of Contract Unit Price)
96 – 100	106
90 – 95	PWL + 10
75 – 89	0.5PWL + 55
55 – 74	1.4PWL – 12
Below 55	Reject 2

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1974
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¹ ALTHOUGH IT IS THEORETICALLY POSSIBLE TO ACHIEVE A PAY FACTOR OF 106 PERCENT FOR EACH LOT, ACTUAL PAYMENT IN EXCESS OF 100 PERCENT SHALL BE SUBJECT TO THE TOTAL PROJECT PAYMENT LIMITATION SPECIFIED IN PARAGRAPH 8.01.

² The lot shall be removed and replaced. However, the Project Manager may decide to allow the rejected lot to remain. In that case, if the Project Manager and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50 percent of the contract unit price AND THE TOTAL PROJECT PAYMENT LIMITATION SHALL BE REDUCED BY THE AMOUNT WITHHELD FOR THE REJECTED LOT.

1985 For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for
 1986 the lot and the contract unit price. Payment shall be subject to the total project payment limitation
 1987 specified in paragraph 8.01. Payment in excess of 100 percent for accepted lots of concrete
 1988 pavement shall be used to offset payment for accepted lots of concrete pavement that achieve a
 1989 lot pay factor less than 100 percent.
 1990

1991 B. Basis of adjusted payment for Smoothness. Price adjustment for pavement smoothness
 1992 will be made in accordance with the following. The adjustment will apply to the total area
 1993 of concrete within a section of pavement and shall be applied with the following equation:
 1994

1995 $(\text{Total payment, from 8.01A}) \times (\text{smoothness pay factor}) = \text{total lot payment}$
 1996

Table 4

Average Profile Index Inches per mile per 1/10 mile pavement strength rating				Smoothness Pay Factor(%)
over 30,000 lb	30,000 lb. or less	Short Sections		
0 - 7	0 - 10	0 - 15		100
7.1 - 9	10. - 11	15.1 - 16		98
9.1 - 11	11.1 - 12	16.1 - 17		96
11.1 - 13	12.1 - 13	17.1 - 18		94
13.1 - 14	13.1 - 14	18.1 - 20		92
14.1 - 15	14.1 - 15	20.1 - 22		90
15.1 & up	15.1 & up	22.1 & up		corrective work required

1997
 1998 8.02 Refer to Appendix A for Basis of Payment
 1999

PART 9 TESTING REQUIREMENTS

2000 All testing shall be performed by approved standardized test procedures, but not limited to the
 2001 following:
 2002

- 2003 ASTM C 31 Making and Curing Concrete Test Specimens in the Field
- 2004
- 2005 ASTM C 39 Compressive Strength of Cylindrical Concrete Specimens
- 2006
- 2007 ASTM C 70 Surface Moisture in Fine Aggregate
- 2008
- 2009 ASTM C 78 Test for Flexural Strength of Concrete (Using Simple Beam with Third-Point
 2010 Loading)
- 2011
- 2012 ASTM C 88 Test for Soundness of Aggregates by Use of Sodium Sulfate & Magnesium
 2013 Sulfate
- 2014
- 2015 ASTM C 114 Chemical Analysis of Hydraulic Cement
- 2016
- 2017 ASTM C 131 Test for Resistance to Abrasion of Small Size Coarse Aggregate by Use of the
 2018 Los Angeles Machine
- 2019
- 2020 ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates
- 2021
- 2022
- 2023
- 2024 ASTM C 138 Test for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete

2025		
2026	ASTM C 143	Test for Slump of Portland Cement Concrete
2027		
2028	ASTM C 172	Sampling Freshly Mixed Concrete
2029		
2030	ASTM C 173	Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
2031		
2032	ASTM C 174	Measuring Length of Drilled Concrete Cores
2033		
2034	ASTM C 227	Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
2035		
2036		
2037	ASTM C 231	Test for Air Content of Freshly Mixed Concrete by the Pressure Method
2038		
2039	ASTM C 289	Potential Reactivity of Aggregates (Chemical Method)
2040		
2041	ASTM C 295	Petrographic Examination of Aggregates for Concrete
2042		
2043	ASTM C 311	Sampling and Testing Fly Ash for Use as an Admixture in Portland Cement Concrete
2044		
2045		
2046	ASTM C 535	Test for Resistance to Abrasion of Large Size Coarse Aggregate by Use of the Los Angeles Machine
2047		
2048		
2049	ASTM C 566	Total Moisture Content of Aggregates by Drying
2050		
2051	ASTM C 642	Test for Density, Absorption, and Voids in Hardened Concrete
2052		
2053	ASTM C 1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
2054		
2055		
2056	ASTM C 1260	Potential Alkali Reactivity of Aggregates (Mortar- Bar Method)
2057	ASTM C 1567	Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
2058		
2059		
2060	ASTM D 3665	Random Sampling of Construction Materials
2061		
2062	ASTM D 4791	Test Method for Flat or Elongated Particles in Coarse Aggregate
2063		
2064	ASTM E 178	Practice for Dealing with Outlying Observations
2065		
2066	ASTM E 1274	Profilograph Testing for Ride Smoothness
2067		
2068	AASHTO T 26	Quality of Water to be Used in Concrete
2069		
2070		

PART 10 MATERIAL REQUIREMENTS

2071		
2072		
2073	ASTM A 184	Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
2074		
2075		
2076	ASTM A 185	Specification for Welded Steel Wire Fabric for Concrete Reinforcement
2077		
2078	ASTM A 497	Specification for Welded Deformed Steel Wire Fabric for Concrete Pavement
2079		

2080	ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
2081		
2082		
2083	ASTM A 616	Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
2084		
2085	ASTM A 617	Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
2086		
2087	ASTM A 704	Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
2088		
2089	ASTM A 714	Specification for High-Strength Low-Alloy Welded and Seamless Steel Pipe
2090		
2091	ASTM A 996	Specification for Rail-Steel and Axle Steel Deformed Bar for Concrete Reinforcement
2092		
2093		
2094	ASTM C 33	Specification for Concrete Aggregates
2095		
2096	ASTM C 94	Specification for Ready-Mixed Concrete
2097		
2098	ASTM C 150	Specification for Portland Cement
2099		
2100	ASTM C 171	Specification for Sheet Materials for Curing Concrete
2101		
2102	ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
2103		
2104	ASTM C 309	Specification for Liquid Membrane-Forming Compounds
2105		
2106	ASTM C 494	Specification for Chemical Admixtures for Concrete
2107		
2108	ASTM C 595	Specification for Blended Hydraulic Cements
2109		
2110	ASTM C 618	Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
2111		
2112		
2113	ASTM C 881	Specification for Epoxy-Resin Base Bonding System for Concrete
2114		
2115	ASTM C 989	Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
2116		
2117		
2118	ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
2119		
2120		
2121	ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
2122		
2123		
2124	AASHTO M 254	Specification for Coated Dowel Bars
2125		
2126	ACI 305R	Hot Weather Concreting
2127		
2128	ACI 306R	Cold Weather Concreting
2129		
2130	ACT 309	Guide for Consolidation of Concrete
2131		
2132	TT-P-644	Federal Specification for Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant
2133	(Rev. D)	
2134		
2135		

2136 MIL-DTL-24441 Paint, Epoxy-Polyamide, Green Primer, Formula 150. Type III
2137 /20a (1999) Dept. of Defense
2138
2139
2140
2141

END OF ITEM P-501

1
2 **ITEM P-604A**

3
4 **PREFORMED EXPANSION JOINT COMPRESSION SEALS**

5
6 **PART 1 GENERAL**

- 7
8 1.01 DESCRIPTION This item shall consist of a moisture tight sealing system for structural sealing of
9 expansion joints in concrete pavement. The seal shall consist of an impermeable closed-cell,
10 closed link, ethylene vinyl acetate, low-density polyethylene copolymer, nitrogen blown resilient,
11 nonextrudable foam material with a Hindered Amine Light Stabilizer added (H.A.L.S.).
12

13 **PART 2 MATERIALS**

- 14
15 2.01 The material shall be Evazote 380 E.S.P., WaboEvazote UV, or approved equal. The material
16 must be jet fuel resistant and glycol compatible.
17
18 2.02 ADHESIVE - Adhesive used for the preformed foam compression seal shall be as recommended
19 by the manufacturer.
20
21 2.03 DELIVERY AND STORAGE Materials delivered to the job site shall be inspected for defects,
22 unloaded, and stored with a minimum of handling to avoid damage. Storage facilities shall be
23 provided at the job site to protect materials from weather and to maintain them at temperatures as
24 recommended by the manufacturer.
25
26 2.04 SUBMITTALS Certified copies of test results shall be provided in accordance with Section 01300.
27
28 A. Construction Equipment List List of proposed equipment to be used in the performance
29 of construction work, including descriptive data, shall be provided in accordance with
30 Section 01300.
31
32 B. Manufacturer's Instructions Where installation procedures, or any part thereof, are
33 required to be in accordance with the manufacturer's recommendations, printed copies of
34 the recommendations shall be furnished in accordance with Section 01300. Installation of
35 the material will not be allowed until the recommendations are received. Failure to furnish
36 these recommendations can be a cause for rejection of the material.
37
38 C. Samples Regardless of testing responsibility, samples of the materials shall be
39 submitted for approval in accordance with Section 01300. Written or printed directions
40 from the manufacturer giving recommended criteria for installation shall be furnished at
41 the same time, plus certification from the manufacturer that the seal selected is
42 recommend for the installation involved on this project. No material will be allowed to be
43 used until it has been approved.
44

45 **PART 3 EQUIPMENT**

- 46
47 3.01 Machines, tools, and equipment used in the performance of the work required by this section shall
48 be approved before the work is started and shall be maintained in satisfactory condition at all
49 times.
50
51 Joint Cleaning Equipment:
52
53 A. Concrete saw A self-propelled power saw with water-cooled diamond or abrasive saw
54 blades shall be provided for cutting joints to the depths and widths specified and for

55 removing filler (existing old joint seal) or other material embedded in the joints or adhered
56 to the joint faces.

57
58 B. Sandblasting Equipment Sandblasting equipment shall include an air compressor, hose,
59 and a long-wearing venturi-type nozzle of proper size, shape, and opening. The maximum
60 nozzle opening should not exceed 1/4 inch. The air compressor shall be portable and
61 shall be capable of furnishing not less than 150 cubic feet per minute and maintaining a
62 line pressure of not less than 90 psi at the nozzle while in use. The compressor shall be
63 equipped with traps that will maintain the compressed air free of oil and water. The
64 height, angle of inclination, and the size of the nozzle shall be adjusted as necessary to
65 ensure satisfactory results.

66
67 C Waterblasting Equipment Waterblasting equipment shall include a trailer-mounted water
68 tank, pumps, high-pressure hose, a wand with safety release cutoff controls, nozzle, and
69 auxiliary water resupply equipment. The water tank and auxiliary water resupply
70 equipment shall be sufficient capacity to permit continuous operations. The pumps,
71 hoses, wand, and nozzle shall be of sufficient capacity to permit the cleaning of both walls
72 of the joint and the pavement surface for a width of at least 1/2 inch on either side of the
73 joint. The pump shall be capable of supplying a pressure of at least 3,000 psi. A
74 pressure gauge mounted at the pump shall show at all times the pressure in pounds per
75 square inch at which the equipment is operating.

76
77

78 **PART 4 CONSTRUCTION METHOD**

79
80 4.01 Installation of foam joint sealant shall comply with Manufacturer's instructions and
81 recommendations for foam joint sealant installation, complete with a compatible epoxy adhesive
82 for adhesion to all surfaces.

83
84 Prior to installing foam joint sealant, make certain that surfaces to which adhesive will adhere are
85 clean and free of dust, dirt and other residues that would inhibit a proper bond.

86
87 The Contractor shall make arrangements for the Manufacturer's representative to meet with the
88 Contractor and the City's Project Manager prior to the start of sealing operations to ensure the
89 installation procedures are in accordance with the Manufacturer's direction. A representative of the
90 joint sealant manufacturer shall visit the job-site a sufficient number of times during the sealing
91 operations and after the sealing is completed to certify that the joint sealant was installed in
92 accordance with the manufacturer's recommended methods and procedures.

93
94 4.02 PREPARATION OF JOINTS Immediately before installation of the preformed joint seal, the
95 joints shall be thoroughly cleaned full depth to remove all laitance, filler, old existing sealant,
96 foreign material and protrusions of hardened concrete from the sides and upper edges of the joint
97 space to be sealed. Any irregularity in the joint face, which would prevent uniform contact
98 between the joint seal and the joint face shall be corrected prior to the installation of the joint seal.
99 All joint faces shall be vertical.

100
101 A. Sawing Joints shall be sawed to clean and to open them to the full specified width and
102 depth. Immediately following the sawing operation, the joint faces and opening shall be
103 thoroughly cleaned using a water jet to remove all saw cuttings or debris remaining on the
104 faces or in the joint opening. Compression seal shall be installed within 3 calendar days
105 of the time the individual joint cavity is sawed. Depth of sawing the cavity shall be
106 between 3/4 and 1 inch deeper than the uncompressed depth of the seal, or otherwise
107 recommended by the manufacturer. The saw cut for the joint seal cavity shall at all
108 locations be centered over the joint line. The nominal width of the sawed joint seal cavity

109 shall be as follows; the actual width shall be within a tolerance of plus or minus 1/16 inch
110 or as noted in the details.

111
112 The pavement temperature shall be measured in the presence of the Project Manager.
113 Measurement shall be made each day before commencing sawing and at any other time

114
115 during the day when the temperature appears to be moving out of the allowable sawing
116 range.

117
118 B. Sandblast Cleaning The concrete joint faces and pavement surfaces extending at least
119 1/2 inch from the joint edges shall be sandblasted clean. A multiple pass technique shall
120 be used until the surfaces are free of dust, direct curing compound, or any residue that
121 might prevent ready insertion or uniform contact of the seal and bonding of the
122 lubricant/adhesive to the concrete. After final cleaning and immediately prior to sealing,
123 the joints shall be blown out with compressed air and left completely free of debris and
124 water.

125
126 C. Waterblast Cleaning The concrete joint faces and pavement surfaces extending at least
127 1/2 inch from the joint edges shall be waterblasted clean. A multiple pass technique shall
128 be used until the surfaces are free of dust, direct, curing compound, or any residue that
129 might prevent ready insertion or uniform contact of the seal and bonding of the adhesive
130 to the concrete. After final cleaning and immediately prior to sealing, the joints shall be
131 blown out with compressed air and left completely free of debris and water. When
132 waterblast cleaning is used, slurry residue must be removed to provide a relatively dust
133 free concrete surface.

134
135 D. Rate of Progress The stages of joint preparation which includes sandblasting or
136 waterblasting of the joint faces and air pressure cleaning of the joints shall be limited to
137 only the linear footage of joint that can be sealed during the same workday.

138
139 4.03 TIME OF INSTALLATION Joints shall be sealed within 3 calendar days of sawing the joint seal
140 cavity and immediately following concrete cure and the final cleaning of the joint walls. Open
141 joints ready for sealing that cannot be sealed under the conditions specified herein shall be
142 provided with an approved temporary seal to prevent infiltration of foreign material. When rain
143 interrupts the sealing operations, the joints shall be washed, air pressure cleaned and allowed to
144 dry prior to installing the lubricant/adhesive and preformed seal.

145
146 4.04 CLEAN-UP Prior to Substantial Completion, all unused materials shall be removed from the site,
147 any adhesive on the pavement surface shall be removed, and the pavement shall be left in clean
148 condition.

149
150 4.05 WARRANTY The Manufacturer shall provide a warranty on the materials furnished for a
151 minimum of 5 years from the date of acceptance by the Project Manager. The Contractor shall
152 provide a warranty on the installation for a minimum of 5 years from the date of acceptance by the
153 Project Manager.

154
155
156 **PART 5 QUALITY CONTROL**

157
158 5.01 PROCEDURES Quality control provisions shall be provided during the joint cleaning process
159 to prevent or correct improper equipment and cleaning techniques that damage the concrete in
160 any manner. Cleaned joints shall be approved by the Project Manager prior to installation of the
161 adhesive and preformed joint seal.

162
163

164 5.02 PRODUCT The joint sealing system (preformed seal) shall be inspected for proper rate
165 of cure and bonding to the concrete, cuts, twists, nicks, and other deficiencies. Seals exhibiting
166 any defects, at any time prior to final acceptance of the project, shall be removed from the joint,
167 wasted, and replaced in a satisfactory manner.
168

169
170 **PART 6 METHOD OF MEASUREMENT**

171
172 6.01 Refer to Appendix A for Method of Measurement.
173

174
175 **PART 7 BASIS OF PAYMENT**

176
177
178 7.01 Refer to Appendix A for Basis of Payment
179

180
181 **PART 8 TESTING REQUIREMENTS**

182
183
184 ASTM D 6211 Test Strength of Conventional Vulcanized Rubber and Thermoplastic
185 Elastomers

186
187 ASTM D 3575 Suffix T Flexible Cellular Materials Made from Olefin Polymers

188
189 ASTM D 3575 Suffix S Flexible Cellular Materials Made from Olefin Polymers
190

191
END OF ITEM P-604A

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ITEM P-605

JOINT SEALING FILLER

PART 1 GENERAL

- 1.01 DESCRIPTION This item shall consist of providing and installing an approved non-sag silicone sealant material capable of effectively sealing joints in pavements.

PART 2 MATERIALS

- 2.01 JOINT SEALANTS, COLD APPLIED SEALANTS The joint sealing material shall be a Dow product or approved equal, Type NS (Non-Sag) and shall comply with the following specifications.

ASTM D 5893 Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

ASTM D 6690 Joint and Crack Sealants, Hot-Applied, for Concrete and Asphalt Pavements

The Contractor shall furnish Manufacturer's certified test results performed for each lot of sealant delivered to the job site. The Contractor must also furnish certifications by an independent testing laboratory that the material meets the requirements of the specifications.

Manufacturer shall provide product bulletins, material safety data sheets and other related data to indicate conformance to the aforementioned specification requirements.

The Contractor shall make arrangements for the Manufacturer's representative to meet with the Contractor and the City's Project Manager prior to the start of sealing operations to ensure the installation procedures are in accordance with the Manufacturer's direction. A representative of the joint sealant manufacturer shall visit the job-site a sufficient number of times during the sealing operations and after the sealing is completed to certify that the joint sealant was installed in accordance with the manufacturer's recommended methods and procedures. Adequate lighting must be provided during nighttime operations to ensure compliance with all applicable local, state and federal laws, rules and regulation. Also this lighting must be adequate to visually inspect the condition of the side walls of the joint prior to the installation of backer rod or joint sealant material.

- 2.02 BACKER ROD Backer rod materials shall be a non-moisture absorbing, closed-cell polyethylene foam rod that is compatible with the sealant material to act as a bond breaker and complies with the sealant manufacturer's recommendation. The backer rod shall be approximately 25 percent larger than the joint width to provide a tight seal that prevents the sealant from flowing to the bottom of the joint. -- *The Contractor shall stock several sizes of backer rod and shall use the appropriate size, as recommended by the manufacturer, or as directed by the Project Manager, to provide a tight seal.*

- 2.03 DELIVERY Each shipment of joint sealant shall be delivered to the job site in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, product name, batch or lot number, date of manufacture, shelf life, mixing instructions and storage instructions. Each shipment shall be accompanied by the manufacturer's certification stating that the joint sealant meets the requirements of this specification.

48 2.04 STORAGE The joint sealing material shall be stored out of weather and direct sunlight, in original,
49 tightly sealed containers at a temperature between 50° F and 100° F or per the manufacturer's
50 recommendations. The more stringent requirements shall apply.
51

52 **PART 3 EQUIPMENT**

53
54 3.01 GENERAL Equipment necessary for construction of this work shall be in first-class working
55 condition. The equipment shall be as recommended by the manufacturer of the joint sealant
56 material and shall be approved by the City's Project Manager prior to beginning work.
57

58 3.02 INSTALLATION EQUIPMENT The joint sealant equipment shall consist of apparatus capable of
59 extruding the material at a continuous feed. The extruding nozzle tip of the machine shall be
60 designed to fill the joint uniformly.
61

62 3.03 EQUIPMENT FOR CLEANING JOINTS The equipment for cleaning joint openings shall consist of
63 powered and hand brooms, air compressors, and sandblasters as required to produce a satisfactory
64 clean and dry joint.
65

66 3.04 AIR COMPRESSOR Air compressors shall be equipped with suitable traps capable of removing all
67 free water and oil from the compressed air and shall be capable of furnishing air with a pressure
68 greater than 100 psi.
69
70

71 **PART 4 CONSTRUCTION METHODS**

72
73 4.01 TIME OF APPLICATION In no case shall sealant be placed when surface temperatures are below
74 50°F, as measured from the bottom of the joint. Weather shall not be foggy or rainy at the time of
75 installation of the joint sealing material and joints shall be dry.
76

77 4.02 PREPARATION OF JOINTS Existing joints that are to be sealed or resealed shall first be widened
78 by saw cutting approximately 1/16" on each face and to a depth as shown on the details. The
79 Contractor shall use a system having two saw blades with a properly-sized spacer between them to
80 cut the joint to the specified width while sawing both faces of the joint simultaneously. The face of all
81 joints shall be uniform in width and depth along the full length of the joint. Finished joint dimensions
82 will correspond to that shown on the plans. The edges of all widened joints shall be chamfered as
83 shown on the plans.
84

85 The cut faces of the joints shall be thoroughly cleaned of all foreign materials, as may be required for
86 proper installation and bonding of the joint sealer or filler by sandblasting as required. The use of a
87 portable hand saws will not be permitted for cleaning of joint faces.
88

89 After completely drying, the joints shall be thoroughly cleaned by sandblasting. The sandblast nozzle
90 shall have only one opening, thus a pass will be required for each face to be cleaned.
91

92 After sandblasting, the joints shall be blown out using oil and moisture free air at a minimum of 100
93 psi and 150 cfm. Blowing out of the joint shall be accomplished by using a blow tube which will fit into
94 the joint.
95

96 All sand and debris shall be removed from the pavement by means of a power sweeper with
97 vacuum pickup prior to the sealing operation beginning.
98

99 After removal of all sand and debris, the joint shall be checked for any residual dust or coating. If
100 any is found the sandblasting and cleaning operations shall be repeated until the joint is cleaned.

101 The cleaned joint shall be sealed the same day as cleaned.

102
103 In the event that the open joints prepared for installation of joint sealing materials become
104 contaminated by traffic, or the result of weather conditions, they shall be re-cleaned as specified
105 above or as approved by the Project Manager at no additional cost to the Owner.

106
107 Prior to the placement of the sealant stop or sealant materials, the joints will be inspected for proper
108 width (utilizing a spacer gauge), depth, alignment and cleanliness and shall be approved by both the
109 Contractor's Quality Control Manager and the City's Quality Assurance Inspectors.

110
111 The backer rod shall be installed immediately after approval is granted by the Contractor's Quality
112 Control Manager and the City's Quality Assurance Inspectors. This backer rod shall be installed
113 utilizing a device which minimizes elongation and insures placement at the proper depth.

114
115
116 4.04 INSTALLATION OF SEALANTS Joint sealing compound shall be applied uniformly solid from
117 bottom to top, filling the joint space without the formation of voids. Equipment as recommended
118 by the sealant manufacturer and approved by the Project Manager will be utilized to force the
119 sealing material to the bottom of the joint and completely fill the joint without spilling the material
120 on the surface of the pavement. Any excess sealant on the pavement surface shall be removed
121 with the surface left in a clean condition acceptable to the Project Manager.

122
123 Sealant which does not bond to the concrete surface of the joint walls, contains voids, or fails to
124 set to a tack-free condition will be rejected and replaced by the Contractor at no additional cost.

125
126 4.05 FIELD TEST Before sealing the joints, the Contractor shall demonstrate that the equipment and
127 procedures for preparing, mixing, and placing the sealant will produce a satisfactory joint seal.
128 The demonstration shall include the preparation of at least two small batches and the application
129 of the resulting material in five joints of at least 25 feet in length each. A representative of the joint
130 sealant manufacturer shall be present at the demonstration to ensure that the installation
131 procedures are in accordance with the manufacturer's recommended installation instructions.

132
133 A. Testing For Cold Applied Silicone Sealants When checking for adhesions of silicone, a
134 pull test may be performed on the job site 21 days after the sealant has been placed.

135
136 (1) Make a knife cut horizontally across and through the silicone from one side of the
137 joint to the other.

138
139 (2) Make a vertical cut approximately 2-3 inches long on each side of the joint
140 starting at the horizontal cut, keeping the cuts the same length on each side.

141
142 (3) Hold the piece of silicone firmly and slowly pull at a 90° angle stretching the
143 silicone not more than 10" per minute as if trying to pull the adhered silicone out
144 of the joint.

145
146 (4) If adhesion is proper, the silicone will not pull out of the joint, but will eventually
147 tear cohesively across the joint at the base of the knife cut.

148
149 If the silicone releases from the joint, adhesion has been affected. Several possible
150 causes are:

151
152 (1) Moisture in the joint during sealant application

153

- 154 (2) Dirty of dusty joint sidewalls
155
156 (3) Improper application (overfilling, etc.)
157
158 (4) Spalling of the joint walls. (pieces of the concrete will be adhered to the silicone)
159
160 B. Repair of sealant in areas of adhesion test The silicone sealant may be replaced by
161 simply applying additional new silicone (normally using a tube of like silicone) in the same
162 manner as it was originally placed, providing good adhesion was achieved. Proper
163 preparation of the area should be performed prior to reapplying the silicone assuring the
164 original silicone and the newly applied silicone are in good contact with each other.
165
166 4.06 WARRANTY The manufacturer shall provide a warranty on the materials furnished for a
167 minimum of 5 years from the date of acceptance by the Project Manager. The Contractor shall
168 provide a warranty on the installation for a minimum of 2 years from the date of acceptance by the
169 Project Manager.
170

171
172 **PART 5 QUALITY CONTROL**
173

- 174 5.01 Pull test shall be the means of verifying both the adhesion and elongation requirements of this
175 Specification Section. Pull test shall be taken every 5,000 linear feet (LF) of sealant installed 21
176 days after placement of sealant in accordance with Manufacturer's recommendation and
177 witnessed by the Project Manager or his designated representative. Pull test must withstand 400%
178 elongation with no failure in adhesion and or material breakage. Any joint found to be
179 unacceptable per the specifications shall be removed and replaced at no cost to the City. All
180 sample areas shall be resealed by the Contractor in accordance with the joint preparation section.
181

182 **PART 6 METHOD OF MEASUREMENT**
183

- 184 6.01 Refer to Appendix A for Method of Measurement.
185
186

187 **PART 7 BASIS OF PAYMENT**
188

- 189 7.01 Refer to Appendix A for Basis of Payment..
190
191

192 **PART 8 TESTING REQUIREMENTS**
193

- 194 ASTM D412 Tests for Rubber Properties in Tension
195
196 ASTM D1644 Tests for Nonvolatile Content of Varnishes
197
198

199 **PART 9 MATERIAL REQUIREMENTS**
200

- 201 ASTM D2628 Preformed Polychloroprene Elastomeric Joint Seals for Concrete
202
203 ASTM D3405 Joint Sealants, Hot Poured, For Concrete and Asphalt Pavements
204
205

206 **END OF ITEM P-605**

ITEM P-610

STRUCTURAL PORTLAND CEMENT CONCRETE

PART 1 GENERAL

1.01 DESCRIPTION This item shall consist of reinforced structural portland cement concrete, prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans. All field-testing will be performed at the point of placement.

PART 2 MATERIALS

2.01 GENERAL Only approved materials, conforming to the requirements of these specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Project Manager before delivery or use is started. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be scored and handled to insure the preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed therein.

In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

Aggregates shall be tested for deleterious reactivity with alkalis in the cement which may cause excessive expansion of the concrete. Tests shall be made for each source of fine and coarse aggregate in accordance with ASTM C 1260 Potential Alkali Reactivity of Aggregates (Mortar bar Method). Acceptance of aggregates shall be based upon satisfactory evidence furnished by the aggregate producer that the aggregates do not produce expansion in excess of 0.10% as indicated by certified by test results performed by a laboratory that meets the requirements of ASTM C 1077. Additional evidence for acceptance of the aggregates shall include service records of concrete of comparable properties under similar conditions or exposure. If the aggregates have been used at DIA provide the project name, project number, mix design number, and present condition of the concrete. If the aggregates have not been previously used at DIA, provide a list of projects, project locations, clients, client contact information and present condition of the concrete.

2.02 COARSE AGGREGATE The coarse aggregate for concrete shall meet the requirements of ASTM C 33, Class 5S. Crushed stone aggregate shall have a durability factor meeting the criteria of ASTM C 33, Table 3 as determined by ASTM C 88.

Coarse aggregate shall be well graded from coarse to fine and shall meet one of the gradations shown in Table 1, using ASTM C 136.

2.03 FINE AGGREGATE The fine aggregate for concrete shall meet the requirements of ASTM C 33. The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of Table 2, when tested in accordance with ASTM C 136:

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 57

**TABLE 1
 GRADATION FOR COARSE AGGREGATE**

Sieve Designation (Square Openings)	Percentage by Weight Passing Sieves							
	2"	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8
No. 4 to 1/2 inch (Size No. 7) (See Note 1)	---	---	---	100	90-100	40-70	0-15	0-5
No. 4 to 3/4 inch (Size No. 67)	---	---	100	90-100	---	20-55	0-10	0-5
No. 4 to 1 inch (Size No. 57)	---	100	95-100	---	25-60	---	0-10	0-5
No. 4 to 1-1/2 inch (Size No. 467)	100	95-100	---	35-70	---	10-30	0-5	-----

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Note 1: The ASTM Size No. 7 aggregate may be used for repair of cement treated base course and shall not be used for any other mix.

**TABLE 2
 REQUIREMENTS FOR GRADATION OF FINE AGGREGATE**

Sieve Designation (Square Openings)	Percentage by Weight Passing Sieves
3/8 inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	5-30
No. 100	0-10

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Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, provided that such deficiency does not exceed 5 percent and is remedied by the addition of pozzolanic or cementitious materials other than portland cement, as specified in 2.06 on admixtures, in sufficient quantity to produce the required workability as approved by the Project Manager.

2.04 CEMENT Cement shall conform to the requirements of Type I-II Low Alkali for 1,200 psi and 3000 psi concrete and Type V, or equivalent, for 4000 psi concrete.

77 Type I/II cement may be substituted for Type V providing it meets the following
 78 requirements:

79			
80	• Magnesium Oxide (MgO), max, %	6.0	ASTM C 114
81	• Sulfur trioxide (SO ₃), ^A max, %	2.3	ASTM C 114
82	• Loss on Ignition, max, %	3.0	ASTM C 114
83	• Insoluble residue, max, %	0.75	ASTM C 114
84	• Equivalent alkalis (Na ₂ O + 0.658K ₂ O), max, %	0.60	ASTM
85	C 114		
86	• Air content of mortar, max volume, %	12	ASTM C 185
87	• Fineness ^B , specific surface, m ² /kg		
88	(alternative methods):		
89			
90	Turbidimeter test:		
91	average value, min	160	ASTM C 115
92	any one sample, min	150	ASTM C 115
93	or		
94	Air permeability test (Blain)		
95	average value, min	280	ASTM C 204
96	any one sample, min	260	ASTM C 204
97			
98	• Autoclave expansion, max, %	0.80	ASTM C 151
99	• Strength, not less than the values shown		
100	for the ages indicated as follows:		
101	Compressive strength, MPa (psi) @ 3 days	10.0 (1450)	ASTM C 109/ C 109M
102			
103	Compressive strength, MPa (psi) @ 7 days	17.0 (2470)	ASTM C 109/ C 109M
104			
105	Compressive strength, MPa (psi) @ 28 days	21.0 (3050)	ASTM C 109/ C 109M
106			
107	• Time of setting; Vicat test: ^C		
108	Time of setting, min, not less than	45	ASTM C 191
109	Time of setting, min, not more than	375	ASTM C 191
110	• Sulfate Resistance ^D , 14 days, max, %		
111	expansion	0.040	ASTM C 452

112
 113
 114 ^A If the (SO₃) requirement cannot be met, exceeding values will be acceptable provided it
 115 has been demonstrated by Test Method C 1038 that the cement with the increased SO₃
 116 will not develop expansion in water exceeding 0.020% at 14 days. Supporting test data
 117 must be provided.

118
 119 ^B The testing laboratory shall select the fineness method to be used. However, when the
 120 sample fails to meet the requirements of the air-permeability test, the Turbidimeter test
 121 shall be used, and the requirements for the turbidimetric method shall govern.

122
 123 ^C The time of setting is that described as initial setting time in Test Method C 191.

124
 125 ^D ASTM C 1012 "Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate
 126 Solution" test may be substituted for ASTM C 452 "Potential Expansion of Portland
 127 Cement Mortars Exposed to Sulfate" test. For acceptance of the C 1012 results
 128 expansion shall be less than 0.05% at 6 months or less than 0.1% at 1 year.

129
 130

- 131 The Contractor shall furnish vendors' certified test reports for each carload, or equivalent, of
132 cement shipped to the project. The report shall be delivered to the Project Manager before
133 permission to use the cement is granted. All such test reports shall be subject to verification by
134 testing sample materials received for use on the project.
135
- 136 2.05 WATER The water used in concrete shall be free from sewage, oil, acid, strong alkalis,
137 vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested in
138 accordance with AASHTO T 26.
139
- 140 2.06 ADMIXTURES The use of any material added to the concrete mix shall be approved by the
141 Project Manager. Before approval of any material, the Contractor shall be required to submit the
142 results of complete physical and chemical analyses made by an acceptable testing laboratory.
143 Subsequent tests shall be made of samples taken by the Project Manager from the supply of the
144 material being furnished or proposed for use on the work to determine whether the admixture is
145 uniform in quality with that approved. The Contractor shall be responsible for any adverse
146 chemical reactions caused by the use of different admixtures.
147
- 148 Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolons meeting the
149 requirements of ASTM C 618.
150
- 151 Air-entraining admixtures shall meet the requirements of ASTM C 260. Air- entraining admixtures
152 shall be added at the mixer in the amount necessary to produce the specified air content.
153
- 154 Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C 494, Type A,
155 water-reducing or Type D, water-reducing and retarding. Water- reducing admixtures shall be
156 added at the mixer separately from air-entraining admixtures in accordance with the
157 manufacturer's printed instructions.
158
- 159 2.07 TESTING LABORATORY The laboratory used to develop the mix design shall meet the
160 requirements of ASTM C 1077 including accreditation. Accreditation shall include all test
161 procedures required to develop the mix design. A certification signed by the manager of the
162 laboratory stating it meets these requirements shall be submitted to the Project Manager. The
163 certification shall contain as a minimum:
164
- 165 A. Qualifications of personnel; including the laboratory manager, supervising technician, and
166 testing technicians involved in developing the mix design.
167
- 168 B. Evidence of current accreditation by a nationally recognized laboratory accreditation
169 organization for all test methods used in developing the mix design.
170
- 171
- 172
- 173
- 174 2.08 MIX DESIGN SUBMITTALS The Contractor shall submit a mix design submittals including all the
175 proposed materials to the Project Manager for the Structural PCC at least thirty (30) days prior to
176 use. The mix design and materials will not be approved when the laboratory trial mix is older than
177 two (2) years and the Certificates of Compliance for the materials are the results from tests
178 performed more than one (1) year in the past.
179
- 180 A. Mix Design – Individual submittals shall be provided for each mix design and shall include:
181
- 182 a. The weights and sources of all ingredients including cement, fly ash, aggregates,
183 water, and admixtures.
184 b. The laboratory trial mix data:
185 • mix identification number

- 186 • date mix was developed
- 187 • developer of the mix
- 188 • water/cement ratio (w/c); include the theoretical and trial batch water/cement
- 189 ratios. Note: the trial batch water/cement ratio shall not be exceeded during
- 190 production.
- 191 • yield
- 192 • coarse aggregate gradation
- 193 • fine aggregate gradation
- 194 • fineness modulus of the fine aggregate
- 195 • consistency
- 196 • air content
- 197 • compressive strength; at least 2 specimens at 7 days and three specimens at 28
- 198 days
- 199

200 B. Fine Aggregate – Individual submittals shall be provided for each source of fine aggregate.
201 The submittal packages shall include the source of the fine aggregate and Certified Certificates of
202 Compliance including actual test results showing that the fine aggregate meets the requirements
203 of 2.01, 2.03, and Table 2. ASTM C 1260 test results and proof of accreditation under ASTM C
204 1077 of the laboratory performing the ASTM C 1260 tests shall also be included in the submittal.
205

206 C. Coarse Aggregate – Individual submittals shall be provided for each source of coarse
207 aggregate. The submittal packages shall include the source of the coarse aggregate and Certified
208 Certificates of Compliance including actual test results showing that the coarse aggregate meets
209 the requirements of 2.01, 2.02 and Table 1. ASTM C 1260 test results and proof of accreditation
210 under ASTM C 1077 of the laboratory performing the ASTM C 1260 tests shall also be included in
211 the submittal.
212

213 D. Cement – Individual submittals shall be provided for each source and each Type of cement.
214 The submittal packages shall include the source, type and Certified Certificates of Compliance
215 including actual test results showing that the cement meets the requirements of 2.04.
216
217

218 E. Fly Ash - Individual submittals shall be provided for each source of fly ash. The submittal
219 packages shall include the source, class and Certified Certificates of Compliance including actual
220 test results showing that the fly ash meets the requirements of ASTM C 618, Class F with
221 exception to the loss of ignition where the maximum shall be less than 6%, the Calcium Oxide
222 (CaO) content where the maximum shall be less than 13% and the total equivalent alkali content
223 where maximum shall be less than 1.5%.
224

225 F. Admixtures - Individual submittals shall be provided for each admixture including brand and/or
226 manufacturer, Certified Certificates of Compliance, the manufacturer's recommend procedures
227 for use and storage showing and that the admixtures meet the requirements of 2.06.
228

229 G. Testing Laboratory Qualifications – Individual submittals shall be provided for each laboratory
230 designing PCCP mixtures. All information required in 2.07 shall be provided.
231

232 2.09 PREMOLDED JOINT MATERIAL No premolded joint filler is allowed to remain in expansion
233 joints if it abuts P-501 pavement. In other areas that specify premolded joint filler the material
234 shall meet the requirements of ASTM D 1751 and as noted on Contract Drawings.
235

236 2.10 JOINT FILLER The filler for joints shall meet the requirements of Item P-605, unless otherwise
237 specified in the proposal.
238

- 239 2.11 STEEL REINFORCEMENT Reinforcing shall consist of bar mats conforming to the requirements
240 of ASTM A 184.
241
- 242 2.12 COVER MATERIALS FOR CURING Curing materials shall conform to one of the following
243 specifications:
244
- | | | |
|-----|---|--------------------|
| 245 | Waterproof paper for curing concrete | ASTM C 171 |
| 246 | Polyethylene Sheeting for Curing Concrete | ASTM C 171 |
| 247 | Liquid Membrane-Forming Compounds | |
| 248 | for Curing Concrete | ASTM C 309, Type 2 |
- 249
250

251 **PART 3 CONSTRUCTION METHODS**
252

- 253 3.01 GENERAL The Contractor shall furnish all labor, materials, and services necessary for, and
254 incidental to, the completion of all work as shown on the drawings and specified herein. All
255 machinery and equipment owned or controlled by the Contractor, which he proposes to use on the
256 work, shall be of sufficient size to meet the requirements of the work, and shall be such as to
257 produce satisfactory work; all work shall be subject to the inspection and approval of the Project
258 Manager.
259
- 260 3.02 CONCRETE COMPOSITION The concrete shall develop a compressive strength of:
261
- 262 A. 3000 psi for concrete encased lighting ducts and light cans under P-401 asphalt or P-501
263 concrete paving, within econcrete/CTB or ATPB, and elsewhere as noted in the plans
264 and specifications
 - 265 B. 4,000 psi for structural concrete and elsewhere as noted in the plans and specifications
 - 266 C. 1,200 psi at 7 days for repair of cement treated base course
- 267
268 in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in
269 accordance with ASTM C 39.
270
271 The 4000 PSI concrete shall contain not less than 470 pounds of cement per cubic yard.
272
273 All concrete shall contain 5-8 percent entrained air as determined by ASTM C 231 and slump shall
274 be in accordance with the approved mix design.
275
276 If the mix design slump is not listed as a range, the range in the following table will be applied:
277
278
279

MIX DESIGN SLUMP

	If 3 Inches or less	If more than 3 inches
Plus tolerance:	0 inches	0 inches
Minus tolerance:	1 ½ inches	2 ½ inches

280
281
282 **NOTE: IN ORDER TO OBTAIN THE MINIMUM SPECIFIED STRENGTH THE**
283 **MIX DESIGN STRENGTH SHOULD BE HIGH ENOUGH THAT ALL TESTS**
284 **EXCEED THE MINIMUM; NOT JUST THE AVERAGE OF THREE**
285 **CONSECUTIVE TESTS.**
286

287 For specific structures detailed on the plans the strength requirement will be as specified on the
288 plans for that specific detail. Submit a mix design in general conformance with this specification
289 meeting the strength required in the detail.
290

291
292 3.03 CONTRACTOR QUALITY CONTROL The Contractor's Independent Testing laboratory shall test
293 the first three truck loads of concrete placed each day for slump and air content until three
294 consecutive loads meet the project requirements. In addition, every fifth truck load placed
295 thereafter on that same day shall be tested for slump and air content. The Independent Testing
296 Agency shall meet the requirements of Section 01401 including ASTM C 1077 and have been
297 approved through the submittal process prior to performing testing.
298

299
300
301 3.04 ACCEPTANCE SAMPLING AND TESTING All concrete will be accepted on the basis of the
302 compressive strength specified in paragraph 3.02 The concrete shall be sampled at the point of
303 placement in accordance with ASTM C 172. The first load of concrete, per mix, delivered each
304 day will be sampled and tested.
305

306 Concrete placed for structures will be sampled and tested for each additional 50 cubic yards per
307 day with a minimum one test per structure. When a single load of concrete is used for more than
308 one structure, that load will be sampled and tested once.
309

310 Concrete placed for light cans will be sampled and tested for each additional 50 cubic yards per
311 day.
312

313 Lean concrete will be sampled and tested for each additional 50 cubic yards per day
314

315
316
317 Concrete cylindrical test specimens shall be made in accordance with ASTM C 31 and tested in
318 accordance with ASTM C 39. Concrete strengths for acceptance shall be the average of at least
319 two 6 by 12 inch or at least three 4 by 8 inch cylinders tested at 28 days. Contractor shall provide
320 the initial on-site storage facilities for the specimens. The on-site storage facilities shall be
321 capable of maintaining a temperature range of 60 to 80°F (16 to 27°C). The Project Manager's
322 Quality Assurance Laboratory will make the actual tests on the specimens at no expense to the
323 Contractor.
324

325 3.05 PROPORTIONING AND MEASURING DEVICES When package cement is used, the quantity
326 for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be
327 measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact
328 amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or
329 hoppers shall be approved by the Project Manager and shall provide means of regulating the flow
330 of aggregates into the batch box so that the required and exact weight of aggregates can be
331 readily obtained.
332

333 3.06 BATCH TICKETS A sample copy of the proposed batch ticket shall be submitted to the Project
334 Manager for approval. Two copies of the batch ticket shall also be provided to the Project
335 Manager or his representative for each batch of concrete prior to unloading at the site. Concrete
336 delivered without a batch ticket containing complete information as specified shall be rejected.
337 The Contractor shall collect and complete the batch ticket at the placement site and deliver all
338 batch tickets to the Project Manager's representative on a daily basis. The Project Manager shall
339 have access to the batch tickets at any time during the placement. The following information shall
340 be provided on each batch ticket:
341

- 342 1. Supplier's name and date
343 2. Truck number
344 3. Project number and location
345 4. Concrete class designation and item number
346 5. Cubic yards batched
347 6. Time batched
348 7. Mix design number
349 8. Type, brand, and amount of each admixture
350 9. Type, brand, and amount of cement and fly ash
351 10. Weights of fine and coarse aggregate
352 11. Moisture of fine and coarse aggregate
353 12. Gallons of batch water (including ice)
354 13. Water cement ration
355 14. Amount of water that can be added to the load prior to placement
356

357 The Contractor shall add the following information to the batch ticket at the placement site:
358

- 359 15. Gallons of water added by truck operator plus quantity of concrete in each truck
360 each time water is added.
361 16. Number of revolutions of drum at mixing speed (for truck mixed concrete)
362 17. Discharge time
363 18. Location of batch in placement.
364

365 3.07 CONSISTENCY The consistency of the concrete shall meet the requirements of 3.02 and shall
366 be checked by the slump test specified in ASTM C 143.
367

368 3.08 MIXING Concrete may be mixed at the construction site, at a central point, or wholly or in part in
369 truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of
370 ASTM C 94.
371

372 3.09 MIXING CONDITIONS The concrete shall be mixed only in quantities required for immediate
373 use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without
374 permission of the Project Manager. If permission is granted for mixing under such conditions,
375 aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature
376 not less than 50°F (10°C) nor more than 90°F (32°C). The Contractor shall be held responsible
377 for any defective work, resulting from freezing or injury in any manner during placing and curing,
378 and shall replace such work at his/her expense.
379

380 If the slump or air content of the load is below the specified amount at the time of arrival, the load
381 can be adjusted prior to placement at the approval of the Contractor's Superintendent or
382 authorized agent. Additional mixing shall be required as specified in ASTM C 94. Once
383 placement has begun, no further adjustment shall be made. When additional water is added to
384 the load the design water cement ratio shall not be exceeded. The amount of water that can be
385 added to the load shall also be included on the batch ticket. Retempering of concrete by adding
386 water or any other material shall not be permitted.
387

388 The delivery of concrete to the job shall be in such a manner that batches of concrete will be
389 deposited at uninterrupted intervals after placement has begun.
390

391 3.10 FORMS Concrete shall not be placed until all the forms and reinforcements have been inspected
392 and approved by the Project Manager. Forms shall be of suitable material and shall be of the
393 type, size, shape, quality, and strength to build the structure as designed on the plans. The forms
394 shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent
395 displacement and sagging between supports. The Contractor shall bear responsibility for their

396 adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and
397 holes.

398
399 The internal ties shall be arranged so that, when the forms are removed, no metal will show in the
400 concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted
401 with water or with a nonstaining mineral oil which shall be applied shortly before the concrete is
402 placed. Forms shall be constructed so that they can be removed without injuring the concrete or
403 concrete surface. The forms shall not be removed before the expiration of at least 30 hours from
404 vertical faces, walls, slender columns, and similar structures; forms supported by falsework under
405 slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate
406 that at least 60 percent of the design strength of the concrete has developed.

407
408 3.11 PLACING REINFORCEMENT All reinforcement shall be accurately placed, as shown on the
409 plans, and shall be firmly held in position during concreting. Bars shall be fastened together at
410 intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings,
411 lists, and bending details shall be supplied by the Contractor when required.

412
413 3.12 EMBEDDED ITEMS Before placing concrete, any items that are to be embedded shall be firmly
414 and securely fastened in place as indicated. All such items shall be clean and free from coating,
415 rust, scale, oil, or any foreign matter. The embedding of wood shall not be permitted. The
416 concrete shall be spaded and vibrated around and against embedded items.

417
418 3.13 PLACING CONCRETE All concrete shall be placed during daylight, unless otherwise approved.
419 The concrete shall not be placed until the depth and character of foundation, the adequacy of
420 forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall
421 be placed as soon as practical after mixing and in no case later than 90 minutes after water has
422 been added to the mix. The method and manner of placing shall be such to avoid segregation
423 and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in
424 placing concrete when necessary. Dropping the concrete a distance of more than 5 feet, or
425 depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon
426 clean, damp surfaces, free from running water, or upon properly consolidated soil.

427
428 The concrete shall be compacted with suitable mechanical vibrators operating within the
429 concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools
430 to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the
431 concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles
432 of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction
433 but shall not be prolonged to the point where segregation occurs. Concrete deposited under
434 water shall be carefully placed in a compact mass in its final position by means of a tremie, a
435 closed bottom dump bucket, or other approved method and shall not be disturbed after being
436 deposited.

437
438 3.14 CONTRACTION JOINTS. Contraction joints shall be installed at the locations and spacing as
439 shown on the plans. Contraction joints shall be installed to the dimensions required by forming a
440 groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the
441 concrete surface after the concrete has hardened. When the groove is formed in plastic concrete
442 the sides of the grooves shall be finished even and smooth with an edging tool. If an insert
443 material is used, the installation and edge finish shall be according to the manufacturer's
444 instructions. The groove shall be finished or cut clean so that spalling will be avoided at
445 intersections with other joints. Grooving or sawing shall produce a slot at least 1/8 inch (3 mm)
446 wide and to the depth shown on the plans.

447
448 3.15 CONSTRUCTION JOINTS When the placing of concrete is suspended, necessary provisions
449 shall be made for joining future work before the placed concrete takes its initial set. For the
450 proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys,

- 451 dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so
452 that a section begun on any day shall be finished during daylight of the same day. Before
453 depositing new concrete on or against concrete which has hardened, the surface of the hardened
454 concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a
455 neat coating of cement paste or grout.
456
- 457 3.16 EXPANSION JOINTS Expansion joints shall be constructed at such points and of such
458 dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same
459 shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of
460 the concrete already in place in such manner that it will not be displaced when concrete is
461 deposited against it.
462
- 463 3.17 DEFECTIVE WORK Any defective work disclosed after the forms have been removed shall be
464 immediately removed and replaced. If any dimensions are deficient, or if the surface of the
465 concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Project Manager
466 cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense
467 of the Contractor.
468
- 469 3.18 SURFACE FINISH All exposed concrete surfaces shall be true, smooth, free from open or rough
470 spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought
471 flush with the finished top surface at the proper elevation and shall be struck-off with a
472 straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or
473 sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.
474
- 475 When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be
476 removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed
477 with a wooden float until all irregularities are removed. If the concrete has hardened before being
478 rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing
479 can be done with a rubbing machine.
480
- 481 3.19 CURING AND PROTECTION All concrete shall be properly cured and protected by the
482 Contractor. The work shall be protected from the elements, flowing water, and from defacement
483 of any nature during the building operations. The concrete shall be cured as soon as it has
484 sufficiently hardened by covering with an approved material. Water-absorptive coverings shall be
485 thoroughly saturated when placed and kept saturated for a period of at least 3 days. All curing
486 mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered
487 and to prevent the surface from being exposed to currents of air. Where wooden forms are used,
488 they shall be kept wet at all times until removed to prevent the opening of joints and drying out of
489 the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has
490 been placed.
491
- 492 3.20 DRAINS OR DUCTS Drainage pipes, conduits, and ducts that are to be encased in concrete
493 shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so
494 that it will not be displaced or moved during the placing of the concrete.
495
- 496 3.21 COLD WEATHER PROTECTION When concrete is placed at temperatures below 40°F (4°C),
497 the Contractor shall provide satisfactory methods and means to protect the mix from injury by
498 freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at
499 temperatures between 50°F and 100°F (10°C and 38°C). All cold weather protection shall be in
500 accordance with ACI 306.
501
- 502 3.22 FILLING JOINTS All joints which require filling shall be thoroughly cleaned, and any excess
503 mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after
504 final curing and shall be done only when the concrete is completely dry. The cleaning and filling

505 shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free
506 from excess filler.
507

508
509 **PART 4 METHOD OF MEASUREMENT**
510

511 4.01 Refer to Appendix A for Method of Measurement
512

513
514 **PART 5 BASIS OF PAYMENT**
515

516 5.01 Refer to Appendix A for Basis of Payment
517

518
519 **PART 6 TESTING REQUIREMENTS**
520

521 ASTM C 31 Making and Curing Test Specimens in the Field
522
523 ASTM C 39 Compressive Strength of Cylindrical Concrete Specimens
524
525 ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
526
527 ASTM C 136 Sieve Analysis of Fine and Coarse Aggregate
528
529 ASTM C 138 Unit Weight, Yield, and Air Content of Concrete
530
531 ASTM C 143 Slump of Hydraulic Cement Concrete
532
533 ASTM C 172 Practice for Sampling Freshly Mixed Concrete.
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535
536 ASTM C 231 Air Content of Freshly Mixed Concrete by the Pressure Method
537
538 ASTM C 1260 Potential Alkali Reactivity of Aggregates (Mortar Bar Method).
539

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541
542 **PART 7 MATERIAL REQUIREMENTS**
543

544 ASTM A 184 Specification for Fabricated Deformed Steel Bar or Rod Mats for Concrete
545 Reinforcement
546
547 ASTM A 185 Steel Welded Wire Fabric Plain for Concrete Reinforcement
548
549 ASTM A 497 Specification for Welded Deformed Steel Wire Fabric for Concrete
550 Reinforcement
551
552 ASTM A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
553
554 ASTM C 33 Concrete Aggregates
555
556 ASTM C 94 Ready-Mixed Concrete
557
558 ASTM C 150 Portland Cement
559
560 ASTM C 171 Sheet Materials for Curing Concrete
561

562	ASTM C 260	Air-Entraining Admixtures for Concrete
563		
564	ASTM C 309	Liquid Membrane-Forming Compounds for Curing Concrete
565		
566	ASTM C 494	Chemical Admixtures for Concrete.
567		
568	ASTM C 595	Blended Hydraulic Cements
569		
570	ASTM C 618	Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
571		
572		
573	ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
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576	ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
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579	AASHTO T 26	Quality of Water to be used in Concrete.
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581	ACI 305	Hot Weather Concreting
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583	ACI 306	Cold Weather Concreting
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END OF ITEM P-610

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ITEM P-620

RUNWAY AND TAXIWAY PAINTING AND SIGNAGE

PART 1 GENERAL

1.01 DESCRIPTION This item shall consist of the painting of numbers, markings, and stripes on the surface of runways and taxiways applied in accordance with these specifications and at the locations shown on the plans, or as directed by the Project Manager.

PART 2 MATERIALS

2.01 MATERIALS ACCEPTANCE The Contractor shall furnish manufacturer's certified test reports for the 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 Project Manager may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Project Manager upon arrival of a shipment of materials to the site.

2.02 PAINT Paint shall be Waterborne meeting the requirements of Federal Specification TT-P-1952 or Solvent Based meeting the requirements of Federal Specification TT-P-85 or TT-P-110. Paint shall be furnished in White - 37925, Yellow - 33538 or 33655, and Black - 37038 in accordance with Federal Standard No. 595. Paint shall be furnished in Type I – Standard Drying time for no-pick-up when tested in accordance with ASTM D 711. Preformed Thermoplastic Airport Pavement Markings shall meet the requirements of Section 2.02.A below.

A. PREFORMED THERMOPLASTIC AIRPORT PAVEMENT MARKINGS Markings must be composed of ester modified resins in conjunction with aggregates, pigments, and binders that have been factory produced as a finished product. The material must be impervious to degradation by aviation fuels, motor fuels, and lubricants.

(1) The markings must be able to be applied in temperatures down to 35°F without any special storage, preheating, or treatment of the material before application.

(2) Graded Glass Beads.

(a) The material must contain a minimum of thirty percent (30%) intermixed graded glass beads by weight. The intermixed beads shall conform to Federal Specification. TT-B-1325D, Type III.

(b) The material must have factory applied coated surface beads in addition to the intermixed beads at a rate of 1 lb. (\pm 10%) per 10 sq. ft. These factory applied coated surface beads shall have a minimum of 90% true spheres, minimum refractive index of 1.50, and meet the following gradation.

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Size Gradation		Retained, %	Passing, %
US Mesh	µm		
12	1700	0 - 2%	98 - 100%
14	1400	0 - 3.5%	96.5 - 100%
16	1180	2 - 25%	75 - 98%
18	1000	28 - 63%	37 - 72%
20	850	63 - 72%	28 - 37%
30	600	67 - 77%	23 - 33%
50	300	89 - 95%	5 - 11%
80	200	97 - 100%	0 - 3%

- (3) Heating Indicators. The top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. These indents shall act as a visual cue during application that the material has reached a molten state so satisfactory adhesion and proper bead embedment has been achieved and a post-application visual cue that the installation procedures have been followed.
- (4) Pigments. Percent by weight.
 - (a) White: Titanium Dioxide, ASTM D 476, type II shall be 10 percent minimum by weight.
 - (b) Yellow and Colors: Titanium Dioxide, ASTM D 476, type II shall be 1 percent minimum by weight. Organic yellow, other colors, and tinting as required to meet color standard.
- (5) Prohibited Materials. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.
- (6) Daylight Directional Reflectance.
 - (a) White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN, Method 6121.
 - (b) Yellow: The daylight directional reflectance of the yellow paint shall not be less than 45 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

x	.462	x	.470	x	.479	x	.501
y	.438	y	.455	y	.428	y	.452
- (7) Skid Resistance. The surface, with properly applied and embedded surface beads, must provide a minimum resistance value of 45 BPN when tested according to ASTM E303.

- 102 (8) Thickness. The material must be supplied at a nominal thickness of 65 mils (1.7
103 mm).
- 104
- 105 (9) Environmental Resistance. The material must be resistant to deterioration due to
106 exposure to sunlight, water, salt, or adverse weather conditions and impervious to
107 aviation fuels, gasoline, and oil.
- 108
- 109 (10) Retroreflectivity. The material, when applied in accordance with manufacturer's
110 guidelines, must demonstrate a uniform level of nighttime retroreflection when tested
111 in accordance to ASTM E1710.
- 112
- 113 (11) Packaging. A protective film around the box must be applied in order to protect the
114 material from rain or premature aging.
- 115
- 116 (12) Manufacturing Control and ISO Certification. The manufacturer must be ISO
117 9001:2000 certified and provide proof of current certification. The scope of the
118 certification shall include manufacture of reflective markings.
- 119
- 120 (a) The markings must be a resilient thermoplastic product with uniformly distributed
121 glass beads throughout the entire cross-sectional area. The markings must be
122 resistant to the detrimental effects of aviation fuels, motor fuels and lubricants,
123 hydraulic fluids, de-icers, anti-icers, protective coatings, etc. Lines, legends, and
124 symbols must be capable of being affixed to bituminous and/or Portland cement
125 concrete pavements by the use of a large radiant heater. Colors shall be
126 available as required.
- 127
- 128 (b) The markings must be capable of conforming to pavement contours, breaks, and
129 faults through the action of airport traffic at normal pavement temperatures. The
130 markings must be capable of fully conforming to grooved pavements, including
131 pavement grooving per FAA AC 150/5320-12, current version. The markings
132 shall have resealing characteristics, such that it is capable of fusing with itself and
133 previously applied thermoplastics when heated with a heat source per
134 manufacturer's recommendation.
- 135
- 136 (c) Multicolored markings must consist of interconnected individual pieces of
137 preformed thermoplastic pavement marking material, which through a variety of
138 colors and patterns, make up the desired design. The individual pieces in each
139 large marking segment (typically more than 20 ft. long) must be factory
140 assembled with a compatible material and interconnected so that in the field it is
141 not necessary to assemble the individual pieces within a marking segment.
142 Obtaining multicolored effect by overlaying materials of different colors is not
143 acceptable due to resulting inconsistent marking thickness and inconsistent
144 application temperature in the marking/substrate interface.
- 145
- 146 (d) The marking material must set up rapidly, permitting the access route to be re-
147 opened to traffic a maximum of 15 minutes after application.
- 148
- 149 (e) The marking material shall have an integral color throughout the thickness of the
150 marking material.
- 151
- 152 (13) Warranty: The Manufacturer shall provide a warranty on the materials furnished for
153 a minimum of 3 years from the date of substantial completion by the Project
154 Manager. The Contractor shall provide a warranty on the installation for a

155 minimum of 3 years from the date of substantial completion by the Project
156 Manager.

157
158 2.03 REFLECTIVE MEDIA Glass beads shall meet the requirements of Fed. Spec. TT-B-1325, Type
159 III. Glass beads shall be treated with adhesion promoting and/or flotation coatings as specified by
160 the manufacturer of the paint. Glass beads shall not be applied to black paint.

161
162
163 **PART 3 CONSTRUCTION METHODS**
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165 3.01 WEATHER LIMITATIONS The painting shall be performed only when the surface is dry, when
166 the atmospheric temperature is above 45 degrees F (7 degrees C), and when the weather is not
167 foggy or windy. Markings will not be applied when the pavement temperature is greater than 120
168 degrees F.

169
170 3.02 EQUIPMENT All equipment for the work shall be approved by the Project Manager and shall
171 include the apparatus necessary to properly clean the existing surface, a mechanical marking
172 machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be
173 necessary to satisfactorily complete the job.

174
175 The mechanical marker shall be an atomizing spray-type marking machine suitable for application
176 of traffic paint. It shall produce an even and uniform film thickness at the required coverage and
177 shall be designed so as to apply markings of uniform cross sections and clear-cut edges without
178 running or spattering and without over spray.

179
180 3.03 PREPARATION OF SURFACE. Immediately before application of the paint, the surface shall be
181 dry and free from dirt, grease, oil, laitance, or other foreign material which would reduce the bond
182 between the paint and the pavement. The area to be painted shall be cleaned by sweeping and
183 blowing or by other methods as required to remove all dirt, laitance, and loose materials.

184
185 Paint shall not be applied to portland cement concrete pavement until the concrete in the areas to
186 be painted is clean of curing material. Sandblasting or high pressure water shall be used to
187 remove curing material from concrete surfaces.

188
189 3.04 LAYOUT OF MARKINGS. On those sections of pavement where no previously applied markings
190 are available to serve as a guide, the proposed markings shall be laid out in advance of the paint
191 application.

192
193 The Contractor shall provide an experienced technician to supervise the location, alignment,
194 layout, dimensions, and application of all paint marking.

195
196 3.05 APPLICATION. Markings shall be applied at the locations and to the dimensions and spacing
197 shown on the plans. Paint, except black, shall have glass beads applied at the rate of 7
198 pounds/gallon as indicated on the plans. Paint shall not be applied until the layout and condition
199 of the surface have been approved by the Project Manager.

200
201 The paint shall be mixed in accordance with the manufacturer's instructions and applied to the
202 pavement with a marking machine in the range of 15 mil thickness so as to properly embed the
203 glass beads. The addition of thinner will not be permitted. A period of 30 days shall elapse
204 between placement of a bituminous surface course or seal coat and application of the paint. If the
205 pavement requires marking prior to the recommended waiting period, the paint may be applied in
206 two applications. The first application may be applied immediately with the second application
207 occurring after the appropriate waiting period. The two applications should be applied at fifty
208 percent of the specified coverage.

209
210 The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50
211 feet (15 m), and the dimensions shall be within a tolerance of plus or minus 5 percent.
212

213 Glass beads, where required, shall be distributed upon the markings immediately after application
214 of the paint. A dispenser shall be furnished which is properly designed for attachment to the
215 marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the
216 rate of 10 pounds/gallon. Glass beads shall not be applied to black paint. Glass beads shall
217 adhere to the cured paint or all marking operations shall cease until corrections are made.
218

219 3.06 APPLICATION – PREFORMED AIRPORT PAVEMENT MARKINGS. To ensure minimum single-
220 pass application time and optimum bond in the marking/substrate interface, the materials must be
221 applied using a variable speed self-propelled mobile heater with an effective heating width of no
222 less than 16 feet (4.88 m) and a free span between supporting wheels of no less than 18 feet
223 (5.49 m). The heater must emit thermal radiation to the marking material in such a manner that
224 the difference in temperature of 2 inch (5.08 cm) wide linear segments in the direction of heater
225 travel must be within 5 percent of the overall average temperature of the heated thermoplastic
226 material as it exits the heater. The material must be able to be applied at ambient and pavement
227 temperatures down to 35°F (2°C) without any preheating of the pavement to a specific
228 temperature. The material must be able to be applied without the use of a thermometer. The
229 pavement shall be clean, dry, and free of debris. A non-VOC sealer with a maximum applied
230 viscosity of 250 centi-Poise (ASTM D 2393) must be applied to the pavement shortly before the
231 markings are applied. The supplier must enclose application instructions with each box/package.
232

233 3.07 PROTECTION After application of the paint, all markings shall be protected from damage until
234 the paint is dry. All surfaces shall be protected from disfiguration by spatter, splashes, spillage, or
235 drippings of paint.
236

237
238 **PART 4 METHOD OF MEASUREMENT**

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240 4.01 Refer to Appendix A for Method of Measurement.
241

242 **PART 5 BASIS OF PAYMENT**

243
244 5.01 Refer to Appendix A for Basis of Payment.
245

246 **PART 6 TESTING REQUIREMENTS**

247		
248	ASTM C-146	Chemical Analysis of Glass Sand
249		
250	ASTM D 711	No-Pick-Up Time of Traffic Paint
251		
252	ASTM E 303	Measuring Surface Frictional Properties Using the British Pendulum
253		Tester
254		
255	ASTM E 1710	Measurement of Retroreflective Pavement Marking Materials with CEN-
256		Prescribed Geometry Using a Portable Retroreflectometer
257		
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259	Federal Test Method	Paint, Varnish, Lacquer and Related Materials; Methods of
260	Standard No. 141	Inspection, Sampling and Testing
261		
262		

263 **PART 7 MATERIAL REQUIREMENTS**

264		
265	ASTM D 476	Specifications for Dry Pigmentary Titanium Dioxide Pigments Products
266		
267	Code of Federal	29 CFR Part 1910.1200 – Hazard Communications
268	Regulations	
269		
270	Fed. Spec. TT-B-1325	Beads (Glass Spheres) Retroreflective
271		
272	Fed. Spec. TT-P-85	Paint, Traffic and Airfield Marking, Solvent Base
273		
274	Fed. Spec. TT-P-110	Paint, Traffic Black (Nonreflectorized)
275		
276	Fed. Spec. TT-P-1952	Paint, Traffic and Airfield Marking, Waterborne
277		
278	Federal Standard 595	Colors used in Government Procurement
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281		

END OF ITEM P-620

ITEM D-751

MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES

PART 1 GENERAL

- 1.01 DESCRIPTION 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 Project Manager.

PART 2 MATERIALS

- 2.01 MORTAR Mortar shall consist of one part portland cement and two parts sand. The portland cement shall conform to the requirements of ASTM C 150, Type V, or equivalent. The sand shall conform to the requirements of ASTM C 144.

- 2.02 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-610-3.02 B, minimum of 4000 psi.

- 2.03 PRECAST CONCRETE PIPE MANHOLE RINGS Precast concrete pipe manhole rings shall conform to the requirements of ASTM C 478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches (90 cm) nor more than 48 inches (120 cm).

- 2.04 FRAMES, COVERS, AND GRATES The castings shall conform to one of the following requirements:

- A. Gray iron castings shall meet the requirements of ASTM A 48, Class 30B and 35B.
- B. Malleable iron castings shall meet the requirements of ASTM A 47.
- C. Steel castings shall meet the requirements of ASTM A 27.
- D. Structural steel for grates and frames shall conform to the requirements of ASTM A 283, Grade D.
- E. Ductile iron castings shall conform to the requirements of ASTM A 536.
- F. Austempered ductile iron castings shall conform to the requirements of ASTM A897.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings 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 A 123.

- 2.05 STEPS The steps or ladder bars shall be gray or malleable cast iron, galvanized steel or steel reinforced co-polymer polypropylene. 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.

58 2.06 REINFORCING STEEL All reinforcing steel shall conform to ASTM A-615, grade 60.
59
60

61 **PART 3 CONSTRUCTION METHODS**
62

63 3.01 UNCLASSIFIED EXCAVATION
64

65 A. The Contractor shall do all excavation for structures and structure footings to the lines and
66 grades or elevations, shown on the plans, or as staked by the Project Manager. The
67 excavation shall be of sufficient size to permit the placing of the full width and length of the
68 structure or structure footings shown. The elevations of the bottoms of footings, as shown
69 on the plans, shall be considered as approximately only; and the Project Manager may
70 order, in writing, changes in dimensions or elevations of footings necessary to secure a
71 satisfactory foundation.
72

73 B. Boulders, logs, or any other objectionable material encountered in excavation shall be
74 removed. All rock or other hard foundation material shall be cleaned of all loose material
75 and cut to a firm surface either level, stepped, or serrated, as directed by the Project
76 Manager. All seams or crevices shall be cleaned out and grouted. All loose and
77 disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface
78 other than rock, special care shall be taken not to disturb the bottom of the excavation, and
79 excavation to final grade shall not be made until just before the concrete or reinforcing is to
80 be placed.
81

82 C. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and
83 protect the excavation and the structure as required for safety or conformance to governing
84 laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the
85 structure.
86

87 D. Unless otherwise provided, bracing, sheathing, or shoring involved in the construction of this
88 item shall be removed by the Contractor after the completion of the structure. Removal shall
89 be effected in a manner which will not disturb or mar finished masonry. The cost of removal
90 shall be included in the unit price bid for the structure.
91

92 E. After each excavation is completed, the Contractor shall notify the Project Manager to that
93 effect; and concrete or reinforcing steel shall be placed after the Project Manager has
94 approved the depth of the excavation and the character of the foundation material.
95

96 3.02 CONCRETE STRUCTURES Concrete structures shall be built on prepared foundations,
97 conforming to the dimensions and form indicated on the plans. When claystone (undisturbed
98 natural or fill) is encountered in the base of the excavation within paved areas as determined by the
99 Project Manager, the material shall be over-excavated to a depth of 3 feet below and 3 feet beyond
100 the sides of the base of the structure. The over-excavation shall be replaced with Select
101 Embankment material meeting the requirements for the lower 4.5 feet as specified in Item P-152,
102 2.03. The Select Embankment material shall be placed in 8 inch thick loose lifts, moisture
103 conditioned and compacted to the requirements of Item P-152, 3.05 and tested in accordance with
104 Item P-152, 6.01, 3. (c). The construction shall conform to the requirements specified in Item
105 P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved
106 by the Project Manager before the concrete is poured.
107

108 All invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and
109 cause minimum resistance to flowing water. The interior bottom shall be sloped downward toward
110 the outlet.
111

112 3.03 PRECAST CONCRETE PIPE STRUCTURES Precast concrete pipe structures shall be
113 constructed on prepared, or previously placed slab, foundations and shall conform to the dimensions
114 and locations shown on the plans. All precast concrete pipe sections necessary to build a completed

115 structure shall be furnished by the Contractor. The different sections shall fit together readily, and all
116 jointing and connections shall be cemented with mortar. The top of the upper precast concrete pipe
117 member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or
118 other cap, as required. Provision shall be made for any connections for lateral pipe, including drops
119 and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause
120 minimum resistance to flow. The steps which are embedded or built into the side walls shall be
121 aligned and placed at vertical intervals of 12 inches (300 mm). When a ladder replaces the steps, it
122 shall be securely fastened into position.
123

124 When required by the Project Manager, the precast manufacturer shall provide detailed structural
125 analysis of the structure being provided that considers the live and dead loads exposed to the
126 structure. The analysis shall be signed and sealed by an engineer registered in the state of
127 installation normally performing structural engineering.
128

129 3.04 INLET AND OUTLET PIPES Inlet and outlet pipes shall extend through the walls of the structures
130 for a sufficient distance beyond the outside surface to allow for connections but shall be cut off flush
131 with the wall on the inside surface, unless otherwise directed. For concrete structures, mortar shall
132 be placed around these pipes so as to form a tight, neat connection.
133

134 3.05 PLACEMENT AND TREATMENT OF CASTINGS, FRAMES, AND FITTINGS All castings, frames,
135 and fittings shall be placed in the positions indicated on the plans or as directed by the Project
136 Manager, and shall be set true to line and to correct elevation. Extra precautions shall be taken
137 during the frame installation to avoid racking so that grates fit properly into the framework to avoid
138 point loading. Grates must be securely bolted to frames prior to concrete placement. If frames or
139 fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position
140 before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete
141 has set.
142

143 After the frames or fittings have been set in final position and the concrete has been allowed to
144 harden for 7 days, then the grates or covers shall be placed and fastened down. The grates or
145 covers shall be set in such a manner that full bearing on the concrete is achieved. Shims or other
146 single point bearing devices shall be removed.
147

148 3.6 INSTALLATION OF STEPS The steps shall be installed as indicated on the plans or as directed by
149 the Project Manager. When the steps are to be set in concrete, they shall be placed and secured in
150 position before the concrete is poured. The steps shall not be disturbed or used until the concrete
151 has hardened for at least 7 days. After this period has elapsed, the steps shall be cleaned and
152 painted, unless they have been galvanized or co-polymer steps are used, in which case the co-
153 polymer steps are to be cleaned only.
154

155 When steps are required with precast concrete pipe structures, they shall be cast into the sides of
156 the pipe at the time the pipe sections are manufactured or set in place after the structure is erected
157 by drilling holes in the concrete and cementing the steps in place.
158

159 In lieu of steps, prefabricated ladders may be installed. The ladder shall be held in place by grouting
160 the supports in drilled holes.
161

162 3.07 BACKFILLING
163

164 A. After a structure has been completed, the area around it shall be filled with approved
165 material, in horizontal layers not to exceed 8 inches (200 mm) in loose depth, and
166 compacted to the density required in Item P-152. Each layer shall be deposited all around
167 the structure to approximately the same elevation. The top of the fill shall meet the elevation
168 shown on the plans or as directed by the Project Manager.
169

170 B. Backfill shall not be placed against any structure until 75% of the design strength has been
171 obtained.

172
173 C. Backfill shall not be measured for direct payment. Performance of this work shall be
174 considered as a subsidiary obligation of the Contractor covered under the contract unit price
175 for the structure involved.
176

177 3.08 CLEANING AND RESTORATION OF SITE After the backfill is completed, the Contractor shall
178 dispose of all surplus material, dirt, and rubbish from the site to the satisfaction of the Project
179 Manager. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Project
180 Manager. The Contractor shall restore all disturbed areas to their original condition.
181

182 After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire
183 site free, clear, and in good condition.
184

185
186 **PART 4 QUALITY ASSURANCE/QUALITY CONTROL**
187

188 4.01 Quality Assurance/Quality Control
189

190 A. Qualifications. The Contractor shall meet the same qualifications for precast pipe structures
191 as are identified in Item D-701 and shall impose all qualifications on its pipe manufacturer.
192

193 Should the Contractor elect to cast-in-place junction structures, the Contractor shall be able
194 to demonstrate experience with similar structures.
195

196 B. Tests. Tests for precast concrete pipe structures (including pipe joints) shall have imposed
197 the same tests as for precast pipe in Item D-701. Refer to Item P-610 for cast-in-place
198 concrete test requirements.
199

200 All backfill material shall be tested for compaction in accordance with Items D-701 and P-
201 152.
202

203 C. Inspections. Inspection for precast concrete pipe structures shall follow inspection
204 procedures identified in Item D-701 for precast pipe and those of Item P-152 for excavation.
205

206 Inspection for cast-in-place concrete structures shall follow Item P-610.
207

208 D. Submittals
209

210 1. Materials. Materials shall be submitted in accordance with Items P-610 and D-701.
211

212 2. Designs and Drawings. If the Contractor elects to use an alternative pipe, then the
213 Contractor shall design or cause the pipe manufacturer to design all precast pipe
214 structures to the specified criteria. The Contractor shall submit support calculations,
215 installation drawings, and detail drawings for review and approval by the Project
216 Manager prior to proceeding with fabrication of structures. Calculations, drawings,
217 and details shall be sealed and signed by a Professional Engineer currently
218 registered in the State of Colorado.
219

220 Should the Contractor elect to substitute and construct precast and/or cast-in-place
221 concrete structures, the Contractor shall submit full designs and details, as above,
222 sealed and signed by a Professional Engineer currently registered in the State of
223 Colorado.
224

225
226 **PART 5 METHOD OF MEASUREMENT**
227

228 5.01 Refer to Appendix A for Method of Measurement.

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231 **PART 6 BASIS OF PAYMENT**

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6.01 Refer to Appendix A for Basis of Payment.

236 **PART 7 MATERIAL REQUIREMENT**

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ASTM A 27	Mild to Medium-Strength Carbon-Steel Castings for General Application
ASTM A 47	Malleable Iron Castings
ASTM A 48	Gray Iron Castings
ASTM A 123	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip
ASTM A 283	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars
ASTM A 536	Ductile Iron Castings
ASTM A 897	Austempered Ductile Iron Castings
ASTM C 150	Portland Cement
ASTM C 478	Precast Reinforced Concrete Manhole Sections

END OF ITEM D-751

ITEM L-100

LIGHTING AND ELECTRICAL WORK

PART 1 DESCRIPTION

1.01 GENERAL

- A. The airfield electrical work to be done under this contract shall include the furnishing of all supervision, labor, materials, tools, equipment, and incidentals necessary to provide new airfield lighting system and other electrical work as shown on the drawings.
- B. Work shall be in accordance with Federal Aviation Administration Advisory Circular No. 150 5370-10, Standards for Specifying Construction of Airports, as modified herein, other FAA Advisory Circulars and Specifications referred to herein, and other requirements as specified herein. All FAA Advisory Circulars shall be as specified, or the latest adopted edition if revised.
- C. The electrical work shall comply with latest adopted editions, codes and standards applicable to this Contract as follows:
 - ICEA Insulated Cable Engineers Association
 - ANSI C2 National Electrical Safety Code
 - ASTM, American Society of Testing and Materials
 - FAA Advisory Circulars
 - FAA Orders
 - NFPA No. 70 National Electrical Code
 - NECA Standard for Installation
 - NEMA Standard for Materials and Products
 - NFPA No. 101 Life Safety Code
 - OSHA Occupational Safety and Health Administration, as Amended
 - UL Underwriters Laboratories
- D. All work shall be performed in strict accordance with these contract specifications, drawings, and any instructions that may be furnished by the DIA Project Manager during execution of the work to aid in interpretation of said drawings and specifications. Installation details, and material and equipment specifications shall be in conformance with all applicable FAA Advisory Circulars. The Contractor shall furnish written proof of FAA approval on all equipment covered by FAA specifications as part of the submittal package. The Contractor shall keep these specifications on file at their airport construction office.

1.02 RELATED DOCUMENTS

- A. The general provisions of the contract apply to the work specified in Items L-100, L-107, L-108, L-110, L-115, L-125, L-131, L-139 L-140 and 13410.

1.03 SUMMARY OF WORK

- A. The work to be performed includes furnishing all labor, supplies, materials, equipment, transportation, and services required to augment, move, install, and complete electrical

work as specified herein and as shown on the contract drawings.

B. The work includes, but is not limited to, the following:

- (1) Maintain in operation, all existing field electrical facilities and circuits while this improvement work is in progress, including protection of airport personnel, aircraft, and vehicles; furnish and maintain temporary circuits, and place augmented airport lighting into operation. Field lighting shall be operable each night, each day when fog conditions exist, and when the airport calls an emergency.
- (2) Provide underground cable (L-824) in accordance with specifications, at the locations shown on the plans. Test all circuit loops before and after installation of new cables to verify that no damage was caused by the Contractor.
- (3) Provide new taxiway lighting and signing systems.
- (4) Return to Owner or remove from the site, as directed by the DIA Project Manager, existing equipment that is to be removed or replaced.
- (5) Ground all equipment, enclosures, and conduits installed under this contract as shown on the plans.
- (6) Adjust finished grade as necessary to accommodate existing and new airfield equipment.
- (7) Other items required to complete foregoing. The omission of expressed reference to any parts necessary for or reasonably incidental to the complete installation shall not be construed as releasing the Contractor from furnishing and installing such parts.
- (8) In P-501 panel removal, asphalt removal or grading areas, the counterpoise conductor shall be tested prior to any work. The resistive value shall be documented and counterpoise found to be open between locations such as (base can to base can, base can to manhole etc...) shall be identified and demonstrated to the project manager or designated representative before work is to proceed. Upon completion of all work the counterpoise shall be tested and witnessed by the Project Management representative. Open counterpoise conductors shall be subject to removal of completed work for the repair of counterpoise at no additional cost to the owner.
- (9) The contractor shall inspect the conduit system prior to paving to assure the conduit is not damaged. The contractor shall use an approved mandrel to proof the conduit system that runs through any panel replacement area; once panel replacement is completed the conduit shall have mandrel pulled through the duct prior to re-installation of cable. New cable shall be installed under any panel replacement area including locations that do not include base cans within the P-501 panels.

C. All items of general work required, such as excavation, cutting, patching, etc. shall be included in this Contract.

1.04 WORK REQUIREMENTS

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- A. The general work requirements are as follows:
 - (1) All work shall be scheduled to minimize the impact and duration of shutdowns. The Contractor shall keep the DIA Project Manager informed of scheduled work which will affect existing equipment and operations. Minimum 3 working days advance notice shall be given to the DIA Project Manager and approval received for any disconnections or shutdowns.
 - (2) Existing lighting systems shall be operational at the end of each working day prior to nightfall except as permitted by the DIA Project Manager. Poor weather visibility or an emergency situation may require postponement of a scheduled shutdown on any given day.
 - (3) The plans are diagrammatic. Locations of equipment to be installed are shown in the plans, but the actual installation will depend on field conditions and the nature of the equipment furnished. When conditions which will adversely affect the installation become apparent, the DIA Project Manager shall be notified in writing.
 - (4) Locations and quantities of materials shown on the plans and in these specifications are approximate and shall be used for estimating purposes only. Actual locations and quantities of materials shall be reviewed by the Contractor through field investigation. No additional payment will be made for discrepancies between estimated quantities and locations of materials as shown in these documents and the actual field conditions.
- B. The Contractor shall at all times keep the construction areas free from accumulations of waste material and rubbish, and prior to completion of work shall remove any rubbish from the project, as well as all tools, reels, equipment, and materials not a part of the project. Upon completion of the construction, the Contractor shall leave the work and premises in a clean, neat, and safe condition satisfactory to the DIA Project Manager. The Contractor shall be responsible for the proper performance in all respects, in whole and in part, of the electrical equipment and for the mechanical installation of electrical equipment until acceptance of the entire work by the DIA Project Manager.

1.05 SUBMITTALS

- A. Submittals of all equipment and materials shall meet the requirements of Section 01300, Section 01340 and in accordance with this specification. Each submittal shall include no more than one spec section, i.e., each spec section shall be submitted under a separate submittal form as per section 01300. One bound copy inclusive of L-125 shall be included with all incidentals for review. This book shall include all fixtures and appropriate incidentals for each fixture to indicate to the project manager that the contractor comprehends the airfield lighting installation process. This item shall only include items submitted for approval.
- B. The Contractor shall include wiring diagrams, cut sheets, brochures, etc. of all equipment used on the job, including, but not limited to the items listed in these specifications and in the format described herein. The submittal package will not be reviewed unless 100% complete.
- C. The submittal shall consist of manufacturer's brochures and cut sheets describing the equipment and materials the Contractor plans to incorporate in the work. These sheets

shall be sequentially ordered by specification number with the reference specification number shown on the bottom right of each sheet. Each cut sheet shall show the complete specification or drawing number which the item must comply with (i.e., L-108.2.3 and/or detail 3 on page E-4). In the one bound book, the cut sheets shall be organized by the specification item number (L-100, L-108, etc.) with a tabbed divider sheet separating each item section. The submitted cut sheet shall clearly show the equipment manufacturer's name, catalog number, size, type, and/or rating as required by these specifications or drawings by underlining or circling the information. The conformance to FAA criteria or other standards where called for shall be clearly indicated for each item. Each sheet shall be dedicated to one piece of equipment, and all sheets shall be sequentially numbered (i.e., 1/50; indicating page 1 of 50 total pages). One manufacturer's cut sheet shall be submitted for each item. All sheets shall be 8-1/2" x 11" or 17" x 11". When these sizes are unpractical, a folded 24" x 36" drawing may be substituted. All drawings shall be to scale. All sheets shall be bound in a 3-ring binder. Each submittal shall show on the cover the complete job name and number, date, contractor's name, and the words: "Electrical Submittal." The checklist shown in this specification shall be included as the first sheet of each submittal and shall show the page number of each item included in the submittal. Additional items to be submitted which are not on the list shall be added to the bottom of the table.

D. Samples of conduit, duct, fittings, cables, tapes, fixtures, etc., may be requested by the DIA Project Manager or required in these specifications. After they have been reviewed, samples will be returned in tested condition to the Contractor. In the event any items of material or equipment contained in the list fail to comply with specification requirements, such items will be rejected. All rejected items shall be amended to meet the criteria and then resubmitted for approval by the DIA Project Manager.

E. Substitutions of materials referenced herein is allowed when "or equal" is referenced. Any substitution shall be included in the submittal package and contain additional information as required by Section 01630.

F. All methods and shop drawings of installations shall be submitted and approved prior to the start of installation for each phase of work.
Contractor's liability to the City, in case of variations in the submittal document from the requirements of the contract documents is not relieved by the City's review and acceptance of submittals containing variations unless the City expressly approves the deviations in writing, in which the City describes the variation.

1.06 DRAWINGS

A. The plans, which constitute an integral part of this Contract, shall serve as the working drawings. They indicate the extent and general layout of the lighting and signing system, arrangement of circuits, cables through ducts, and connections to existing circuit cables, and other work. Field verification of scale dimensions is required to determine actual locations, distances, and levels. The Contractor shall research in the field the exact routing and identification of all circuits which extend through, serve, or are affected by the area where work is to commence. No extra compensation will be allowed because of minor differences between work shown on the drawings and field conditions. The Contractor shall check the plans and specifications and, if any portion of the work is found to be omitted, unclear, or in error, the Contractor shall immediately notify the DIA Project Manager. The directions of the DIA Project Manager shall be followed and the work completed accordingly. The design drawings may be utilized in the preparation of the shop or working drawings showing the permanent construction, as described in L-100.

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- B. The plans and specifications are complementary and what is called for in either one shall be as binding as if called for in both.
 - C. Where a disagreement exists between the plans and specifications, the item or arrangements of better quality, greater quantity, or higher cost shall be included in the bid.
 - D. Any discrepancies between the drawings, Advisory Circulars, and field conditions must be resolved with the DIA Project Manager before proceeding. All agreements shall be verified in writing.
 - E. 'Record' drawings covering equipment installed under previous contracts and which relate to this contract will be available for the Contractor. The airport cannot, however, guarantee the accuracy of these drawings. Those conditions which will affect the work under this contract should be verified prior to any design/fabrication/installation commitment.
 - F. Detail dimensions shown on the plans are approximate and shall be field verified before construction. All differences shall be submitted to the DIA Project Manager in writing before construction begins.

234 1.07 RECORD DRAWINGS

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- A. The Contractor shall mark up a set of blue line prints to show the as-built conditions which differ from the contract plans. All changes shall be recorded by a skilled draftsman with at least three years of CAD experience. The DIA Project Manager will furnish a newly printed set of blueline drawings to be used for this purpose. Record drawings will be checked periodically for accurateness and partial payments will be withheld until the record drawings are completely updated. The mark-up set shall be kept at the site, and any changes, discoveries, or deviations shall be recorded daily. The Contractor shall furnish one newly printed as-built drawing set to the DIA Project Manager upon completion. This work shall be completed and accepted by the DIA Project Manager before approval of final payment.
- The contractor shall include complete asbuilt drawings with Northern, Eastern and elevations of duct banks installed. The contractor shall document all return splice locations and complete wiring diagrams including the actual field configuration of circuits.

249 1.08 MAINTENANCE AND OPERATING INSTRUCTIONS

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- A. The Contractor shall provide the Owner with complete instructions in the proper care and operation of the equipment installed under this contract. This is considered as part of the final inspection, and final acceptance will not be given until the Owner's representative is knowledgeable about the system.
 - B. The Contractor shall also collect and assemble into each of six hardcover books the installation details, instructions, parts list, source of local supply, schematics of actual equipment and operations, and directions supplied by the manufacturer with all equipment. If cut sheets are included showing various models and features of the equipment supplied, the specific model and features shall be clearly indicated to show only the options of the equipment that are actually provided and installed. Final acceptance of the work will be withheld until such data has been presented complete to the DIA Project Manager for transmission to the Owner. The contractor shall include complete asbuilt drawings with Northern, Eastern and elevations of duct banks installed. The contractor shall document all return splice locations and complete wiring diagrams.

266 The contractor shall comply with section 01730 operation and maintenance data
267

268 C. The Contractor shall install all equipment according to the manufacturers' instructions and
269 as shown in the drawings and specifications. The Contractor shall notify the DIA Project
270 Manager in writing if any discrepancies exist between the aforementioned documents.
271 Work shall be suspended until resolved and approval to proceed has been granted by the
272 DIA Project Manager.
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274 1.09 SAFETY RULES
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276 A. The Electrical Safety Rules shall be observed and complied with in every detail, and any
277 violation thereof shall be cause for immediate termination of the Contractor's authority to
278 proceed with the work and recourse to their Surety for completion of the Project. The
279 Electrical Safety Rules are as follows:
280

281 B. The Contractor shall be responsible for conforming to the safety requirements of AC 150-
282 5370-2C, Appendix 1.
283

284 C. Electrical circuits, operating over 300 volts, phase-to-ground shall be de-energized before
285 work is accomplished thereon. Work on energized systems shall be accomplished by
286 trained personnel, properly insulated, and done with extreme caution.
287

288 D. Electrical circuits shall be considered de-energized only when one of the following
289 conditions exists:
290

291 (1) Switches connecting subject circuit to the electrical supply are observed in the
292 OPEN position, with an air break, and safety-tagged (padlocked) in the OPEN
293 position;
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295 (2) Electrically operated switches are visibly OPEN, blocked or racked in the OPEN
296 position, and safety-tagged OPEN;
297

298 (3) Whenever the supply circuit breaker is not visible and clearly identified, the circuit
299 shall be grounded. The ground connection shall be safety-tagged before work
300 thereon, when the ground connection is not within sight of the work area.
301

302 (4) Oil switches observed OPEN in a sight window, and tagged OPEN; or oil fuse
303 cutouts with fuse carrier removed and tagged OPEN.
304

305 (5) For airfield lighting circuits fed by constant current regulators, the disconnects
306 feeding all affected regulators and power circuits leaving the vault shall be locked
307 in the OPEN position. When working in manhole housings, additional circuits not
308 a part of the project, those circuits shall be locked in the position as well. The
309 circuits shall be put into maintenance lock out on the control system with the
310 assistance of the project management team prior to lock out of the regulator.
311

312 E. Use of Red Safety Tags:
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314 (1) Safety tags shall be filled out daily and connected to any switch or equipment
315 opened for protection of personnel working upon circuits connected thereto.
316

317 (2) Safety tags shall be removed only by the employee who placed the tag, or by
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- 319 another employee designated in writing by the employee who placed the tag, to
320 remove the tag. Removal of a safety tag placed by an employee not available at
321 the time of need to remove may be authorized by the Electrical Superintendent or
322 his designated representative, only after carefully checking that the circuit is ready
323 to be energized.
324
- 325 (3) Equipment with a safety tag attached shall not be operated, and connections with
326 a safety tag attached shall not be changed.
327
- 328 (4) Insulated cables, operated at over 300 volts to ground shall be handled, when
329 energized, only with rubber gloves tested to 15,000 volts.
330
- 331 (5) Insulated cables, which have been in operation, shall be cut only with a grounded
332 cable shears, or shall be grounded by driving a grounded sharp tool through the
333 shielding and the conductors before cutting.
334
- 335 (6) All personnel working around energized electrical equipment operating at over
336 600 volts shall wear standard insulated, non-conducting hard hats, and shall wear
337 no garments with metallic zipper fasteners, and remove all jewelry.
338
- 339 (7) Ladders used in any electrical work shall be of wood or fiberglass construction.
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- 341 (8) The Contractor shall designate a supervisor for all contract personnel and
342 operations; said supervisor shall be on the job wherever contract operations are
343 in progress.
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346 PART 2 EQUIPMENT AND MATERIALS

347 2.01 GENERAL

- 348 A. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA)
349 specifications shall be certified by independent laboratory testing to be in compliance with
350 the specification, at the date of the contractor's bid submission.
351
- 352 B. Equipment and materials covered by other referenced specifications shall be subject to
353 acceptance through manufacturer's certification of compliance with the applicable
354 specification when requested by the DIA Project Manager. Whenever Underwriters
355 Laboratories has a published standard applicable to the equipment furnished for this
356 contract, the furnished equipment shall be listed by UL.
357
- 358 C. Materials and equipment shall be as specified herein. When materials are used that are
359 not specifically designated herein, they shall be in accordance with the best industry
360 standards and practices for equipment of this type. All components and parts shall be
361 suitable for operation under the environmental conditions specified herein. Metal parts
362 shall be either inherently corrosion-resistant or shall be suitably protected to resist
363 corrosion or oxidation during extended service life.
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367 2.02 HARDWARE AND CORROSION PROTECTION

- 368 A. In order to prevent deterioration due to corrosion, all bolts, nuts, studs, washers, pins,
369 terminals, springs, hangers and similar fastenings and fittings shall be of an approved
370 corrosion-resisting material and/or be treated in an approved manner to render it
371

372 adequately resistant to corrosion. All hardware such as cap screws, set screws, tap bolts,
373 nuts, washers, etc., shall be of stainless steel type 304, SAE grade 2, if they are used
374 outdoors unless specified otherwise on the plans. Brass, bronze, or hot-dip galvanized
375 ferrous hardware (per ASTM, Specification A1530) will be considered for indoor use. All
376 bolts, screws, nuts, etc., shall be coated with a layer of "Neverseize" compound.
377

378 B. All ferrous metalwork shall be hot-dip galvanized. If any galvanizing is damaged, the
379 metal work shall be refinished by cleaning, treating with one coat of wash primer
380 conforming to Federal (military) Specification MIL-P-152388, and shall be given one shop
381 coat of zinc-rich base paint (zinc dust paint) conforming to Federal Specification TT-P-
382 641F Type II, immediately when the wash primer is dry.
383

384 2.03 PARTS RATING

385
386 A. All parts shall be of adequate rating for the application and shall not be operated above
387 the parts manufacturer's recommended ratings.
388

389 2.04 ENVIRONMENTAL CONDITIONS

390
391 A. The equipment installed outdoors shall be designated for continuous outdoor operation
392 under the following environmental conditions unless specified elsewhere:
393

394 (1) Temperature: Any ambient temperature from minus 20°F to plus 120°F.

395 (2) Altitude: 6000 MSL.

396 (3) Humidity: Up to 100 percent.

397 (4) Sand and Dust: Exposure to windblown sand and dust particles.

398 (5) Wind: Operation at wind velocities up to 200 miles per hour.

399 (6) Water: Components provided for underground installation, direct buried or
400 installed in underground housing, shall be suitable for continuous operation,
401 continuously or intermittently submerged in water.
402

403 (7) Chemical: Shall be rated for exposure to all de-icing and anti-icing agents.
404

405 2.05 SALVAGE

406
407 A. Except as otherwise specified or indicated on the drawings, all electrical materials and
408 equipment to be salvaged, removed, or "stored" shall become the property of the Airport,
409 and shall be moved by the Contractor to a site at the airport or within 5 miles of the airport
410 designated by the DIA Project Manager. All wastes such as removed asphalt, concrete,
411 excess dirt, conductors, damaged base cans, etc., shall become property of the
412 Contractor and shall be disposed of off site by the Contractor.
413

414 2.06 TESTING

415
416 A. All materials and finishes are subject to testing. Material inspection and testing, and
417 strength tests on the concrete will be performed by the Contractor at no expense to the
418 Airport other than material used. The Contractor shall assist the DIA Project Manager in
419 obtaining samples during the course of construction work. The testing of electrical
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425 equipment shall conform to the description of the individual specification sections.

426

427 2.07 INSPECTION

428

429 A. Provide for electrical inspections by the DIA Project Manager. No work shall be
430 concealed or enclosed until after inspections. If work is concealed or enclosed without
431 inspection and approval, the Contractor shall be responsible for all expense and work
432 required to open and restore the concealed area in addition to all required modifications.

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435 B. Mill inspection will be waived, and the materials accepted upon certified copies of mill
436 reports identifying the material specification requirements. Copies of order bills and test
437 reports shall be furnished as requested.

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441 2.08 WARRANTY

442

443 A. The Contractor shall provide a written 2-year warranty guaranteeing all work installed
444 under this contract. It shall cover all parts and labor against defective parts, corrosion or
445 workmanship necessary to repair or bring into proper operation any equipment including,
446 but not limited to, isolation transformers, lamps, edge lights, lighting fixtures, poles,
447 conduit system, and junction boxes. The warranty shall start upon the final acceptance of
448 all work as accepted by the DIA Project Manager. Final payment will be withheld until
449 receipt of the warranty by the DIA Project Manager.

450

451 B. LED fixtures shall have a written 5 year warranty provided.

452 **PART 3 CONSTRUCTION METHODS**

453

454 3.01 GENERAL

455

456 A. Installation shall be performed by experienced and skilled persons to obtain only the best
457 workmanship. All equipment shall be set square and true with construction. The work
458 shall be under constant supervision by the Contractor, or by an authorized and competent
459 foreman with five years airfield experience, until completion. All installation shall be
460 inspected by the electrical QC. The installation and adjustments shall be by competent
461 Colorado State recognized license journeyman electricians. The contractor shall include
462 no more than one certified apprentice per journeyman electrician. Apprentice shall be
463 under the direct supervision of a licensed electrician at all times.

464

465 3.02 INSTALLATION METHOD

466

467 A. The methods used for the installation of electrical system and equipment shall conform to
468 the National Electric Contractors Association (NECA) published "Standard of Installation"
469 except where specifically specified or shown otherwise, and to the requirements of the
470 National Electrical Code (NEC) and its revisions.

471

472 B. All electrical materials, construction methods, and installation shall be in accordance with
473 applicable Federal Aviation Administration's advisory circulars including amendments, the
474 National Electrical Code, and the American National Standards Institute Standard C2.

475

476 C. Workmanship shall be consistent with the best commercial practices for installation of this
477 type. The workmanship shall be first class and in accordance with the highest standards

478 of the electrical industry. The installations and adjustments shall be by registered
479 competent electricians. The contractor shall include no more than one certified apprentice
480 per journeyman electrician. Apprentice shall be under the direct supervision of a licensed
481 electrician at all times.
482

483
484 D. The responsibility for the correct and satisfactory installation and operation of all materials
485 and equipment required herein shall rest with the Contractor. Before any equipment is
486 ordered, a complete schedule of materials and detailed shop drawings covering all items
487 of equipment and brochures of the materials proposed for installation shall be submitted
488 for approval by the DIA Project Manager as described in Item L-100.
489

490 3.03 SITE CONDITIONS
491

492 A. At least five working days prior to commencing construction operations in an area which
493 may involve underground utility facilities, the Contractor shall notify the DIA Project
494 Manager and the owners of each underground utility facility shown on the plans. The FAA
495 will assist the Contractor in locating FAA cables. Please contact Sarah Earwood for any
496 FAA coordination.
497

498 B. The existence of any known buried wires, conduits, junction boxes, ducts, or other
499 facilities is shown in a general way only. It will be the duty of the Contractor, with the help
500 of airport personnel, to visit the site and make exact determination of the existence and
501 location of any facilities prior to commencing any work. It is understood that the
502 Contractor will be responsible for making the exact determination of the location and
503 condition of such facilities. Any costs shall be paid for by the Contractor. The Contractor
504 shall obtain from the DIA Project Manager copies of contract drawings from previous
505 construction projects, and examine these drawings and verify at the site the location of all
506 below grade utilities in the vicinity of the work performed under this contract.
507

508 C. All items damaged by the Contractor's workers or equipment shall be replaced
509 immediately at the Contractor's expense.
510

511 3.04 INTERRUPTIONS
512

513 A. Interruptions of lighting circuits may be necessary during construction. The Contractor
514 shall provide a reliable shunt cable to provide temporary continuity of circuit service to
515 runway and taxiway lights and signs during construction where required. The Contractor
516 shall not interrupt any circuit or perform any work that might endanger any circuit until
517 approval of the DIA Project Manager has been received. Temporary cables shall be
518 protected and identified as a hazard.
519

520 B. The Contractor shall be responsible for installing, maintaining, protecting, and removing
521 all required temporary jumper cables used to maintain power to electrical circuits.
522

523 C. For the permanent installation, all temporary connections and rerouting of circuits shall be
524 replaced with new materials installed in accordance with the specifications and as shown
525 on the plans.
526

527 D. See Item L-100, paragraph SAFETY RULES. Payment for this work will be made under
528 Item L-108, Temporary Electrical Work/Jumpers.
529

530 E. If requested by the Project Manager, Contractor shall submit for approval an Operational

531 Safety Plan (OSP) including circuits to be locked off and signs to be covered during
532 construction.
533

534 3.05 CODES
535

536 A. The Contractor shall comply with all ordinances, laws, regulations, and codes applicable
537 to the work involved and as referenced in these specifications. This does not relieve the
538 Contractor from furnishing and installing work shown or specified which may be beyond
539 the requirements of such ordinances, laws, regulations, and codes.
540

541 3.06 Safety Area
542

543 A. The contractor shall abide by the requirements of the contract specifications when
544 working within the runway or taxiway safety areas or as directed by the DIA Project
545 Manager.
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548 **PART 4 METHOD OF MEASUREMENT**
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550 4.01 Refer to Appendix A for Method of Measurement.
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553 **PART 5 BASIS OF PAYMENT**
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555 5.01 Refer to Appendix A for Basis of Payment.
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557
558 **PART 6 MATERIAL REQUIREMENTS**
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560	AC 150/5370-2C	Operational Safety on Airports During Construction
561	AC 150/5370-10	Standards for Specifying Construction of Airports
562	MIL-P-152388	Wash Primer Specification
563	TT-P-641F	Type II, Base Paint, Zinc-Rich

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END OF ITEM L-100

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ITEM L-108

AIRPORT UNDERGROUND CABLE

PART 1 DESCRIPTION

1.01 GENERAL This item shall consist of furnishing and installing underground cable in accordance with these specifications at the locations shown in the Drawings. This item shall include the installation of cable and counterpoise wire in trench, duct or conduit. It shall include splicing, cable marking, and testing of the installation and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the DIA Project Manager. It shall include temporary electrical work and jumper cables to maintain operating or series lighting circuits during construction at the direction of the DIA Project Manager. This item shall not include the installation of the duct or conduit.

This item shall also include removal of existing wire and/or cable when applicable. Any wire or cable, installed in duct or conduit, which is abandoned by this project, shall be completely removed, and the scrap shall be full compensation to the Contractor for removing said excess wire or cable unless a cable removal item is included in the proposal.

1.02 SUBMITTALS Shall comply with specification L-100, Lighting and Electrical Work. Data sheets for each airfield lighting component called for in this section, indicating FAA approval, shall be submitted for approval and be approved prior to ordering any materials for this section. This submittal shall include the proposed method of installation and detail sufficient, in the opinion of the DIA Project Manager, to determine compliance with the contract documents. Cold temperature methods, procedures and limitations shall be included in the submittal.

PART 2 EQUIPMENT AND MATERIALS

2.01 GENERAL.

- A. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall have the prior approval of the FAA, and are listed in Advisory Circular (AC) 150/5345-53 latest edition, Airport Lighting Equipment Certification Program, Appendix 3.
- B. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the DIA Project Manager.
- C. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials acceptable to these specifications and to the DIA Project Manager. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the DIA Project Manager, at the sole cost of the Contractor.
- D. The series lighting circuit shall be a 6.6 amp.

2.02 CABLE Underground cable shall conform to the requirements of AC 150/5345-7D, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits. The following types are covered in Specification L-824 and for control cable:

- 56 A. Type A. (Not Used)
- 57
- 58 B. Type B. Unshielded Single conductor copper cable rated at five thousand volts at 100% of
- 59 the insulation rating. Insulation shall be ethylene-propylene rubber (EPR). The cable shall
- 60 be manufactured by the Tamaqua Cable Products single conductor, 5000 volt, FAA type B
- 61 power cable with Ethylene propylene rubber (EPR) insulation with an overall
- 62 thermoplastic chlorinated polyethylene (CPE) jacket or approved equal. The cable shall
- 63 be certified for 5 KV at single phase applications. The contractor shall submit
- 64 documentation that the cable will not deteriorate when in contact with potassium acetate or
- 65 sodium acetate .
- 66
- 67 C. Type C. (Not Used).
- 68
- 69 D. All cable for airport lighting service shall be stranded i.e.: six hundred volt, seven strand and
- 70 for five thousand volt, nineteen strand. The use of seven-strand cable for five thousand volt
- 71 is specifically prohibited.
- 72
- 73 E. The L-824 return conductor shall be white . This is from the last fixture (light, sign, etc.) in
- 74 the series circuit to the regulator in the vault or selector switch.
- 75
- 76 F. Circuits other than airport lighting service shall conform to one of the following insulation
- 77 types: UL Standard 83, Thermoplastic Insulated Wires and Cables – THW or THWN
- 78 UL Standard 44, Rubber Insulated Wires and Cables – XHHW
- 79

80 The conductors shall be seven stranded copper with 600V rate insulation. Multiple conductor cables

81 shall have a hypalon overall jacket. For power cable, conductor size shall not be smaller than No. 12

82 AWG. Control cable, conductor size shall be not less than No. 16 AWG unless noted otherwise.

83 These limits on conductor sizes shall not apply to leads furnished by manufacturers on transformers

84 and fixtures.

85

86 Where counterpoise conductors are to be installed and where soil conditions would adversely affect

87 bare copper wire, thermoplastic wire conforming to Fed. Spec. A-A-59544 Type TW, 600 volt, shall

88 be used, at no additional cost.

89

90 Cable type, size, number of conductors, strand and service voltage shall be specified in the Drawings

91 and/or Proposal.

92

93 2.03 BARE COPPER WIRE (COUNTERPOISE) Bare copper wire for counterpoise installations shall be

94 bare stranded wire conforming to ASTM Specifications B 3 and B 8. Counterpoise conductor is

95 incidental to other work.

96

97 2.04 CABLE CONNECTIONS In-line connections of underground primary cables shall be of the type

98 called for in the Drawings and shall be listed below.

99

100 A. The Cast Splice. A cast splice, employing a plastic mold and using epoxy resin equal to that

101 manufactured by Minnesota Mining and Manufacturing (3M) Company, "Scotchcast" Kit

102 No. 82-A, or as manufactured by Hysol Corporation, "Hyseal Epoxy Splice" Kit No. E1135,

103 for potting the splice is approved. Not to be used on 5 KV airfield cable.

104

105 B. The Vulcanized Splice. Not used.

106

107 C. The Field Attached L-823 Plug-In Connector. Figure 3 of Specification for L-823 (A/C

108 150/5345-26B) Plug and Receptacle, Cable Connectors, employing connector kits, is

109 approved for field attachment to single conductor cable as manufactured by Integro , or

110 approved equal. It shall be the Contractor's responsibility to determine the outside diameter

111 of the cable to be spliced and to furnish appropriately sized connector kits and/or adapters.
112 Prior to final cable termination, new connectors shall be installed on all cable splices where
113 the heat shrink tubing was removed during construction.
114 The Integro complete kit or approved equal kit may be used with half lapped Scotch 130C
115 or approved equal rubber tape 3" centered over field made joints in lieu of shrink tube.
116
117 D. The Factory-Molded L-823 Plug-in Connector. Specification for L-823 Connectors,
118 Factory-Molded to Individual Conductors, are approved.
119
120 E. The Taped Splice. Not used.
121
122 F. The Exothermic Splice. Furnish proper configuration and sizes for counterpoise and
123 ground rod connections.
124
125 G. Low Voltage Power and Lighting Cable Splices shall be made using a compression sleeve
126 applied with a tool which must be fully activated before it can be removed. The splice shall
127 be insulated to at least the voltage rating of the cable. The insulating material shall be a
128 product equal to 3M ITCSN heat shrinkable tubing with the sealing/insulating material factory
129 applied to the inside of the tubing. The length of the tubing shall extend at least 10 diameters
130 to both sides of the compression sleeve.
131
132 Insulated spring wire connectors with plastic caps for copper conductor splices and taps may
133 be used for 10 AWG and smaller conductor connections.
134

135 2.05 HEAT SHRINKABLE KIT Heat shrinkable kits for airfield lighting shall be CD-3, Equipment Co.
136 ALP-C (or approved equal) 1.3" diameter and long enough to extend 2" beyond connector body on
137 each end when shrunk. The tubing seal gel will for a visible continuous bead at the seal joint to the
138 wire.
139

141 2.06 FIBER OPTIC CABLE Refer to Section 16742 for fiber optic cable requirements.
142

143 PART 3 CONSTRUCTION METHODS

145 3.01 GENERAL The Contractor shall install the specified cable at the approximate locations indicated in
146 the airport lighting layout Drawings. The DIA Project Manager shall approve specific location plan
147 submitted by the Contractor.
148

149 L-823 connectors shall be installed on all cables in each manhole, base can or other accessible
150 locations except as modified below. Connectors are not required in cables passing through a light
151 base with a fixture and not feeding that fixture. These cables shall have the required slack and cable
152 ID tags in each base can. Connectors are required in all cables in all manholes and light base cans
153 that are used only as pull-cans (with no fixture.) L-823 connectors are required in sign circuits
154 passing through a manhole or base can that has a stub out for a future sign. L-823 connectors shall
155 be installed so a portion of the loop can be bypassed. See connector details (the female connector
156 shall be on the regulator supply cable.) The Contractor shall identify all L-824 cables at all
157 accessible locations with approved plastic tags with black letters on white background a minimum of
158 1/8 inch thick and as described on the Drawings.
159

160 The underground cable work to be performed under this Contract shall consist of furnishing and
161 installing new cables as shown in the Drawings and as directed by the DIA Project Manager.
162

163 All primary cable and secondary wiring connections to the isolation transformers and light assemblies
164 shall be made by means of factory-attached plug-in connector kits in accordance with FAA
165 Specification L-823 of Advisory Circular No. 150/5345-26B. Connectors shall be compatible for

166 insulation used. The various type connector kits to be used shall be as described in FAA Advisories.
167 Airfield lighting circuits shall not be intermixed except as shown on the circuitry Drawings.
168

169 Where existing cable and new cable will be connected, install a new connector on the existing and
170 new cable, as stated above.
171

172 3.02 INSTALLATION IN DUCT OR CONDUIT This item includes the installation of the cable in duct or
173 conduit as described below. The maximum number and voltage ratings of cables installed in each
174 single duct and conduit, and the current-carrying capacity of each cable shall be in accordance with
175 the latest National Electric Code, and the code of the local agency having jurisdiction.
176

177 The Contractor shall not install in conduits or ducts any connections or splices of any kind.
178

179 The duct or conduit shall be installed as a separate item in accordance with Item L-110, "Installation
180 of Airport Underground Electrical Duct." The Contractor shall make sure that the duct is open,
181 continuous, and clear of debris before installing cable. The contractor shall provide and comply with
182 approved methods prior to clearing of debris. The cable shall be installed in a manner to prevent
183 harmful stretching of the conductor, injury to the insulation, or damage to the outer protective
184 covering. The ends of all cables shall be sealed with moisture-seal tape before pulling into the
185 conduit and it shall be left sealed until connections are made. Where more than one cable is to be
186 installed in a duct all cable shall be pulled in the duct at the same time. The pulling of a cable
187 through ducts or conduits may be accomplished by hand, hand winch or power winch with the use of
188 cable grips or pulling eyes. Pulling tensions shall be monitored by means recommended by the
189 manufacturer for straight pulls or bends and at no time exceed the manufacturer's recommendations.

190 The cable pull tension shall be monitored on every pull exceeding 300 feet in length. A lubricant
191 recommended for the type of cable being installed shall be used where pulling lubricant is required.
192 The manufacturer's minimum bend radius or the NEC or local requirements, whichever is greater
193 shall apply. Cable removed from the duct shall be considered used and not be reused for permanent
194 application.
195

196
197 Cable installation, handling, and storage shall be per manufacturer's recommendations. During cold
198 weather, particular attention shall be paid to the manufacturer's minimum installation temperature.
199 The manufacturer's cold weather handling and installation information shall be included in the
200 submittal. Cable shall not be installed when the temperature is at or below the manufacturer's
201 minimum installation temperature.
202

203 Not less than three feet (3') or more than four feet (4') of cable slack shall be left on each side of all
204 connections from conduit entrance, isolating transformers, light units and at all other points where
205 cable is connected to field equipment. In base cans and handholes cables without connectors shall
206 have six feet (6') of slack. In manholes the cable shall have enough slack to extend six feet (6')
207 above the lid.
208

209 The return splice shall be as-built. When installation allows, splice the return conductor in base cans
210 identified with "0" or "5" end number.
211

212
213 3.03 SPLICING Connections of the type shown in the Drawings shall be made by experienced personnel
214 regularly engaged in this type of work and shall be made as follows:
215

216 A. Cast Splices. These shall be made by using crimp connectors for joining conductors. Molds
217 shall be assembled, and the compound shall be mixed and poured in accordance with the
218 manufacturer's instructions and to the satisfaction of the DIA Project Manager.
219

220 B. Vulcanized Splices. Not used.

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- C. Field-Attached L-823 Plug-In Connectors. These connectors shall be assembled in accordance with manufacturer's instructions. Strip the insulation from the L-824 cable in a way so the copper conductor is not damaged (ringed or nicked) in any way. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Crimp twice at 90° opposite. Test the crimped connection by pulling on the cable. These connections shall be made by plugging directly into mating connectors. In all cases, the joint where the connectors come together and the area where the cable and the connector come together shall be wrapped with 3" of Scotch 130C rubber tape 1-1/2" on each side of the joint and half lapped. Ends of tape shall not extend beyond ends of heat shrink tubing. The Integro complete kit, Amerace super kit or approved equal kit may be used with half lapped Scotch 130C or approved equal rubber tape 3" centered over field made joints in lieu of shrink tube. The L-823 connectors shall meet buy American requirements or be included in BA calculation for larger component.
- D. Factory-Molded Plug-In Splices. These shall be made by plugging directly into mating connectors. In all cases, the joint where the connectors come together shall be covered by rubber tape, except when connecting to an elevated fixture.
- All connections of the type shown in the Drawings shall be made using L-823 connectors covered with heat shrink tubing with integral sealant and rubber tape per the drawing details. Both ends of connectors where the cable enters the connection, shall be protected with heat shrinkable tubing and rubber tape to prevent moisture penetration.
- E. Taped Splices. Not used.
- F. Exothermic connections shall be used for all counterpoise splices and connections to ground rods.
- G. Power and Lighting Cable Splices. These shall be made using a procedure similar to the one shown above for field-attached L-823 plug-in connectors. The crimp sleeve shall be designed for the wire size and the tool shall apply the correct pressure before it can be released. The insulation shall be cleaned before the heat shrink tubing is installed. A non-extruding insulating compound shall be used to build the diameter at the crimp sleeve to the approximate diameter of the cable insulation.
- H. EXISTING CIRCUITS. Whenever the scope of work requires connection to an existing circuit, the complete circuit's insulation resistance shall be tested, in the presence of the Engineer. The test shall be performed prior to any activity affecting the respective circuit. The Contractor shall record the results on forms acceptable to the engineer. The forms shall include all information required per section L-108 3.05 and be submitted within 48 hours of test taken. When the work affecting the circuit is complete, the circuit's insulation resistance shall be tested at all new installation locations to meet testing requirements of section L-108 3.05, in the presence of the engineer. The Contractor shall record the results on forms acceptable to the engineer and submit within 48 hours. The Contractor shall then test the entire existing circuit. If the reading is not equal to or greater than the first entire circuit reading and the Contractor has confirmed new cable locations have not created the lower meg readings, the contractor shall notify the owner's representative immediately. All test results shall be submitted within 48 hours of test time and all test results shall be submitted in the Operations and Maintenance (O&M) manual.
- 3.04 BARE COUNTERPOISE WIRE INSTALLATION AND GROUNDING FOR LIGHTNING PROTECTION A stranded bare copper wire, No. 6 AWG, shall be installed for lightning protection

276 of the underground cables. The insulated cables for the taxiway and runway circuits shall be
277 protected by a bare counterpoise wire installed in the same trench above the conduit or cable for the
278 entire length of cables as indicated on the Drawings. The counterpoise wire shall be securely
279 bonded to each light fixture base, reinforcing cage and to ground rods located not more than 500 feet
280 along the conduit path. Ground rods are not required for the centerline lighting system. The
281 centerline counterpoise wire shall be connected to the edge light counterpoise wire at every 500 feet
282 or less and as shown on the plans. These connections shall be made with a No 6 AWG stranded
283 bare copper wire and exothermic welds. Ground rods shall be copper clad steel, 3/4 inch diameter
284 and 10 feet long and shall be installed with an inspection pit so each ground rod installed is
285 accessible. Ground rods shall meet testing requirements specified in 108-3.5, G. All ground rods
286 and counterpoise conductor shall be tested prior to connection to grounding conductor. The
287 Contractor shall perform the necessary inspection and tests for these items concurrently with the
288 installation because of subsequent inaccessibility of some components. Submit test results to the
289 Project Manager.

290
291 The counterpoise system shall terminate at the transformer vault or at the power source. It shall be
292 securely attached to the vault or equipment grounding system. The connections shall be made by
293 exothermic process and shall be incidental to other work.
294

295 3.05 TESTING The Contractor shall furnish all necessary equipment and appliances for performing all
296 the tests referenced in the specification and this section. The Contractor shall measure and record
297 operating voltage, current, circuit resistance, insulation resistance, ground rod resistance in the
298 presence of the DIA Project Manager or his appointed representative. Tests include the following.
299

- 300 A. That all lighting power and control circuits are continuous and free from short circuits. (circuit
301 resistance)
- 302
- 303 B. That all circuits are free from unspecified grounds.
- 304
- 305 C. That the insulation resistance to ground of all new and newly retrofitted non-grounded series
306 circuits is not less than 1000 megohms when tested at 1,000 volts DC-applied for three
307 minutes.
- 308
- 309 D. Prior to energizing, all building service cables, feeders to and/or from transformers,
310 switchboards, panelboards are to be tested with a 1000-volt DC insulation megohm meter to
311 determine insulation resistance levels. Test cables three minutes with a 500 volt megohm
312 meter or as recommended by the manufacturer. All field test data is to be recorded,
313 corrected to a baseline temperature and furnished to the Project Manager. A test is to
314 include meggering for three minutes between conductors and between each conductor and
315 ground. Cables are to be meggered after installation with cables disconnected at both ends.
316 Insulation test values shall meet or exceed the values given below.
317

<u>Conductor Size</u> <u>(AWG or kCMIL)</u>	<u>Resistance</u> <u>(Megohms – 1,000 ft)</u>
12-8	200
6-2/0	100
3/0-500	100

- 318
- 319 E. That all circuits are properly connected in accordance with applicable wiring diagrams.
- 320
- 321 F. That all circuits are operable. Tests shall be conducted that include operating each control
322 not less than 10 times and the continuous operation of each lighting and power circuit for not
323 less than 4 hours.
- 324
- 325 G. That all ground rods are 5 ohms or less to ground. When the contact resistance to earth

326 exceeds 5 OHMS, provide location and resistance value to the project manager. Project
327 Manager shall direct corrective action when needed to reduce the resistance to 5 OHMS or
328 less.

329
330 H. That all counterpoise is continuous as determined by the resistive value (size and length) as
331 routed with the circuit conductors. (light can to light can, manhole to light can, manhole to
332 manhole, light can to ground rod)

333
334 I. Final test shall be made before and after all work is complete and the typed results
335 submitted to the DIA Project Manager in bound form. The information shall include the type
336 of meter used, manufacturer, model, serial number and the last time the meter was
337 calibrated and calibration due date.

338
339 3.06 LOW VOLTAGE POWER CABLE All cables shall be tagged in each equipment enclosure. Tags
340 shall be attached to cables immediately after installation.

341
342 Tags shall be large enough to accommodate all required lettering (1/4-inch high and appropriate
343 width). All characters shall be legibly written on material which is not affected by water, solvents or
344 other severe conditions. Tags shall be non-metallic and attached securely with non-metallic fastener.

345
346 Marking of the tags shall consist of an abbreviation of the name of the facility or facilities served by
347 the cable and panelboard branch circuit connected to.

348
349 Wires for three phase circuits shall be color coded by insulation or with a band of tape at each
350 termination and at the entrance and exit from each conduit, box, or other device. The wire tag shall
351 also indicate the phase by letter A (black), B (red), C (blue), neutral (white) for 120/208 volts or A
352 (brown), B (orange), C (yellow) and neutral (natural gray) for 277/480 volt circuits. Ground wires shall
353 have green insulation or be bare copper. Tape shall not be used to identify neutral or ground wires
354 unless specifically permitted by the NEC. Conductors #6AWG and smaller shall have a colored
355 insulation.

356
357 Where more than one identical cable is used to serve the same facility, they may be bundled under
358 one tag, unless the plans state otherwise.

359
360

361 **PART 4 METHOD OF MEASUREMENT**

362
363 4.01 Refer to Appendix A for Method of Measurement.

364
365

366 **PART 5 BASIS OF PAYMENT**

367
368 5.01 Refer to Appendix A for Basis of Payment.

369
370

371 **FAA SPECIFICATIONS**

372
373 A/C 150/5345-7E Specification for L-824 Underground Electrical Cables for
374 CHANGE 1 Airport Lighting Circuits.

375
376 A/C 150/5345-26D Specification for L-823 Plug & Receptacle Cable Connectors

377
378 A-A-59544 Cable and Wire, Electrical Power, Fixed Insulation

379
380

381 **ASTM SPECIFICATIONS**

- 382
- 383 B3 Soft or Annealed Copper Wire.
- 384
- 385 B8 Concentric-Lay-Stranded Copper Conductor, Hard, Medium-Hard, or
- 386 Soft.
- 387
- 388

389 **UL SPECIFICATIONS**

- 390
- 391 ANSI/UL 44 Thermoset-Insulated Wires and Cables
- 392
- 393 ANSI/UL 83 Thermoplastic-Insulated Wires and Cables
- 394

395

396 **END OF ITEM L-108**

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ITEM L-110

AIRPORT UNDERGROUND ELECTRICAL DUCT

PART 1 DESCRIPTION

1.01 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete) installed in accordance with this specification at the locations and in accordance with the dimensions, designs, and details shown in the Drawings. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all trenching, backfilling, removal, and restoration of any paved areas or turfed area; manholes, concrete encasement, mandreling, installation of the pull line, detectable tape, and duct markers, plugging of conduits, and the testing of the installation as a completed duct system ready for installation of cables in accordance with the plans and specifications, to the satisfaction of the DIA Project Manager. This item shall also include furnishing and installing conduits and all incidentals for the providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

1.02 SUBMITTALS Shall comply with specification L-100 Lighting and Electrical Work.

PART 2 EQUIPMENT AND MATERIALS

2.01 GENERAL. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification.

2.02 NOT USED

2.03 CONCRETE. Concrete shall conform to Item P-610, Structural Portland Cement Concrete, using 1-inch maximum size coarse aggregate.

2.04 PLASTIC CONDUIT. Plastic conduit and fittings shall conform to the requirements of Fed. Spec. W-C-1094, and ANSI/UL shall be the following:

Type II (Schedule 40). Heavy-wall polyvinyl chloride (PVC) conduit listed by an independent testing laboratory for [Above Ground Exposed, Underground Concrete Encased (CE) and Underground Direct Earth Burial (DEB) for applications as described in Article 352 of the current National Electrical Code].

All joints shall be solvent welded in accordance with the recommendation of the conduit manufacturer. Solvent shall be brushed on the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. The plastic conduit, fittings, expansion joints and joint adhesive shall be products of one manufacturer to assure compatibility.

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using approved manufactured sweep bends.

2.05 ELBOWS. All elbows (bends) 90 degrees or less used in PVC duct system to be schedule 80 or schedule 40, with P-610 encasement, PVC . A bend exceeding 90 degrees is not acceptable.

55 2.06 DETECTABLE TAPE. Detectable tape shall be a red polyethylene film with a metallized foil core and
56 shall be 3-inch wide. The tape shall read "Caution - Electric Line Below". The tape shall be
57 manufactured by Reef Industries, Inc., or approved equal.
58

59
60 **PART 3 CONSTRUCTION METHODS**
61

62 3.01 GENERAL. The Contractor shall install underground duct banks and conduits at the approximate
63 locations indicated in the Drawings. The DIA Project Manager shall approve the Contractor's
64 specific locations plan as the work progresses if required to differ from the plans. Duct banks and
65 conduits shall be of the size, material, and type indicated in the Drawings or Specifications. Where
66 no size is indicated in the Drawings or Specifications, the ducts shall be not less than 2 inches inside
67 diameter or comply with the National Electrical Code based on cable to be installed whichever is
68 larger. All duct lines shall be laid so as to grade toward handholes, manholes and duct ends for
69 drainage. Unless shown otherwise on the plans. Grades shall be at least 3 inches per 100 feet. On
70 runs where it is not practicable to maintain the grade all one way, the duct lines shall be graded from
71 the center in both directions toward manholes, handholes, or duct ends, with a drain into the storm
72 drainage system. Pockets or traps where moisture may accumulate shall be avoided.
73

74 The Contractor shall mandrel each duct individual conduit.. An approved iron-shod mandrel, not
75 more than 1/4-inch smaller than the bore of the duct shall have a rope secured at both ends and
76 pulled through each duct. The Contractor shall cease pulling the mandrel through existing duct
77 system if the mandrel does not move freely and notify the Project Manager of the condition. The
78 mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.
79

80 The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc.
81 interiors IMMEDIATELY prior to pulling cable. Once cleaned and swabbed the base cans,
82 manholes, pull boxes, etc. and all accessible points of entry to the duct/conduit system shall be kept
83 closed except when installing cables. All raceway systems left open, after initial cleaning, for any
84 reason shall be recleaned at the contractors expense. All accessible points shall be kept closed
85 when not installing cable. The contractor shall verify existing ducts proposed for use in this project
86 as clear and open. The Contractor shall notify the Engineer of any blockage in the existing ducts.
87

88 All ducts installed shall be provided with a 200-pound polypropylene line for pulling the permanent
89 wiring. Sufficient length shall be left in manholes or handholes and securely attached to the pulling
90 iron to prevent it from slipping back into the duct. Where spare ducts are installed, as indicated on
91 the Drawings, the open ends shall be plugged with removable tapered plugs, designed for this
92 purpose..
93

94 All conduits shall be securely fastened in place during construction and progress of the work. All
95 ducts shall be plugged to prevent contaminate, seepage of grout, water, or dirt. Any duct section
96 having a defective joint shall be removed and replaced at the Contractors expense. Ducts shall be
97 supported and spaced apart using approved spacers at intervals not to exceed 5 feet.
98
99

100 All ducts installed under runways, taxiways, aprons, and other paved areas including asphalt
101 shoulders, shall be encased in a concrete envelope meeting Item P-610..
102

103 Trenches for ducts may be excavated manually or with mechanical trenching equipment. Walls of
104 trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of
105 road patrols or graders shall not be used to excavate the trench. The Contractor shall ascertain the
106 type of soil or rock to be excavated before bidding. All excavation shall be unclassified and shall be
107 paid for as a part of Item L-110.
108

109 3.02 DUCTS ENCASED IN CONCRETE. Unless otherwise shown in the Drawings all ducts shall be
110 encased in concrete, concrete-encased ducts shall be installed so that the top of the concrete
111 envelope is not less than 24 inches below the finished subgrade where installed under runways,
112 taxiways, aprons, or other paved areas, and not less than 36 inches below finished grade where
113 installed in unpaved areas. Duct encasement under paved areas shall extend at least 5 feet beyond
114 the edges of the pavement or 5 feet beyond any underdrain which may be installed alongside the
115 paved area whichever distance is greater. Trenches for concrete-encased ducts shall be opened the
116 complete length before concrete is laid so that if any obstructions are encountered, proper provisions
117 can be made to avoid them. All ducts for concrete encasements shall be placed using approved
118 spacers no more than 5' apart. Where two or more ducts are encased in concrete, the Contractor
119 shall space them not less than 2 inches apart (measured from outside wall to outside wall) using
120 spacers applicable to the type of duct. As the duct laying progresses, concrete not less than
121 3 inches thick shall be placed on top, bottom and sides of the duct bank. End bells or couplings shall
122 be installed flush with the concrete encasement where required.

123
124 When specified, the Contractor shall reinforce the bottom side and top of encasements with steel
125 reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor
126 shall supply additional supports where the ground is soft and boggy, where ducts cross under
127 roadways, or where otherwise shown on the Drawings. Under such conditions, the complete duct
128 structure shall be supported on reinforced concrete footings, piers, or piles located at approximately
129 5-foot intervals. All construction joints in the concrete encased ducts shall have a minimum of four
130 steel dowels evenly spaced and installed at the joint. The dowels shall be deformed steel reinforcing
131 bars, 1 inch in diameter and 24 inches long, with one-half of the length embedded in the plastic
132 concrete that is constructed initially. If conduits transverse more than one paving lane, the adjacent
133 cans must be surveyed for location and elevation to assure proper location of conduits.

134
135 3.03 DUCTS WITHOUT CONCRETE ENCASEMENT. Trenches for single-duct lines shall be not less
136 than 6 inches nor more than 12 inches wide, and the trench for 2 or more ducts installed at the same
137 level shall be proportionately wider. Trench bottoms for ducts without concrete encasement shall be
138 made to conform accurately to grade so as to provide uniform support for the duct along its entire
139 length. Any loose material in the bottom of the trench shall be removed or compacted to specified
140 requirement.

141
142 Unless otherwise shown in Drawings, ducts for direct burial shall be installed so that the tops of all
143 ducts are at least 36 inches below the finished grade.

144
145 When two or more ducts are installed in the same trench without concrete encasement, they shall be
146 spaced not less than 2 inches apart (measured from outside wall to outside wall) in a horizontal
147 direction.

148
149 Trenches shall be opened the complete length before duct is installed so that if any obstructions are
150 encountered, proper provisions can be made to avoid them.
151 Back fill of trenches shall be P-162 flowable backfill material with red dye.

152
153 3.04 DUCT MARKERS. The location of the ends of all ducts shall be marked by a concrete slab marker
154 2 feet square and 6 inches thick which has a 12-inch diameter by 12-inch deep anchor attached.
155 The top of the marker shall extend approximately 1-inch above the surface. The markers shall be
156 located above the ends of all ducts or duct banks, except where ducts terminate in a light can,
157 handhole, manhole, underdrain, or building.

158
159 The Contractor shall impress the word "duct" on each marker slab. They shall also impress on the
160 slab the number and size of ducts beneath the marker. The letters shall be 4 inches high and
161 3 inches wide with width of stroke 1/2-inch and 1/4-inch deep or as large as the available space
162 permits.

163
164 3.05 BACKFILLING. P-162 flowable backfill material with red dye shall be used to backfill all trenches for
165 ducts encased in concrete under new concrete or asphalt pavement. Under pavement the flowable
166 backfill shall be level with the subgrade. The Contractor shall reference section P-162 of these
167 specifications, and shall be responsible for material and placement.

168
169 The excavated material shall be removed and disposed of in accordance with instructions issued by
170 the DIA Project Manager.

171
172 3.06 DETECTABLE TAPE. Detectable tape shall be placed above all conduits, ducts, and duct banks not
173 installed under pavement in accordance with manufacturer's installation instructions.

174
175 3.07 DUCTS INSTALLED BY DRILLING UNDER PAVEMENT. When required by the plans, the
176 Contractor shall install three inch rigid steel conduit duct in a void under pavement created by drilling.
177 The diameter of the void shall be kept to a minimum. Waterjet excavation will not be permitted.
178 Drilling shall be completed by a dry process or with a water cooled cutting head. A locator system
179 shall be used in conjunction with the cutting head to provide for true-line drilling and to prevent water
180 from collecting in the pavement subgrade. Depth of the duct below pavement grade should be as
181 close to 24 inches as possible.

182
183

184 PART 4 METHOD OF MEASUREMENT

185
186 4.01 Refer to Appendix A for Method of Measurement.

187
188

189 PART 5 BASIS OF PAYMENT

190
191 5.01 Refer to Appendix A for Basis of Payment.

192
193

194 PART 6 MATERIAL REQUIREMENTS

195
196 Fed. Spec. W-C-1094 Conduit and Fittings; Nonmetallic, Rigid (Plastic)
197
198 ANSI/UL 651 Schedule 40 and 80 Rigid PVC Conduit
199
200 ANSI/UL 651A Rigid PVC Conduit and HDPE Conduit
201
202 ANSI/UL 651B Continuous Length HDPE Conduit
203
204 Rigid Metal Conduit
205
206 Fittings for Conduit
207

208
209

END OF ITEM L-110

ITEM L-125

AIRPORT LIGHTING SYSTEMS

PART 1 DESCRIPTION

1.01 GENERAL. This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable Federal Aviation Administration Advisory Circulars. The systems shall be installed at the location and in accordance with the dimensions, layout, design, and details shown in the drawings. This item shall include furnishing and installing all lights, signs, transformers, bases, mounting assemblies, base plates, adapter rings, concrete work, sealing filler, adhesive sealant, cable connections, all lamps, ground rod and inspection pits, testing of the installation and all incidentals and appurtenances necessary to place the systems in operation as completed units to the satisfaction of the DIA Project Manager. The contractor shall not place an order for any electrical, lighting, or signing material until specific approval is received from the DIA Project Manager for each order on an individual basis.

1.02 REFERENCED MATERIALS. Additional details pertaining to specific systems covered in this item are contained in the Advisory Circulars (latest edition) listed below:

- 150/5340-1H Standards for Airport Markings
- 150/5340-4C Installation Details for Runway Centerline and Touchdown Zone Lighting Systems
- 150/5340-18C Standards for Airport Sign Systems
- 150/5340-28 Low Visibility Taxiway Lighting Systems
- 150/5340-24 Runway and Taxiway Edge Lighting System
Chg. 1
- 150/5345-53B Airport Lighting Equipment Certification Program, Appendix 3
- 150/5345-7D Specification for L-824 underground Electrical Cable for Airport
Lighting Circuits.
Chg. 1
- 150/5345-42C Specification for Airport Light Bases, Transformer Housings, Junction Boxes,
and Accessories
Chg. 1
- 150/5345-43E Specification for Obstruction Lighting Equipment
- 150/5345-26B Specification for L-823 Plug and Receptacle, Cable Connectors
Chg. 1 & 2
- 150/5345-44F Specification for Taxiway and Runway Signs
Change 1
- 150/5345-46B Specification for Runway and Taxiway Light Fixtures

53 150/5345-47A Isolation Transformers for Airport Lighting Systems

54
55 The Contractor is responsible for using the latest edition of the referenced FAA Advisory Circulars.

56
57 1.03 SUBMITTALS. Submittals shall comply with Item L-100, Lighting and Electrical Work. Shop
58 drawings of each airfield lighting component, indicating FAA approval, shall be submitted for
59 approval and be approved prior to ordering any materials for this section. This submittal shall include
60 the proposed method of installation for all airfield lighting components. The data submitted shall be
61 sufficient, in the opinion of the DIA Project Manager, to determine compliance with the contract
62 documents. The Contractors submittals shall be submitted to the DIA Project Manager within 30
63 days of the first Notice To Proceed. Submittals shall include as a minimum the following data:

- 64
65 A. Safety precautions used while maintaining the equipment.
66
67 B. Theory of circuit and system operation.
68
69 C. Complete schematic and interconnecting wiring diagrams.
70
71 D. Complete parts list with each circuit component keyed to designations assigned on
72 schematics and wiring diagrams. Complete information shall be given for each part to
73 permit ordering for replacement purposes. This information shall include the components
74 rating, name of manufacturer and the manufacturer's part number.
75
76 E. Recommended preventative maintenance.
77
78 F. Troubleshooting procedures.
79
80 G. Physical characteristics (weight, size, mounting dimensions etc.).
81
82 H. Installation instructions/Details
83
84 I. Operating instructions.
85
86 J. There shall be no "Black Boxes" for which there are no schematic/wiring diagrams.

87
88 The submittals shall be bound in a Dennison National 98 series trapezoid, stiff/casemade three ring
89 binder or approved equal, and subdivided by topic, material and/or equipment. The binder(s) shall
90 be labeled listing the project name and number, and the equipment name, number, and
91 manufacturer. The topic division shall utilize Dennison National non-insertable poly-indexes or
92 approved equal. The method of binding and marking/labeling shall be submitted to the DIA Project
93 Manager for approval.

94
95 1.04 QUALIFICATIONS. The DIA Project Manager reserves the right to reject any equipment which, in
96 their opinion, does not meet the system design and the standards and codes specified herein.
97

98 **PART 2 MATERIALS**
99

100 2.01 GENERAL.
101

- 102 A. Airport lighting equipment and materials covered by FAA specifications shall have prior
103 approval of the Federal Aviation Administration, Airports Service, Washington, DC 20591,
104 and shall be listed in Advisory Circular 150/5345-53, Latest Edition, Airport Lighting

105 Equipment Certification Program, Appendix 3. All items that are FAA Testing Laboratory or
106 DIA Project Manager approved at the time of bidding, which otherwise meet the project
107 specifications, are acceptable. All Light cans to be located in P-501 paving shall be shipped
108 with plywood and target covers.

109
110 B. All other equipment and materials covered by other referenced specifications shall be
111 subject to acceptance through the manufacturer's certification of compliance with the
112 applicable specifications. The Contractor shall submit the manufacturer's certificates of
113 compliance with the applicable equipment submittals.

114
115 C. Lists of the equipment and materials required for a particular system are contained in the
116 applicable Advisory Circulars.

117
118 2.02 GUARANTEES.

119
120 A. Except as modified below, all equipment and materials furnished and installed under this
121 specification shall be guaranteed against defects in materials and workmanship for a period
122 of twenty four (24) months from final acceptance by the DIA Project Manager. The defective
123 materials and/or equipment shall be repaired or replaced, at the DIA Project Managers
124 discretion, with no additional cost to the Owner.

125
126 B. The lamp life, as rated by the FAA, shall be warranted for the specified number of hours.
127 Should ten percent (10%) of the lamps fail prior to 70% of the rated life of the lamp, then the
128 entire system using the failing lamp type shall be re-lamped, at the contractors expense, and
129 the warranty time shall start over. At the Owners option, the Contractor may supply 100%
130 spares.

131
132 C. LED fixtures shall be provided with a 5 year warranty.

133
134 2.03 BASIS OF DESIGN. The airfield lighting systems are designed using the below listed maximum
135 fixture wattage. Approved airfield lighting fixtures with higher wattage are not permissible. In no
136 case shall the Contractor be allowed to reduce the size of the constant current regulators or the
137 power distribution systems. The series lighting circuits shall be 6.6 amps, except sign circuits.

138			
139	L-850A	Runway Centerline Light	96W
140			
141	L-850B	Touchdown Zone Light	48W
142			
143	L-850C	In-pavement Runway Edge Light	210W
144			
145	L-852C	Taxiway Centerline Light – Narrow Beam (Uni-directional)	32W
146			
147	L-852D	Taxiway Centerline Light – Wide Beam (Uni-directional)	32W
148			
149	L-852C	Taxiway Centerline Light – Narrow Beam (Bi-directional)	64W
150			
151	L-852D	Taxiway Centerline Light – Wide Beam (Bi-directional)	64W
152			
153	L-852C	Taxiway Centerline Light – Two-Lamp, Two-Circuit	2-32W
154			
155	L-852D	Taxiway Centerline Light – Two-Lamp, Two-Circuit	2-32W
156			

157	L-852GS	In-pavement Stop Bar/Runway Guard Light	150W
158			
159	L-852T	In-pavement Taxiway Edge Light	45W
160			
161	L-861T	Elevated Taxiway Edge Light	45W
162			
163	L-862	Elevated Runway Edge Light	120W
164			
165	L-862E	Elevated Runway Threshold Light	150W
166			

167 2.04 RUNWAY CENTERLINE LIGHT. The runway centerline lights shall be L-850A type. Fixtures shall
168 be Class 2, Mode 1 (6.6A) Style 3 ("Flush") and shall have a maximum height above finished
169 pavement of 0.220". LED fixtures shall have heater kits. Light fixture shall be manufactured by
170 Crouse Hinds, Inc., ADB, or approved equal.

171
172 2.05 RUNWAY TOUCHDOWN ZONE LIGHT. The runway touchdown zone lights shall be L-850B type.
173 Fixtures shall be Class 2, Mode 1 (6.6A) Style 3 ("Flush") and shall have a maximum height above
174 finished pavement of 0.220". LED fixtures shall have heater kits. Light fixture shall be manufactured
175 by Crouse Hinds, Inc., ADB, or approved equal.

176
177 2.06 RUNWAY EDGE LIGHT. The runway edge lights shall be L-850C type. Fixtures shall be Class 2,
178 Mode 1 (6.6A) Style 3 ("Flush") and shall have a maximum height above finished pavement of
179 0.220". Elevated runway edge light shall be L-862 quartz type and have an overall mounting height
180 of 24". Light fixture shall be manufactured by Crouse Hinds, Inc., ADB, or approved equal.

181
182 2.07 TAXIWAY CENTERLINE LIGHT. The taxiway centerline lights shall be L-852 type. Fixtures shall be
183 Class 2, Mode 1 (6.6A) Style 3 ("Flush") and shall have a maximum height above finished pavement
184 of 0.220". LED fixtures shall have heater kits. Light fixture shall be manufactured by Crouse Hinds,
185 Inc., ADB, or approved equal.

186
187 2.08 TAXIWAY EDGE LIGHT. The taxiway edge lights shall be L-852T type. Fixtures shall be Class 2,
188 Mode 1 (6.6A) Style 3 ("Flush") and shall have a maximum height above finished pavement of
189 0.220". Elevated taxiway edge light shall be L-861T quartz type and have an overall mounting height
190 of 24".

191
192 2.09 LIGHT BASES. The light bases shall be L-867 type for the non-load bearing units and L-868 for the
193 load bearing units. The sizes of the units shall be as shown on the drawings and in this specification.
194 All light bases shall be Class I (Steel) with an epoxy powder coating for corrosion protection. The
195 epoxy powder coating shall be Morton Powder Coatings of Reading, PA, product name Corvel
196 17000, with performance characteristics meeting ECB-1363A, or approved equal. Apply a minimum
197 of 2 coats 3 mil thick inside the base. Apply 1 coat, 3 mil thick for exterior surfaces and spacers. All
198 base cans shall include an identification marker installed on the opposite side of pavement marking.
199 The threaded bolt holes shall be masked so that the threads are not covered by the epoxy powder
200 coating material. The ground lug and the counterpoise connection must maintain electrical
201 continuity. The galvanized steel surfaces of the base can and other items shall be pre-treated prior
202 to application of the epoxy coating. The pre-treatment shall ensure that the epoxy coating adheres to
203 the galvanized surfaces. The pre-treatment shall be as recommended by the manufacture of the
204 epoxy coating material, the epoxy coater and as approved by the DIA Project Manager.

205
206 The epoxy powder coating shall be applied level to the top flange of the base can to ensure the
207 fixture, spacer ring(s), flange ring, adapter ring, gaskets and O-ring remain level after installation.
208 For telescoping cans and if required, the diameter of the top and bottom section shall be such that
209 the epoxy powder coating does not interfere with the adjustment of the base can. The temporary top

- 210 section being used as a mud plate does not need to be epoxy powder coated. The spacer rings,
211 adapter rings, flange rings shall be epoxy powder coated. The thickness of the epoxy powder
212 coating shall be 3 mils. The epoxy coating in the channel for the O-ring (between the flush light
213 fixture and the concrete ring or adapter ring) shall be level. The diameter of the O-ring shall be
214 adjusted, if required, such that it is not excessively elevated above channel.
215
- 216 2.10 CABLES. Cables shall comply with specification L-108.
217
- 218 2.11 CONNECTORS. Connectors shall comply with specification L-108.
219
- 220 2.12 ISOLATION TRANSFORMER. The isolation transformers shall be L-830, sized per the fixture
221 manufacturer's recommendations, manufactured by Integro, LLC, Amerace or approved equal.
222
- 223 Existing L-830 sign transformers are 5.5 / 6.2 amps and wattage is sized per amount of sign module.
224
225
- 226 2.13 LAMP. Lamps shall be quartz of size and type to provide distribution and minimum output
227 requirements of isocandela curves shown for each size in AC 150/5345-46B.
228
- 229 2.14 COLORED FILTERS. Colored filters, or colored lenses, to be used for Airfield Lighting Fixtures shall
230 conform to the requirements of Military Specification MIL-C-25050 type I and FAA Advisory Circulars.
231
- 232 2.15 TAPE. Electrical tapes shall be Scotch Electrical Vinyl Tape number 88 and Scotch Electrical
233 Rubber Type number 130C, as manufactured by the Minnesota Mining and Manufacturing
234 Company, or an approved equal.
235
- 236 2.16 CONCRETE and FLOWABLE BACKFILL. Concrete for backfill and flowable backfill shall be in
237 accordance with Item P-610 and P-162.
238
- 239 2.17 CONDUIT. Conduit shall comply with specification L-110.
240
- 241 2.18 HEAT SHRINK. Heat shrink shall comply with specification L-108.
242
- 243 2.19 IDENTIFICATION/NUMBER MARKERS. The engraved identification/number markers shall be as
244 shown on the drawings. Samples shall be submitted and approved prior to placement. Payment for
245 the markers shall be incidental to the item identified, except as indicated otherwise on the drawings.
246
- 247 2.20 REINFORCING STEEL. All reinforcing steel shall be ASTM A615 grade 60.
248
- 249 2.21 BOLTING HARDWARE. All airfield bolting hardware shall be stainless steel and meet FAA
250 requirements. All bolts 1/4" and larger shall be hex head type. All bolts smaller than 1/4" trade size
251 shall be recessed allen type. All bolted connections shall utilize an approved anti-rotational locking
252 type device.
253
- 254 All bolts attaching equipment to a base can shall extend 1/2" minimum, 1-1/2" maximum beyond the
255 base can flange ring. Bolts attaching equipment to base cans shall conform to Engineering Brief 83
256 or latest approved edition, such as approved Dual coated bolts, with ceramic-metallic base
257 coat/fluoropolymer top coat by MCB industries or approved equal.
258
- 259 2.22 ANTI-SEIZE COMPOUND. Anti-seize compound shall have an oxidation inhibitor and electrical
260 conductive properties.
261
- 262 2.23 FILLERS AND ADHESIVES. Joint sealing filler shall be FAA type P-605 and adhesive compounds

263 shall be FAA type P-606.

264

265 2.24 DELIVERY, STORAGE AND HANDLING. Ship materials and equipment disassembled only to the
266 extent necessary for reasons of shipping limitations, handling facilities, and to avoid damage during
267 shipment. Maintain materials in new condition. This shall include the use of heat lamps, suitable
268 coverings, indoor storage, etc. to properly protect the equipment and materials. Any equipment or
269 materials, in the opinion of the DIA Project Manager, damaged during construction, handling, or
270 storage periods shall be replaced by and at the cost of the Contractor.

271

272 2.25 CEMENTITIOUS GROUT. For use in the installation of ID markers. Use SikaGrout 212 or equal as
273 approved by the DIA Project Manager.

274

275

276 PART 3 CONSTRUCTION METHODS

277

278 3.01 INSTALLATION.

279

280 A. All fixtures, signs, base cans, etc. shall be installed as shown on the drawings or approved
281 shop drawings and in accordance with the applicable FAA Advisory Circular. Tolerances
282 given in the FAA Advisory Circulars, these specifications, and the drawings shall not be
283 exceeded. Where no tolerance is given, no deviation is permitted. Items not installed in
284 accordance with the FAA Advisory Circulars, these specifications and drawings shall be
285 replaced by and at the expense of the contractor. In case of conflict between documents
286 the most stringent shall apply. Plywood and target covers are required on all light cans
287 located in P-501 during shipping and paving. The tops of the light cans shall be surveyed to
288 be located a minimum of 2 3/8" below the finished surface of the P-501. All concrete used
289 for these items shall be completely consolidated and contain no voids. All exposed concrete
290 shall be finished smooth with a steel trowel and broom finished. The finished pavement
291 surface shall be protected from foreign substances which could cause staining, i.e. oil, etc.
292 The Contractor shall immediately clean all spills and correct/clean any stained surfaces at
293 the Contractor's expense.

294

295 B. Assemble units and connect to the system in accordance with the manufacturer's
296 recommendations and instructions.

297

298 C. An identification marker shall be installed with each fixture, sign, blank base can, etc. as
299 shown in the drawings. Plastic circuit identification tags identifying each circuit shall be
300 attached to each cable as shown in the drawings.

301

302 D. Provide three (3) feet minimum, four (4) feet maximum of slack in each cable in each base
303 can from conduit entrance.

304

305 E. Painted, epoxy coated or galvanized surfaces that are damaged shall be repaired according
306 to the manufacturer's recommendations, to the satisfaction of the DIA Project Manager.
307 When the damage to a surface is ten percent or more of the total surface, the item shall be
308 replaced at the contractor's expense. . Base cans that have been deformed will cause paint
309 to flake or peel and will be cause for removal and replacement at the contractor's expense.

310

311 F. All airfield lighting threaded connections, i.e. frangible couplings shall be coated with an
312 approved anti-seize compound before being screwed together.

313

314 G. All damaged or incorrect ID markers shall be removed and replaced.

315

- 316 H. Where existing cable and new cable will be connected, install a new connector on the
317 existing and new cable. Once the connection is made, all joints shall be wrapped and the
318 connection covered with heat shrink tubing as in specification L-108.
319
- 320 I. Reinforcing steel cages shall be assembled with tie wire. Reinforcing steel shall be installed
321 true and plumb according to the dimensions and tolerances given on the drawings. Welding
322 is not acceptable.
323
- 324 J. If a PCCP panel must be removed and replaced for any reason and the panel contains a
325 light base, a new light base shall be installed at the Contractor's expense.
326
- 327 K. Maintenance of Existing Airport Lighting Systems during Construction. Protect existing
328 airport lighting systems. Any portion of the existing airport lighting systems damaged or
329 disconnected during installation of the new systems, or other construction activities shall
330 be repaired and reconnected and must be fully functional prior to dusk each day or during
331 adverse weather conditions, to the satisfaction of the Engineer. This work shall be at no
332 additional cost to the Owner. All lighting systems serving active taxiways or runways shall
333 be completely operational to the satisfaction of the Engineer. Any closure to taxiway or
334 runway shall be approved by the Airport.
335
- 336 L. Dewatering necessary to construct L-125 Items and related erosion and turbidity control in
337 accordance with Federal, State and local requirement is incidental to its respective pay
338 item as part of L-125. The cost of all excavation regardless of type of material
339 encountered shall be included in the unit price bid for the L-125 Item.
340
- 341 M. Installation of Base Can in turf. Depth of the hole shall be sufficient for the base can as
342 well as any aggregate material to be placed below for drainage. Fasten a cover to the
343 can, which shall include gasket at final installation. Base cans shall be surveyed to proper
344 elevation, location and set level. P-610 anchor shall be placed around the base can with
345 a minimum of 6" anchor on all sides of the base can. ID markers shall be incidental to
346 base can installation. Dispose of any unused material as direct by the Engineer.
347
- 348 The can hub shall be fitted with grommet fittings as shown on the Drawings. Unused
349 openings shall be securely sealed by an approved manufactured means.
350
- 351 For paved areas, base installation shall be as shown on the Drawings. Before paving
352 may proceed, the Contractor shall demonstrate to the Engineer that the base cans are at
353 the correct elevation, azimuth and rotation and that the proper clearance exists between
354 the base can the paving train.
355
- 356 In Asphalt paved areas two piece L-867 base cans shall have the bottom section
357 surveyed and conduit installed prior to asphalt pavement, to assure the base can
358 installation is at the correct azimuth and elevation.
359
360
361
- 362 N. Semi-flush Fixture Installation. Semi-flush lights shall be assembled in accordance with
363 manufacturer's instructions. The transformer secondary leads shall be connected to the
364 lamp leads by means of a disconnecting plug and receptacle.
365
- 366 Install the fixtures in accordance with the general requirements and details shown on the
367 Drawings. The fixture base and leveling jig shall not be removed until the concrete has
368 sufficiently set.
369
- 370 Proper base can installation is critical to the elevation and alignment of in-pavement

- 371 lights.
- 372
- 373 After installation of the light fixture, the azimuth of the light beam shall not vary more than
- 374 plus or minus ½-degree from the required orientation.
- 375
- 376 O. All bolts and lock washers removed by the Contractor shall be replaced with new bolts
- 377 and washers. Any existing damage to existing equipment shall be documented and
- 378 brought to the Project Manager's attention prior to commencing work. Light fixture
- 379 mounting bolts which are broken by the Contractor shall be repaired by the Contractor at
- 380 no additional cost to the airport. Broken bolts shall be repaired using a method approved
- 381 by the Project Manager.. Method shall include using an approved repair kit that fits within
- 382 the fixture dam ring. Existing bolts shall be drilled out and tapped using the template to
- 383 assure proper alignment of drill. Inserts shall only be used when approved by CCD
- 384 project manager, two part epoxy, and spacer rings are to be removed to assure the insert
- 385 is installed properly. The insert used shall be approved, and manufactured for the intent
- 386 of base can repairs.
- 387
- 388 P. In new pavement, all conduits, ducts banks, counterpoise, base cans, etc. shall be
- 389 installed prior to the placement of the final lift of pavement.
- 390
- 391 Q. If a light can is installed incorrectly or the duct / conduit is plugged / broken or the
- 392 concrete joints are installed incorrectly or the light base can is sawed by the concrete
- 393 saw, the concrete or asphalt pavement around the light base can and the light shall be
- 394 removed and replaced at the Contractor's expense. When in concrete, the full panel shall
- 395 be removed. No partial panel removals will be accepted.
- 396
- 397 R. Manufacturer approved means as accepted by the Project Manager shall be used to seal
- 398 between sections of base cans, spacer rings, and adapter rings. Manufacturer approved
- 399 means for lubrication fixture flange ring or o-ring shall be used.
- 400
- 401 S. All new fixtures shall be provided with properly sized FAA approved transformers.
- 402

403 3.02 TESTING

404

- 405 A. Fully test the installation under the observation of the DIA Project Manager by continuous
- 406 operation for a period of not less than four (4) hours as a completed unit, prior to acceptance
- 407 by the DIA Project Manager.
- 408
- 409 B. Up to two (2) walk-throughs may be initiated by the DIA Project Manager during which the
- 410 airfield lighting units will be required to be in operation. Additional walk-throughs may be
- 411 necessary depending upon the number of discrepancies found on the previous walk-
- 412 throughs.
- 413
- 414 C. The Contractor is responsible for lamp replacements and necessary maintenance of airfield
- 415 items during the testing, construction and walk-through periods.
- 416
- 417 D. Test cabling per specification L-108.
- 418
- 419 E. The Contractor shall perform the necessary inspection and tests for some items
- 420 concurrently with the installation because of subsequent inaccessibility of some
- 421 components. The DIA Project Manager shall be notified by the Contractor forty-eight (48)
- 422 hours in advance of any testing.
- 423
- 424 F. Prior to beginning work, provide written certification that existing light fixtures in area of work

425 are operational.

426

427

428

429 **PART 4 METHOD OF MEASUREMENT**

430

431 4.01 Refer to Appendix A for Method of Measurement.

432

433

434 **PART 5 BASIS OF PAYMENT**

435

436 5.01 Refer to Appendix A for Basis of Payment.

437

438

439

440

END OF ITEM L- 125

SECTION 606

TENSIONED CABLE BARRIER (TL-4)

PART 1 GENERAL

- 1.01 DESCRIPTION This specification covers work for the installation of a two strand Tensioned Cable Barrier Test Level 4 (TL-4) with post spacing as shown on plans.

PART 2 MATERIALS

- 2.01 The two-strand tensioned cable barrier system shall meet the NCHRP Report 350 Test Level 4.
- 2.02 All cable and hardware shall be new (not re-used) and free from defects. All posts shall be socketed posts and shall be fitted with excluders and caps. Prismatic reflectors shall be installed as depicted on the plans and on every cap, and at all end terminal posts. Reflector color shall match the color of the adjacent traveled way edge line. Concrete for posts and anchorages shall be in accordance with section P-610 Structural Portland Cement Concrete. Compressive strength test specimens shall be made in accordance with ASTM C31 and testing in accordance with ASTM C39. Testing frequency shall be at a minimum of one test per day production.

PART 3 CONSTRUCTION REQUIREMENTS

- 3.01 Tensioned Cable Barrier TL-4 shall be installed in accordance with the details shown on the plans and in accordance with the manufacturer's recommendations.
- 3.02 The contractor shall obtain documentation from the manufacturer confirming the most recent detailed drawings are provided for the materials to be installed, and that these materials conform to the requirements of the NCHRP Report 350 TL-4. Three weeks prior to start of work, the contractor shall submit three (3) copies of the manufacturer's drawings and specifications to the engineer. Work shall not begin until approval of these drawing and specifications has been received from the engineer.

Installation of the cable barrier shall be performed by contractor personnel in the presence of the DIA Project Manager or his representative.

The wire rope shall be pre-stretched during manufacturing in accordance with the manufacturer's specifications. The minimum breaking strength shall be not less than 39,000 pounds. Sections of wire rope shall be connected using turnbuckles, with threaded ends factory swaged onto the wire rope. However, a maximum of two field-installed wedge-type connectors per wire rope per run may be used if needed for length adjustment. If used, they shall be the threaded-end socket type which secures the wedge by compression.

End anchorages (Tensioned Cable barrier) shall conform to NCHRP 350, Test Level 3 (TL-3) (End anchorages rated for TL-3 are the only devices currently available.)

Concrete foundations for end anchorages and line posts shall be constructed with the appropriate rebar as recommended by the manufacturer, based on size of the foundations. Concrete foundations for line posts and end anchorage shall be constructed with reinforcing rings, regardless of whether mow strips are installed or not.

The concrete post footing size shall be 14 inches in diameter and 3 feet in depth. The concrete anchor footing size shall be 18 inches in diameter, and 3 feet in depth. All footings shall be constructed in accordance with section P-610 Structural Portland Cement Concrete.

58
59 The contractor shall maintain the cable barrier until the DIA Project Manager's final acceptance
60 upon project completion. Cable barrier tensioning shall be checked no later than six weeks after
61 project acceptance.
62

63 Tensioned Cable Barrier (TL-4) and End Anchorage (Tensioned Cable Barrier) spare parts shall
64 be provided and become the property of DIA Maintenance. Spare parts shall be delivered to the
65 DIA Project Manager. Spare parts shall include one complete anchorage (above ground
66 hardware only) and all supplies needed for repairs for 100 linear feet of tensioned cable barrier
67 (TL-4), including but not limited to: standard socketed line posts, transition posts, post caps,
68 turnbuckles, excluders, locating pegs, and post caps with prismatic reflectors with same spacing
69 as installed. Spare parts shall not include cable. The contractor shall coordinate delivery of the
70 spare parts with the DIA Project Manager.
71

72
73

74 **PART 4 METHOD OF MEASUREMENT**

75

76 4.01 Tensioned Cable Barrier (TL-4) will be measured by linear foot of barrier that is installed and
77 accepted, excluding end anchorage, posts, ropes, all necessary parts and fittings, and minimum
78 post footings will not be measured and paid for separately, but shall be included in the cost of the
79 work.
80

81 End anchorage (Tensioned Cable Barrier) for tensioned cable barrier will be measured by the
82 actual number of anchorages that are installed and accepted. End anchorage (Tensioned Cable
83 Barrier) shall include concrete for standard size footings, and all necessary parts and fittings.
84

85 Additional concrete required for post or end anchorage footings larger than minimum size, if any
86 is required, shall be incidental. Additional length or diameter of boring, if any is required, shall be
87 incidental.
88

89

90 **PART 5 BASIS OF PAYMENT**

91

92 5.01 The accepted quantities of tensioned cable barrier will be paid for at the contract unit price for
93 each of the pay items listed.
94

Pay Item	Pay Unit
Tensioned Cable Barrier (TL-4)	Linear Foot
End Anchorage (Tensioned Cable Barrier)	Each
P-610 Structural Portland Cement Concrete	Cubic Yard

99

100 Payment will be full compensation for all work and materials required to complete the Tensioned
101 Cable Barrier (TL-4) and End Anchorage work.
102

103 Minimum concrete foundations for end anchorage and line posts will not be measured and paid
104 for separately, but shall be included in the work. Payment for concrete will be only for extra
105 material required for larger foundations and approved by the DIA Project Manager. Payment for
106 concrete foundations larger than described in this specification shall include longer-length or
107 larger-diameter boring and all reinforcing steel.
108

109 Furnishing and delivering the spare parts will not be measured and paid for separately, but shall
110 be incidental.
111

112 All costs associated with manufacturer's documentation, foundation design, will not be measured
113 and paid for separately but shall be incidental.
114

115

END OF SECTION 606

APPENDIX A
MEASUREMENT AND PAYMENT

P-150 – DEMOLITION**PART 4 METHOD OF MEASUREMENT**

- 4.01 Removal of pavement shall be measured per square yard based on the area shown on the plans. Any pavement removed outside the designed limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. The thickness of the existing material to be removed is approximate only and the Contractor will not be reimbursed for areas that may be thicker than shown on the plans. Removal of pavement shall include all sawcutting of pavement necessary to facilitate removal.
- 4.02 Pavement marking removal shall be measured per square foot.
- 4.03 Removal of base cans, surface sensor, light fixtures, detector loops, or headwalls/wingwalls shall be measured per each. The removal of taxiway edge lights and includes all conduit and cable. The removal of the detector loops shall include all sawcutting of pavement necessary to facilitate removal.
- 4.04 Removal of area drains and pipe shall be measured per linear foot.
- 4.05 Removal of De-Ice Booms shall be measured per each.

PART 5 BASIS OF PAYMENT

- 5.01 Payment shall be made at the contract unit price per square yard for each type of pavement material removed. This price shall be full compensation for furnishing all materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.
- 5.02 Payment shall be made at the contract unit price per square foot for pavement marking removal. This price shall be full compensation for furnishing all materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.
- 5.03 Payment shall be made at the contract unit price per each for base cans or headwall/wingwall removed. This price shall be full compensation for furnishing all materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.
- 5.04 Payment shall be made at the contract unit price per linear foot for removal of area drains and pipe. This price shall be full compensation for furnishing all materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.
- 5.05 Payment shall be made at the contract unit price per linear foot for removal of De-Ice Booms and associated electrical panel, removal of electrical wiring back to main panel, removal of lights, removal of pumps and all, above ground, apparatus. Plumbing shall be capped below the concrete. All removed equipment shall be hauled offsite. This price shall be full compensation for furnishing

APPENDIX A – MEASUREMENT AND PAYMENT

all materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment shall be made under:

- P-150a Remove 17-Inch Reinforced Concrete Pavement.....per square yard
- P-150b Remove 17-Inch Non-Reinforced Concrete Pavementper square yard
- P-150c Pavement Marking Removal..... per square foot
- P-150d Demolish L-868B Base Canper each
- P-150e Demolish L-868C Base Canper each
- P-150f Remove and Cap Area Drains and Pipeper linear foot
- P-150g Remove De-Ice Booms & Associated Electrical Panels, Cap Plumbing,
Haul offsiteper each

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MEASUREMENT AND PAYMENT

P-151 – CLEARING AND GRUBBING

PART 3 METHOD OF MEASUREMENT

- 3.01 Clearing and grubbing will not be measured for payment, but shall be considered incidental to Item P-152, Excavation and Embankment.

PART 4 BASIS OF PAYMENT

- 4.01 Clearing and grubbing shall be considered incidental to Item P-152, Excavation and Embankment. No direct payment shall be made for clearing and grubbing.

APPENDIX A**MEASUREMENT AND PAYMENT****P-152 – EXCAVATION AND EMBANKMENT****PART 4 METHOD OF MEASUREMENT**

- 4.01 The quantity of topsoil removal, stockpile, and replacement will be measured in its final place, per square yard.
- 4.02 The quantity of excavation to be paid for shall be the number of cubic yards measured in place by field survey. Measurement for excavation shall be to a vertical plane at the horizontal distances shown on the plans. Quantities for all excavations shall be computed by the average end area method in cross-sections taken at maximum 100 foot intervals. Measurement shall be based on the elevations of ground surface after stripping, between neat lines shown on the Contract Drawings.
- 4.03 The quantity of common and select embankments to be paid for shall be the number of cubic yards measured in place by field survey. No measurement shall be made due to foundation or embankment settlement. Measurement for select embankment shall be to a vertical plane at the horizontal distances shown on the plans. Any select embankment outside of the vertical slope or below the plan thickness shall be measured and paid for as common embankment. Quantities for all embankments shall be computed by the average end area method in cross-sections taken at maximum 100 foot intervals. Measurement shall be based on the elevations of ground surface after stripping, between neat lines shown on the Contract Drawings. No payment will be made due to over excavation.

PART 5 BASIS OF PAYMENT

- 5.01 For "Unclassified Excavation, Export Off Site" 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. It includes clearing and grubbing, excavating, hauling, haul roads, stockpiling, preparation of the embankment area, placing, spreading, shaping, maintaining ditches, disposing of unsuitable material, and conditioning and compacting of embankment materials. The volume will be determined based on 4.02 and Section 01025, paragraph 1.02C, Measurement by Volume.
- 5.02 For "DIA Upper Select Fill Borrow Embankment" 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. It includes excavating, hauling, haul roads, stockpiling, preparation of the embankment area, placing, spreading, conditioning, compacting, also includes clearing and grubbing, borrow area topsoil removal and replacement, blending, and all other operations required for the select material borrow areas.

The scarifying, moisture conditioning, recompaction, and retesting of the top 8" of existing surfaces, or as shown on the drawings, shall be included in the unit price for DIA Upper Select Fill Borrow Embankment.

Payment shall be made under:

P-152a Unclassified Excavation, Export Off Site per cubic yard

P-152b DIA Upper Select Fill Borrow Embankment..... per cubic yard

APPENDIX A

MEASUREMENT AND PAYMENT

P-153 – WATERING

PART 4 METHOD OF MEASUREMENT

- 4.01 There shall be no direct measurement or payment for water required in the construction of this project. The work under this item shall be considered subsidiary to other items of work.

PART 5 BASIS OF PAYMENT

- 5.01 Water shall be considered incidental to the project. No direct payment shall be made for water.

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MEASUREMENT AND PAYMENT

P-161 – GEOTEXTILE

PART 4 METHOD OF MEASUREMENT

4.01 Bondbreaker fabric used in conjunction with pavement construction shall be measured by the number of square yards in-place based on the neat lines shown on the Drawings. No allowance will be made for materials in laps, seams, or for waste trimmed.

PART 5 BASIS OF PAYMENT

5.01 Payment will be made at the contract unit price per square yard for bondbreaker fabric. The price shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment shall be made under:

P-161a Bondbreaker Fabricper square yard

APPENDIX A

MEASUREMENT AND PAYMENT

P-162 – CONTROLLED LOW-STRENGTH MATERIAL (CLSM)

PART 4 METHOD OF MEASUREMENT

4.01 The quantity of CLSM shall be measured by number of cubic yards of completed and accepted base course.

PART 5 BASIS OF PAYMENT

5.01 Payment shall be made at the contract unit price per cubic yard for CLSM base course. This price shall be full compensation for utilizing existing materials and for all preparation, delivering, placing and mixing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

P-162a Repair Soil Cement Base with CLSM (Flowable Fill)..... per cubic yard

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MEASUREMENT AND PAYMENT

P-301 – SOIL-CEMENT BASE COURSE

PART 4 METHOD OF MEASUREMENT

- 4.01 The quantity of soil-cement base course shall be measured by number of square yards of completed and accepted base course.
- 4.02 The quantity of hydrated cement shall be measured by the ton. Weigh tickets or similar documentation shall be used to determine the actual amount of cement used.

PART 5 BASIS OF PAYMENT

- 5.01 Payment shall be made at the contract unit price per square yard for soil-cement base course. This price shall be full compensation for utilizing existing materials (except portland cement) and for all preparation, delivering, placing and mixing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item. The soil consists of the existing upper most twelve inches of in-place select embankment material. Pavement shall include only the cost of reprocessing/mixing the in-place select embankment material.
- 5.02 Payment shall be made at the contract unit price per ton for hydrated cement. This price shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment shall be made under:

P-301a Soil-Cement Base Course (12-Inch).....	per square yard
P-301b Hydrated Cement.....	per ton

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P-304 – CEMENT-TREATED BASE COURSE

PART 5 METHOD OF MEASUREMENT

7.01 The quantity of cement-treated base to be paid for will be determined by neat line measurement of the number of square yards of base at the depths indicated on the Plans which are actually constructed and accepted by the Engineer as complying with the Plans and Specifications.

PART 6 BASIS OF PAYMENT

8.01 Payment for accepted plant mix bituminous pavement shall be made at the contract unit price per ton adjusted in accordance with paragraph 401-8.01.A.

8.02 Payment shall be made at the contract unit price per square yard at the depth indicated for cement-treated base course. This price shall be full compensation for furnishing all materials, for all preparation, manipulation, and placing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Each lot of cement-treated base course will be accepted for density at the full contract unit price when the results of four density tests indicate that the average density is equal to or greater than 98 percent as determined by paragraph 304-4.6. Each lot not meeting this requirement will be accepted at an adjusted contract unit price in accordance with Table 3.

In addition, each lot of cement treated base course will be accepted for thickness at the full contract unit price when the results of four thickness tests indicate that the average thickness is within 0.25 inches of plan depth. Each lot not meeting this requirement will be accepted at an adjusted contract unit price in accordance with Table 4.

Payment shall be made under:

P-304a Cement-Treated Base Course (8-Inch)per square yard

APPENDIX A

MEASUREMENT AND PAYMENT

P-401 – PLANT MIX BITUMINOUS PAVEMENTS

PART 7 METHOD OF MEASUREMENT

7.01 Plant mix bituminous pavement shall be measured per ton per the specified depth of bituminous mixture to be used in the accepted work. Recorded batch weights or truck scale weight will be used to determine the bases for the tonnage.

PART 8 BASIS OF PAYMENT

8.01 Payment for accepted plant mix bituminous pavement shall be made at the contract unit price per ton adjusted in accordance with paragraph 401-8.01.A.

Payment shall be made under:

P-401a Bituminous Surface Course (3-Inch)per ton

P-401b Bituminous Base Course (7-Inch).....per ton

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P-403 – ASPHALT-TREATED PERMEABLE BASE

PART 6 METHOD OF MEASUREMENT

6.01 Asphalt Treated Permeable Base (ATPB) shall be measured by the number of square yards as specified in-place, complete and accepted by the DIA Project Manager.

PART 7 BASIS OF PAYMENT

7.01 Payment for an accepted Asphalt Treated Permeable Base (ATPB) shall be made at the full or adjusted contract unit price per square yard. This price shall be full 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 shall be made under:

P-403a Asphalt-Treated Permeable Base Course (5-Inch to 7-Inch)per square yard

APPENDIX A

MEASUREMENT AND PAYMENT

P-501 – PORTLAND CEMENT CONCRETE PAVEMENT

PART 7 METHOD OF MEASUREMENT

7.01 Portland cement concrete pavement shall be measured by the number of square yards of either plain or reinforced pavement as specified in-place, complete and accepted by the DIA Project Manager. Portland cement concrete pavement transition areas from 17” to 21” shall be measured as 17” Portland cement concrete pavement, either plain or reinforced.

Saw cutting for joints, dowel and tie-bar placement, steel reinforcement, and sealants as detailed in the drawings and specifications, shall be considered incidental, and shall not be measured separately.

7.02 Spall repair shall be measured by the number of square feet of spall repair as specified in-place, completed and accepted by the DIA Project Manager.

Sawcutting, removal of existing pavement including chipping, sandblasting, rebar, and sealants as detailed in the drawings and specifications, shall be considered incidental, and shall not be measured separately. Epoxy repair shall be measured and paid for separately per 501-7.06.

7.03 Concrete blockouts shall be measured per each blockout installed and accepted by the DIA Project Manager.

Rebar, reinforcing, and sealant as detailed in the drawings and specifications, shall be considered incidental, and shall not be measured separately.

PART 8 BASIS OF PAYMENT

8.01 Payment for accepted concrete pavement shall be made at the contract unit price per square yard adjusted in accordance with paragraph 501-8.01.A.

8.02 Payment for spall repair shall be made at the contract unit price per square foot. This price shall be full 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.

8.04 Payment for concrete blockouts shall be made at the contract unit price per each. This price shall be full 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 shall be made under:

P-501a 17-inch Portland Cement Concrete Pavement, Plain-Low Production (LP)per square yard

P-501b 17-inch Portland Cement Concrete Pavement, Reinforcedper square yard

APPENDIX A – MEASUREMENT AND PAYMENT

- P-501c Concrete Blockoutper each
- P-501d Spall Repair Around Light Can per square foot
- P-501e Spall Repair per square foot

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P-604A – PREFORMED EXPANSION JOINT COMPRESSION SEALS

PART 6 METHOD OF MEASUREMENT

- 6.01 There shall be no direct measurement or payment for preformed expansion joint compression seals. The work under this item shall be considered subsidiary to other items of work.

PART 7 BASIS OF PAYMENT

- 7.01 Preformed expansion joint compression seals shall be considered incidental to the project. No payment shall be made for preformed expansion joint compression seals.

APPENDIX A

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P-605 – JOINT SEALING FILLER

PART 6 METHOD OF MEASUREMENT

- 6.01 There shall be no direct measurement or payment for joint sealing filler. The work under this item shall be considered subsidiary to other items of work.

PART 7 BASIS OF PAYMENT

- 7.01 Joint sealing filler shall be considered incidental to the project. No payment shall be made for joint sealing filler.

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P-610 – STRUCTURAL PORTLAND CEMENT CONCRETE

PART 4 METHOD OF MEASUREMENT

- 4.01 In general, and unless listed in the proposal as a separate payment item, structural concrete will not be measured for payment, but shall be incidental to those proposed items constructed of concrete.
- 4.02 Cement Treated Base (CTB) repair shall be measured per square yard including existing cement treated base milling and structural concrete installation.

PART 5 BASIS OF PAYMENT

- 5.01 Structural concrete shall be considered incidental to the project. No payment shall be made for structural concrete, unless listed in the proposal as a separate payment item.
- 5.02 Payment for Cement Treated Base Repair shall be made at the contract unit price per square yard. This price shall be full compensation for furnishing all labor, material, equipment, tools, and incidentals necessary to complete the item.

Payment shall be made under:

P-610a Cement Treated Base Repair.....per square yard

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MEASUREMENT AND PAYMENT

P-620 – RUNWAY AND TAXIWAY PAINTING AND SIGNAGE

PART 4 METHOD OF MEASUREMENT

4.01 The quantity of taxiways pavement markings to be paid for shall be the number of square feet of painting performed in accordance with the specifications and accepted by the Project Manager.

PART 5 BASIS OF PAYMENT

5.01 Payment for pavement marking shall be made at the contract unit price per square foot. This price shall be full 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 shall be made under:

P-620a Pavement Marking..... per square foot
P-620b Non-Reflective Pavement Marking per square foot

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D-751 – MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES

PART 5 METHOD OF MEASUREMENT

5.01 Repair and reconstruction of manholes and utilities shall be measured per each, in-place, complete and accepted by the DIA Project Manager.

PART 6 BASIS OF PAYMENT

6.01 Payment for repair and reconstruction of manholes and utilities shall be made at the contract unit price per each, complete and in-place. This price shall be full compensation for furnishing all materials and for all preparation, dewatering, excavation, backfilling and placing of the materials; furnishing and installation of such special connections to pipes and other structures as may be required to complete the item shown on the plans; and for all labor, equipment, tools and incidentals necessary to complete the item.

Payment shall be made under:

- D-751a Adjustment to Gate Elevation of Existing 1-Grate Inletper each
- D-751b Adjustment to Gate Elevation of Existing 2-Grate Inletper each
- D-751c Adjustment to Gate Elevation of Existing 4-Grate Inletper each

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L-100 – LIGHTING AND ELECTRICAL WORK

PART 4 METHOD OF MEASUREMENT

4.01 There shall be no separate measurement made for items in L-100.

PART 5 BASIS OF PAYMENT

- 5.01 All work required by Item L-100 shall be included in the prices for installation of the respective electrical items. Each pay item listed in other sections of these specifications lists the major components of work and material to be installed. In no way shall the omission of any reference to work or material implied by the drawings or specifications release the Contractor from performing or providing a complete and functional installation for the contract price as agreed upon at the time of contract award.
- 5.02 If the Contractor can identify work not included as part of other pay items, payment in L-100 shall be made under the following conditions. The work identified must not be described or shown on the plans, not listed as part of other pay items as identified in these specifications, and must be required to complete the work and provide a complete and functional installation. If this pay item is submitted upon, the contractor shall submit a list clearly identifying and describing each item claimed not to be part of the other pay items. This list shall be reviewed by the DIA Project Manager for approval.

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L-108 – UNDERGROUND POWER CABLE FOR AIRPORTS

PART 4 METHOD OF MEASUREMENT

- 4.01 Cable installed in conduit shall be measured by the number of linear feet of cable installed in conduit, including L-823 connector kits, vinyl electrical tape, rubber electrical tape, heat shrink tubing and cable tags in place, completed, ready for operation, and accepted as satisfactory.
- 4.02 Counterpoise wire and all exothermic welds shall be incidental to either each base can installed or the linear feet of conduit installed.
- 4.03 Temporary jumper cable shall be measured by the number of linear feet of cable installed in conduit, including counterpoise, ground rods and connectors, trench and backfill, conduit, saw kerfs and sealant, or other projection, installed and removed.

PART 5 BASIS OF PAYMENT

- 5.01 Payment will be made at the contract unit price for cable installed in conduit measured from center-to-center of lights or splice cans along the conduit path including cable slack and loops as measured and accepted by the DIA Project Manager. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.
- 5.02 Payment will be made at the contract unit price for cable installed in conduit measured from one end of the closed circuit to the other along the low profile barricades at the perimeter of the closure. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

- L-108a Install Cable, 1/C #8, 19 Strand, 5kV, L-824, Type Bper linear foot
- L-108b Install Cable, 2/C #8, 19 Strand, 5kV, L-824, Type B, Temporary Jumper.....per linear foot

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L-110 – AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

PART 4 METHOD OF MEASUREMENT

- 4.01 Underground duct shall be measured by the linear feet of duct installed, including trenching, excavation, removal of excavated material, conduit chairs, conduit couplings, adhesives, concrete encasement, backfill, compaction, all measured in place, completed, and accepted as satisfactory.

PART 5 BASIS OF PAYMENT

- 5.01 Payment will be made at the contract unit price per linear foot for each type and size of duct completed and accepted by the DIA Project Manager. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

- L-110a Install 1-way, 2-inch PVC Concrete Encased Duct.....per linear foot
- L-110b Install 1-way, 2-inch PVC Duct in CLSM.....per linear foot
- L-110c Remove 1-way, 2-inch PVC Concrete Encased Duct.....per linear foot

APPENDIX A**MEASUREMENT AND PAYMENT****L-125 – AIRPORT LIGHTING SYSTEMS****PART 4 METHOD OF MEASUREMENT**

- 4.01 The quantity of airfield lighting units to be paid for under this item shall be the number of each type installed, complete and in place, ready for operation, and accepted by the DIA Project Manager. It shall also include the safeguarding of existing lights and isolation transformers, the reconnection to existing conduits and counterpoise wire.

When installing an existing fixture on an existing base can, incidental to the pay Item shall be spacer ring(s), concrete dam, stainless steel bolts, two piece lock washers, adhesive, and sealant.

When installing a new base can, incidental to the pay Item shall be a new epoxy coated spacer ring(s), epoxy coated concrete dam, rubber grommets, rubber o-ring, end bells, stainless steel bolts, two piece lock washers, rebar, concrete, adhesive, and sealant. Each airfield lighting unit shall include the installation of identification brass marker(s) as detailed in the drawings.

When installing a new 26" deep base can, incidental to the pay Item shall be a new epoxy coated spacer ring(s), epoxy coated concrete dam, rubber grommets, rubber o-ring, end bells, stainless steel bolts, two piece lock washers, rebar, concrete, trenching of existing conduit, new conduit, P-610 dyed red, 1,200 psi P-610 structural concrete, adhesive, and sealant. Each airfield lighting unit shall include the installation of identification brass marker(s) as detailed in the drawings.

When installing a new fixture, incidental to the pay Item shall be an L-830 isolation transformer.

Removal and reinstallation of light fixture will be paid for fixtures within the width one concrete panel that are adjacent to concrete panels being demolished.

- 4.02 Adjustment of base cans and lights shall be measured per each, in-place, complete and accepted by the DIA Project Manager.

PART 5 BASIS OF PAYMENT

- 5.01 Payment will be made at the contract unit price for each item completed in accordance with the plans and specifications that is installed by the Contractor and accepted by the DIA Project Manager. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment shall be made under:

L-125a Remove and Reinstall Light Fixture (for fixtures 1 panel outside demo area and for taxiway

APPENDIX A – MEASUREMENT AND PAYMENT

edge lights).....	per each
L-125b Install New Transformer.....	per each
L-125c Install New 22" L-868B Base Can.....	per each
L-125d Install New 26" L-868B Base Can (fixtures located at Expansion Joints).....	per each
L-125e Install New L-852C, Bi-directional, Narrow Beam, Taxiway Centerline Light on Base Can.....	per each
L-125f Drill Out Existing Light Can Bolt and Re-thread Existing Bolt Hole	per each
L-125g Install New L-852D, Bi-directional, Wide Beam Taxiway Centerline Light on Base Can.....	per each
L-125h Install New L-852D, Uni-directional, Wide Beam Taxiway Centerline Light on Base Can.....	per each
L-125i Install New ¾" Steel Blank with Recessed bolts on Base Can.....	per each

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606 – TENSIONED CABLE BARRIER

PART 4 METHOD OF MEASUREMENT

- 4.01 The quantity of tensioned cable barrier to be paid for under this item shall be the number of linear feet of barrier installed, complete and in place, ready for operation, and accepted by the DIA Project Manager.
- 4.02 The quantity of tensioned cable barrier anchors to be paid for under this item shall be the number of each anchor installed, complete and in place, ready for operation, and accepted by the DIA Project Manager.

PART 5 BASIS OF PAYMENT

- 5.01 Payment will be made at the contract unit price for each liner foot of barrier completed in accordance with the plans and specifications that is installed by the Contractor and accepted by the DIA Project Manager. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.
- 5.02 Payment will be made at the contract unit price for each cable barrier anchor completed in accordance with the plans and specifications that is installed by the Contractor and accepted by the DIA Project Manager. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment shall be made under:

- 606a Install New Tensioned Cable Barrier.....per linear foot
- 606b Install New Tensioned Cable Barrier Anchorper each

EXHIBIT E

DIA RECYCLE YARD SCHEDULE OF PRICES

DIA Project & Maintenance:

(Excludes Applicable Taxes and Fees)

Incoming Recyclable Rubble:

Pre-Break, Size, Clean & Stockpile

Weigh & Inspect Incoming Rubble	\$0.46	per Ton
<24" Rubble Size	\$2.20	per Ton
>24" Rubble Size	\$5.75	per Ton
Structural Reinforced Rubble	\$13.30	per Ton
Reinforced Concrete Pipe	\$8.95	Linear Foot

Outgoing Recycled Material:

Class 6-CDOT Recycled Concrete Base	\$5.20	per Ton
Class 6-CDOT Recycled Asphalt Base	\$5.10	per Ton
Class 5-CDOT Recycled Concrete Base	\$5.20	per Ton
Class 5-CDOT Recycled Asphalt Base	\$5.10	per Ton
Class 1-CDOT Structural Fill	\$4.46	per Ton
2" x 3/4" Concrete Dry Screened Stone	\$11.50	per Ton
4" x 2" Concrete Dry Screened Stone	\$10.55	per Ton
ASTM (#57/#67) Concrete Dry Screened Stone	\$15.20	per Ton
DIA Stone (6" & 12")	\$16.10	per Ton
3/8" Fines	\$3.15	per Ton

Load Recycled Materials (Out-Going)	\$0.79	per Ton
Weigh Recycled Materials (Out-Going)	\$0.46	per Ton



DENVER INTERNATIONAL AIRPORT

Contractor's Daily Construction Report

Contract Name: _____
 Contractor: _____ Contract No.: _____
 Date: _____
 Prepared by: _____ Report No.: _____

Weather: Sunny Fair Cloudy Rain _____ inches Snow _____ inches
 Max. Wind: _____ mph Max/Min Temp. _____ deg F/ _____ deg F

DAILY ACTIVITIES WITH LOCATION	SHIFT START _____ STOP _____	LOAD COUNTS	COMPLIES WP&S	
			YES	NO

QUANTITY COMPLETE	MAJOR SHIPMENTS RECEIVED

Subcontractors								EQUIPMENT AT SITE		
								DESCRIPTION	NO.	HRS.

PERSONNEL

Work Delayed and Reason

Rework and Reason

Potential Future Delays

Problems and Unusual Conditions **UNDER REPAIR**

Direction Received

CERTIFIED BY (signature required):
 Contractor QC Representative: _____
 Contractor Superintendent: _____ Page ____ of ____

NOTE: This report must be completed with legible handwriting and submitted to the City and County of Denver Project Manager with original signatures. Use a separate sheet per shift.

DENVER INTERNATIONAL AIRPORT REQUEST FOR INFORMATION

Contractor: _____
Subcontractor: _____
Contract Title: _____
Site Location: _____

RFI No.:	_____
Contract No.:	_____
Date Logged:	_____
Logged by:	_____

Subject: _____ Reply Required by: _____ URGENT?

Dwg./Spec. No.: _____ Detail/Sec. No.: _____

Problem:

Proposed Solution from Contractor by:	Date:	Reviewed By:
---------------------------------------	-------	--------------

Response by Project Manager:

Solution by:	Reviewed By:
--------------	--------------

CM-30 INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.
 2. Each submittal shall be numbered consecutively in the space provided for "Submittal No.". This number shall begin with the overall sequential number 001 through the last total number of submittals to date. This number shall not be repeated. Next, show the specification section number (e.g.; 01370) and end with the specification section sequential number 001 through the last submittal in that section.

EXAMPLE NO. 1: 005-01370-002 five submittals have been logged overall with two submittals made to specification section 01370.

EXAMPLE NO. 2: 009-01370-002R1 nine submittals made overall and one revision to submittal 01370-002.
- Mark the appropriate box "New Submittal" or "Resubmittal". For first time specification section submittals place the submittal number in the "Transmittal No." box and an N/A in the "Previous Submittal No." box. For resubmittals place the new submittal number in the "Submittal No." box with the previous submittal number of that item in the "Previous Submittal No." box.
3. The "Item No." will be consecutive from 001 to the last item on the submittal form.
 4. Use separate submittal forms for each specification section. Do NOT use more than one specification section on the same CM-30.
 5. A check mark shall be placed in Column "g" when a submittal is not in accordance with the plans and specifications. Include a written statement to that effect in the "Remarks" box.
 6. This form is self-transmitted; a separate Letter of Transmittal is NOT required.
 7. When a sample of material or manufacturer's Certificate of Compliance is submitted, indicate "Sample" or "Certificate" in Column "c".
 8. The CCD approving authority will assign action codes as indicated below in spaces provided in Column "h" for each item submitted. In addition, the CCD will ensure enclosures are indicated and attached to the form prior to return to the Contractor.
- THE FOLLOWING ACTION CODES SHALL BE GIVEN TO ITEMS SUBMITTED:
- | | | | |
|-----|--|-----|-----------------------|
| A - | Accepted as submitted. | E - | Not Accepted. |
| B - | Accepted as Noted. Resubmission is NOT required. | F - | Receipt Acknowledged. |
| C - | Revise and Resubmit. Resubmission IS required. | G - | Other (specify). |
| D - | Will be returned to the Contractor by separate correspondence. | | |
9. Acceptance of items does not relieve the Contractor from complying with all requirements of the contract plans and specifications.

DENVER INTERNATIONAL AIRPORT CONTRACTOR WARRANTY

CONTRACT NAME:

CONTRACT NO.:

Contractor: _____

Work - means all work performed by the Contractor under the contract referred to above.

City - means the City and County of Denver, Colorado

Contract Documents - means contract documents for the DIA contract between the City and the contractor referred to above.

I. CONTRACTOR'S WARRANTIES AND CORRECTION WORK

A. The contractor warrants to the City that all parts, materials, components, equipment, and other items incorporated into the Work are new, unless otherwise specified, and are suitable for the purpose used, are of good quality, are free from faults and defects, and are in conformance with the contract documents. The contractor also warrants that its workers are sufficiently skilled to produce quality Work free from faults and defects. Work not so conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The contractor, when requested, shall furnish the City with satisfactory evidence as to the kind and quality of materials and equipment incorporated into the Work. The contractor further warrants that the construction processes and methods employed to perform the Work have in the past proven to be suitable for the results expected.

B. The contractor further warrants that it has full title to all parts, materials, components, equipment, and other items conveyed to the City under the terms of this contract, that its transfer of such title to the City is rightful, and that all such parts, materials, components, equipment, and other items shall be transferred free and clear from all security interests, liens, or encumbrances whatsoever. The contractor agrees to warrant and defend such title against all persons claiming the whole, or any part thereof, at no cost to the City.

C. The contractor shall promptly investigate, repair, replace or otherwise correct any of its workmanship and any parts, materials, components, equipment, or other items incorporated into the Work which contain faults or defects whether such failures are observed by the City or the contractor at any time during the contract term or during the warranty period. The contractor shall bear all costs of investigating and correcting, which includes the design efforts necessary to correct such Work covered by the warranty as described under the 1999 edition of the General Contract Conditions, Title 18 or elsewhere in the contract documents. If repair or replacement of faulty items of the Work is necessary, proper temporary substitutes shall be provided by the contractor in order to maintain the progress of the Work and/or keep systems operating without any additional costs to the City. The obligations of this Contractor Warranty shall survive termination of the contract under the provisions of the 1999 edition of the General Contract Conditions, Title 22. Nothing herein shall limit the City's right to seek recovery for latent defects that are not observable until after the warranty periods have run.

D. The contractor's warranty for all Work components shall continue for the following period:

1. For a period of one (1) year after the date of Substantial Completion or for such longer period of time as may be prescribed by the terms of any special warranties required by the contract documents.

E. Nothing contained in this Contractor Warranty shall be construed to establish a period of limitation with respect to any other obligation that the contractor might have under the contract documents. The establishment of the warranty period set forth above relates only to the specific obligation of the contractor to

DENVER INTERNATIONAL AIRPORT CONTRACTOR WARRANTY

CONTRACT NAME:

CONTRACT NO.:

correct the Work and has no relationship to the time within which its obligation to comply with the contract documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the contractor's liability with respect to its obligations and resulting damages other than specifically to correct the Work.

F. The contractor, at its own expense, shall also investigate, repair, or replace any damages to any equipment, facilities, or other personal or real property owned or leased by the City which is damaged as a result of any such fault or defect in the Work with no cost to the City.

G. All subcontractor's, manufacturer's, and supplier's warranties, express or implied, for any part of the Work and any materials used therein, shall be obtained and enforced by the contractor for the benefit of the City whether or not these warranties have been assigned or otherwise transferred to the City. The contractor shall assign or transfer such warranties to the City if the City requests the contractor to do so, but such transfer shall not affect the contractor's obligation to enforce such warranties. These warranties are listed at the end of this document and attached hereto.

II. PERFORMANCE DURING WARRANTY PERIOD

A. The City will notify the contractor of Work found to be defective and fails to satisfy the warranties as described the 1999 edition of the General Contract Conditions, Article 18, Section 1801, or elsewhere in the contract documents. The contractor shall, within ten (10) days or such longer time as may be requested and set forth in the notice, commence the repair, replacement, or correction of the defective work. Should the contractor fail to complete such Work within a reasonable period, the City may make the repairs or replacements at the expense of the contractor. If the City determines that immediate action to make repairs, replacements, or other corrections is necessary because of emergency conditions or to prevent further loss or damage, the City may proceed without notice to the contractor, but at the expense of the contractor.

B. If the contractor does not proceed with the correction of such defective work within the time fixed by written notice from the Project Manager, or in an emergency condition, the City may remove the defective work and may store the materials or equipment at the expense of the contractor. If the contractor does not pay the cost of the removal and storage within ten (10) days thereafter, the City may, upon ten (10) additional days written notice, sell the stored Work at auction.

C. If the proceeds of any such sale do not cover all costs which the City has incurred and which the contractor should have borne, the difference shall be charged to the contractor and the contractor and its surety shall be liable for and pay the difference to the City.

D. If the contractor does not agree that the Work is defective or the defective work is its responsibility and if there are no emergency conditions, the contractor may request review, in writing, of the City's decision in accordance with the 1999 edition of the General Contract Conditions, Title 13. If such review is not requested within ten (10) days of the notification of defective work, the contractor shall have waived the right to contest its responsibility for the correction of the defective work. Under emergency conditions, the contractor shall immediately correct the alleged defective work, and the question of responsibility for the expense shall be determined by the Deputy Manager of Aviation, subject to the right of the contractor to seek review, within ten (10) days of the City's notice allocating responsibility for the expense.

DENVER INTERNATIONAL AIRPORT CONTRACTOR WARRANTY

CONTRACT NAME:

CONTRACT NO.:

E. Should the City claim by written communication sent or mailed before the warranty period expires that certain defective work exists and that it requires repair or replacement, the warranty period for such defective work shall be automatically extended for as long as that defective work exists.

III. CONTRACTOR'S SPECIAL EXTENDED WARRANTIES AND OTHER WARRANTIES REQUIRED BY THE TECHNICAL SPECIFICATIONS.

(Copies of applicable pages from the technical specifications are attached.)

The list below represents contractor warranty requirements and warranty periods specifically required by the contract document technical specifications. The fact that warranty requirements or warranty periods for all work performed by the contractor are not listed in the technical specifications does not affect or limit the contractor's general warranty described in paragraph I of this Contractor Warranty.

<u>Specification Number</u>	<u>Specification Title</u>	<u>Warranty Period</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

IV. MANUFACTURER WARRANTIES REQUIRED BY THE TECHNICAL SPECIFICATIONS

(Copies of applicable pages from the technical specifications are attached.)

The list below represents the manufacturer's warranties specifically required by the contract documents. These warranties are attached.

<u>Specification Number</u>	<u>Specification Title</u>	<u>Warranty Period</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**DENVER INTERNATIONAL AIRPORT
CONTRACTOR WARRANTY**

CONTRACT NAME:

CONTRACT NO.:

ASSIGNMENT OF WARRANTY

The contractor hereby assigns this Contractor Warranty, special extended warranties, and manufacturer's warranties listed above, and attached hereto, to the City (except those that may be listed below), but such assignment shall not affect the contractor's obligation to enforce such warranty as provided under paragraph I.G above of this Contractor Warranty and such assignment does not affect the contractor's warranties described elsewhere in the contract documents.

Contractor:

By:

Title:

Date:

DENVER INTERNATIONAL AIRPORT CONTRACTOR / SUBCONTRACTOR WARRANTY

CONTRACT NAME:

CONTRACT NO.:

Subcontract No.: _____

Contractor: _____

Subcontractor: _____

Description: _____

Work – means all work performed by the Contractor under the contract referred to above.

City – means the City and County of Denver, Colorado

Contract Documents – means contract documents for the DIA contract between the City and the contractor referred to above.

Subcontract Documents – means subcontract documents for the subcontract between the contractor and subcontractor referred to above.

I. SUBCONTRACTOR’S WARRANTIES AND CORRECTION WORK

A. The subcontractor warrants to the contractor that all parts, materials, components, equipment, systems and other items incorporated into the Work are new, unless otherwise specified, and are suitable for the purpose used, are of good quality, are free from faults and defects, and are in conformance with the subcontract documents. The subcontractor also warrants that its workers are sufficiently skilled to produce quality work free from faults and defects. Work not so conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The subcontractor, when requested, shall furnish the contractor with satisfactory evidence as to the kind and quality of materials and equipment incorporated into the Work. The subcontractor further warrants that the construction processes and methods employed to perform the Work have in the past proven to be suitable for the results expected.

B. The subcontractor further warrants that it has full title to all parts, materials, components, equipment and other items conveyed to the contractor under the terms of this subcontract, that its transfer of such title to the contractor is rightful, and that all such parts, materials, components, equipment and other items shall be transferred free and clear from all security interests, liens or encumbrances whatsoever. The subcontractor agrees to warrant and defend such title against all persons claiming the whole, or any part thereof, at no cost to the contractor.

C. The subcontractor shall promptly investigate, repair, replace or otherwise correct any of its workmanship and any parts, materials, components, equipment or other items incorporated into the Work which contain faults or defects whether such failures are observed by the City or the contractor at any time during the subcontract term or during the warranty period. The subcontractor shall bear all costs of investigating and correcting, which includes the design efforts necessary to correct such Work covered by the warranty as described under the 1999 edition of the General Contract Conditions, Title 18 or elsewhere in the subcontract documents. If repair or replacement of faulty items of the Work is necessary, proper temporary substitutions shall be provided by the subcontractor in order to maintain the progress of the Work and/or keep systems operating without any additional costs to the contractor or the City. The obligations of this Subcontractor

DENVER INTERNATIONAL AIRPORT CONTRACTOR / SUBCONTRACTOR WARRANTY

CONTRACT NAME:

CONTRACT NO.:

Warranty shall survive termination of the subcontract under the provisions of the 1999 edition of the General Contract Conditions, Title 22. Nothing herein shall limit the contractor's right to seek recovery for latent defects that are not observable until after the warranty periods have run.

D. The subcontractor's warranty for all Work components shall continue for the following period:

1. For a period of one (1) year after the date of Substantial Completion or for such longer period of time as may be prescribed by the terms of any special warranties required by the subcontract documents.

E. Nothing contained in this Subcontractor Warranty shall be construed to establish a period of limitation with respect to any other obligation that the subcontractor might have under the subcontract documents. The establishment of the warranty period set forth above relates only to the specific obligation of the subcontractor to correct the Work and has no relationship to the time within which its obligation to comply with the subcontract documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the subcontractor's liability with respect to its obligations and resulting damages other than specifically to correct the Work.

F. The subcontractor, at its own expense, shall also investigate, repair or replace any damages to any equipment, facilities or other personal or real property owned or leased by the contractor or the City which is damaged as a result of any such fault or defect in the Work with no cost to the contractor or the City.

G. All subcontractor's sub-tier subcontractors, manufacturer's and supplier's warranties, express or implied, for any part of the Work and any materials used therein, shall be obtained and enforced by the subcontractor for the benefit of the City whether or not these warranties have been assigned or otherwise transferred to the contractor or the City. The subcontractor shall assign or transfer such warranties to the contractor or the City if the contractor requests the subcontractor to do so, but such transfer shall not affect the subcontractor's obligation to enforce such warranties. These warranties are listed at the end of this document and attached hereto.

II. PERFORMANCE DURING WARRANTY PERIOD

A. The contractor will notify the subcontractor of Work found to be defective and fails to satisfy the warranties as described in the 1999 edition of the General Contract Conditions, Article 18, Section 1801, or elsewhere in the subcontract documents. The subcontractor shall, within ten (10) days or such longer time as may be requested and set forth in the notice, commence the repair, replacement or correction of the defective work. Should the subcontractor fail to complete such Work within a reasonable period, the contractor may make the repairs or replacements at the expense of the subcontractor. If the contractor determines that immediate action to make repairs, replacements or other corrections is necessary because of emergency conditions or to prevent further loss or damage, the contractor may proceed without notice to the subcontractor, but at the expense of the subcontractor.

B. If the subcontractor does not proceed with the correction of such defective work within the time fixed by written notice from the contractor, or in an emergency condition, the contractor may remove the defective work and may store the materials or equipment at the expense of the subcontractor. If the subcontractor does not pay the cost of the removal and storage within ten (10) days thereafter, the contractor may, upon ten (10) additional days written notice, sell the stored Work at auction.

DENVER INTERNATIONAL AIRPORT CONTRACTOR / SUBCONTRACTOR WARRANTY

CONTRACT NAME:

CONTRACT NO.:

C. If the proceeds of any such sale do not cover all costs which the contractor has incurred and which the subcontractor should have borne, the difference shall be charged to the subcontractor and the subcontractor and its surety shall be liable for and pay the difference to the contractor.

D. If the subcontractor does not agree that the work is defective or the defective work is its responsibility and if there are no emergency conditions, the subcontractor may request, in writing, a review of the contractor's decision in accordance with the 1999 edition of the General Contract Conditions, Title 13. If such review is not requested within ten (10) days of the notification of defective work, the subcontractor shall have waived the right to contest its responsibility for the correction of the defective work. Under emergency conditions, the subcontractor shall immediately correct the alleged defective work, and the question of responsibility for the expense shall be determined by the contractor, subject to the right of the subcontractor to seek review, within ten (10) days of the contractor's notice allocating responsibility for the expense.

E. Should the contractor claim by written communication sent or mailed before the warranty period expires that certain defective work exists and that it requires repair or replacement, the warranty period for such defective work shall be automatically extended for as long as that defective work exists.

III. SUBCONTRACTOR'S SPECIAL EXTENDED WARRANTIES AND OTHER WARRANTIES REQUIRED BY THE TECHNICAL SPECIFICATIONS

(Copies of applicable pages from the Technical Specifications are attached.)

The list below represents subcontractor warranty requirements and warranty periods specifically required by the subcontract document technical specifications. The fact that warranty requirements or warranty periods for all work performed by the subcontractor are not listed in the technical specifications does not affect or limit the subcontractor's general warranty described in paragraph I of this Subcontractor Warranty.

<u>Specification Number</u>	<u>Specification Title</u>	<u>Warranty Period</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**DENVER INTERNATIONAL AIRPORT
CONTRACTOR / SUBCONTRACTOR WARRANTY**

CONTRACT NAME:

CONTRACT NO.:

IV. MANUFACTURER WARRANTIES REQUIRED BY THE TECHNICAL SPECIFICATIONS
(Copies of applicable pages from the Technical Specifications are attached.)

The list below represents the manufacturer's warranties specifically required by the contract documents. These warranties are attached.

<u>Specification Number</u>	<u>Specification Title</u>	<u>Warranty Period</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Subcontractor:

By:

Title:

Date:

**DENVER INTERNATIONAL AIRPORT
CONTRACTOR / SUBCONTRACTOR WARRANTY**

CONTRACT NAME:

CONTRACT NO.:

ASSIGNMENT OF WARRANTY

The subcontractor hereby assigns this Subcontractor Warranty, special extended warranties and manufacturer's warranties listed above, and attached hereto, to the contractor (except those that may be listed below), but such assignment shall not affect the subcontractor's obligation to enforce such warranty as provided under paragraph I.G above of this Subcontractor Warranty and such assignment does not affect the subcontractor's warranties described elsewhere in the contract documents.

Subcontractor:

By:

Title:

Date:

Contractor:

By:

Title:

Date:

**CITY AND COUNTY OF DENVER
 AVIATION DIVISION, DEPT. OF PUBLIC WORKS
 DENVER INTERNATIONAL AIRPORT
 APPLICATION FOR PROGRESS PAYMENT
 SUMMARY AUTHORIZATION**

Contract No.: _____
 Contract Title: _____
 Contractor: _____
 Application No.: 12
 Period: _____ to _____

CONTRACTOR:
 I hereby warrant that: 1) The title to the Work covered by this estimate of Work completed will pass to the City by incorporation into the completed work; 2) The Work covered by previous estimates of Work completed is free and clear of liens, claims, security interests or encumbrances, except for any interest created by retainage; and 3) No Work covered by this estimate of Work completed is subject to an agreement under which an interest therein, or an encumbrance thereon, is retained by the seller or otherwise imposed by the Contractor or any other person or entity.

SIGNATURE/TITLE _____ DATE _____

CITY AND COUNTY OF DENVER:
 I hereby certify that, to the best of my knowledge, this payment application represents a true and correct statement of the work performed and is in conformance with the terms of the Contract documents.

Project Manager _____ DATE _____
 DIA Planning and Development

Michael H. Steffens _____ DATE _____
 Assistant Deputy Manager of Aviation
 DIA Planning and Development

APPROVED FOR PAYMENT:

 Margo Blu
 Senior Agency Budget Analyst
 Finance and Administration

DATE _____

CONTRACT STATUS		TOTAL CONTRACT	CURRENT APPLICATION	PREVIOUS PAYMENT
a)	ORIGINAL CONTRACT AMOUNT			
b)	PREVIOUS CHANGE ORDERS NOS. (+ or -)			
c)	NEW CHANGE ORDERS NO. (+ or -)			
d)	ADJUSTED TOTAL CONTRACT d = [a + b + c]	\$ -		
e)	PREVIOUS EARNINGS			
f)	EARNINGS THIS APPLICATION			
g)	TOTAL CURRENT EARNINGS g = [e + f]	\$ -		
h)	TO COMPLETE h = [d - g]	\$ -		
i)	PREVIOUS RETENTION			
j)	RETENTION THIS APPLICATION		\$ -	
k)	TOTAL RETENTION k = [i + j]	\$ -		
l)	OTHER DEDUCTIONS			
m)	BALANCE DUE ON CONTRACT m = [h + k + l]	\$ -		
n)	TOTAL PREVIOUS PAYMENTS n = [e - i - l]			\$ -
o)	PAYMENT THIS APPLICATION o = [f - j - l]		\$ -	

Note: Items a, b, c, d, g, h, k and m amounts - place only in Total Contract column.

DENVER INTERNATIONAL AIRPORT

CERTIFICATE OF CURRENT COST OR PRICING DATA

Contract Title:

Contract No.:

This is to certify that, to the best of my knowledge and belief, the cost of pricing data submitted in writing to the City in support of _____ is accurate, complete and current as of _____ and represents the best price that is available from suppliers and subcontractors.

This certification includes the cost of pricing data supporting any advance agreements and forward pricing rate agreements between the offeror and the City that are part of the proposal.

FIRM
NAME
TITLE
DATE



DENVER INTERNATIONAL AIRPORT PARTIAL LIEN RELEASE – CONSTRUCTION (Subcontractor)

Project: _____

Date: _____

City Contract No. _____

Current Subcontract
Amount: \$ _____

FROM:
Subcontractor _____

(1) Last Progress Payment for billing
period ending _____ 20__

Address: _____

\$ _____

City/State: _____

(2) Progress invoiced for previous billing
period (if unpaid) _____ 20__

Telephone: _____

\$ _____

TO:
Contractor _____

(3) Progress invoiced for current billing
period ending _____ 20__

Address: _____

\$ _____

City/State: _____

(4) **Total Paid to Date:**
\$ _____

() MBE/WBE () SBE () DBE () Non

The undersigned Subcontractor hereby (1) acknowledges receipt of the progress payment referred to above as the Last Progress Payment which, when added to the total of all previous progress payments, constitutes full payment, less retainage, for all labor, services, material and supplies which the undersigned has provided for use in and upon the project described above through _____, 20__ and, (2) hereby releases the Contractor, surety, the City and County of Denver, and any intermediate subcontractor or supplier of any tier from any and all claims prior to the above mentioned date, except for the withheld retainage.

The Subcontractor also hereby agrees that the Contractor, Surety, the City and County of Denver, and any intermediate subcontractor or supplier of any tier shall be released from any and all claims arising out of its performance or non-performance of any contract associated with the above project through _____, 20__, except for withheld retainage after it has received full payment, less retainage, of the amount invoiced for the current billing period.

Subcontractor: _____

Certified by: _____

Title: _____

Date: _____



DENVER INTERNATIONAL AIRPORT FINAL LIEN RELEASE – CONSTRUCTION (Subcontractor)

Project: _____

Date: _____

City Contract No. _____

Subcontractor Contract No. _____

FROM:

Subcontractor: _____

(1)

Dated: _____, 20__

Last Progress Payment for billing
period ending _____, 20__

Address: _____

\$ _____

City/State: _____

(2)

Does not apply

Telephone: _____

TO:

Contractor: _____

(3)

Does not apply

Address: _____

City/State: _____

(4)

Total Paid to Date:

\$ _____

SBE DBE MBE WBE Non

The undersigned Subcontractor hereby (1) acknowledges receipt of the progress payment referred to above as the Last Progress Payment which, when added to the total of all previous progress payments, constitutes full payment for all labor, services, materials and supplies which the undersigned has provided for use in and upon the project described above through _____, 20__ and, (2) hereby releases the Contractor, Surety, the City and County of Denver, and any intermediate subcontractor or supplier of any tier from any and all claims prior to the above mentioned date.

The Subcontractor also hereby agrees that the Contractor, Surety, the City and County of Denver, and any intermediate subcontractor or supplier of any tier shall be released from any and all claims arising out of its performance or non-performance of any contract associated with the above project.

Subcontractor: _____

Certified by: _____

Title: _____

Date: _____

DENVER INTERNATIONAL AIRPORT REQUEST FOR SUBSTITUTION

CONTRACT NO. _____

CONTRACT TITLE: _____

This form is to be used only after Notice to Proceed. Completely fill in this form. If necessary, use additional pages. If a question is not applicable, write "NA". Use of this form will help ensure a faster response to the Contractor's request.

I. In accordance with General Condition 406, check the appropriate item for the reason for the substitution request:

A. The specified material or equipment is not available (provide name and telephone number of who was contacted at bid time and at time order was placed):

B. The specified material or equipment is not deliverable within a reasonable time (provide the delivery time quoted at the time of bid, telephone number and name of person contacted, when the contractor was notified this time could not be met, and why):

C. The substitution is being requested as allowed by technical specification:

II. What is specified in the contract?

A. Specification section and page: _____

B. Drawing number and detail: _____

C. Specific product: _____

D. Specified manufacturer: _____

E. Specified model number and features: _____

F. Other specified requirements: _____

III. Substitution being requested:

A. Substitution product: _____

B. Substitution manufacturer: _____

C. Substitution model number and features: _____

DENVER INTERNATIONAL AIRPORT REQUEST FOR SUBSTITUTION

CONTRACT NO.

CONTRACT TITLE:

- IV. Provide additional reasons why the substitution is being requested under technical specification Section 01630:
-
- V. Provide a list of all variations from what is specified in the contract. Any variation not listed and later found to impact the City could lead to rejection of the substitution at a later date.
- VI. Provide detailed manufacturer's literature, samples and drawings to comply with technical specification submittal requirements.
- VII. Provide details on compatibility with the rest of the project, including but not limited to:
- A. Dimensions, including required clearances (provide a sketch showing an outline of the substitution with dimensions and clearances as required).
 - B. Utility connection size, type and locations, including electrical, plumbing, HVAC, fire protection, and controls (provide a sketch showing the locations of each utility connection and a brief description of the connection).
 - C. Samples of color and texture, as required.
 - D. Performance characteristics, including performance curves and different operating conditions.
- VIII. Provide details on reliability, ease of use and maintenance, including:
- A. Instructions on operation and maintenance
 - B. The name and location of the local organization that is certified to maintain the substitution.
 - C. A list of at least three other projects of similar nature to this contract where the substitution has been in use for at least one year. This list shall include the telephone number and the name of the person to contact at these projects.
- IX. Provide detailed information on cost of the specified material versus the substitution, including but not limited to:
- A. Operating cost for one year and for the life of the substitution
 - B. Energy consumption for one year.
 - C. Maintenance cost for one year and for the life of the substitution
 - D. Cleaning cost for one year and for the life of the substitution
 - E. Repair parts list recommended by the manufacturer, including prices

DENVER INTERNATIONAL AIRPORT REQUEST FOR SUBSTITUTION

CONTRACT NO. _____

CONTRACT TITLE: _____

- F. Cost to install parts
 - G. Cost to upgrade to the next higher performance level
 - H. A list of any license fees or royalties that must be paid
 - I. Any additional costs for the area in which the substitution is located; such as, additional heating or cooling requirements to maintain a prescribed environment
- X. Provide detailed information on the schedule impact of approving the substitution, including but not limited to:
- A. Date by which the substitution must be approved to avoid any schedule impact (note that substitution requirements must be submitted 30 days prior to when the order must be placed per GC 406).
 - B. Date the order will be placed.
 - C. What item in the schedule is the substitution connected to or with, and how is it connected?
 - D. When the submittal requirements of technical specification section 01300 and 01340 will be met.
 - E. Any impact on Milestone dates or Contract Time.
 - F. Any impact on the sequence of work as shown on the accepted schedule.
- XI. Provide potential cost savings to the Contractor and the Contractor's willingness to share with the City, including but not limited to savings in:
- A. Change in material price due to substitution: \$ _____
 - B. Change in installation price due to substitution \$ _____
 - C. Increased float or altered schedule critical path? Yes No
 - D. Increased production rates on other work? Yes No
 - E. Change in prices from subcontractors due to substitution? \$ _____

**DENVER INTERNATIONAL AIRPORT
REQUEST FOR SUBSTITUTION**

CONTRACT NO. _____

CONTRACT TITLE: _____

**SUBSTITUTIONS WHICH WILL INCREASE OR DECREASE THE CONTRACT AMOUNT, OR
MODIFY ANY SCHEDULED EVENT, MUST BE SUBMITTED WITH A DETAIL NARRATIVE
AND COST AND/OR SCHEDULE BREAKDOWN**

XII. The substitution's ability to meet all applicable governing regulations, rules and laws, including funding agency requirements.

NOTE: Specified materials and equipment on FAA funded contracts must meet FAA requirements. The Contractor will provide proof that the exact substitution being requested is FAA approved.

CONTRACTOR'S STATEMENT:

The substitution being submitted is equal to or superior in all respects to the contract required item or process. All differences between the substitution and the contract required items or process are described in this request along with all cost and scheduling data.

Contractor's Superintendent Name

Date

Signature

As a condition of submitting a Request for Substitution, the Contractor waives all rights to claim for extra cost for change in Contract Time other than those outlined in the request and approved by the Deputy Manager of Aviation. The Contractor also, by submitting a Request for Substitution, accepts a full liability for cost and scheduling impact on other contractors or the City due to the substitution.

DENVER INTERNATIONAL AIRPORT REQUEST FOR SUBSTITUTION

CONTRACT NO. _____

CONTRACT TITLE: _____

RECOMMENDATION AND APPROVAL: (IF DISAPPROVED, STATE THE REASON)

I. Designer of Record recommendation:

APPROVED **APPROVED AS NOTED** **DISAPPROVED**
Notes:

II. Designer of Record recommendation:

APPROVED **APPROVED AS NOTED** **DISAPPROVED**
Notes:

III. CCD Design Project Manager recommendation:

APPROVED **APPROVED AS NOTED** **DISAPPROVED**
Notes:

IV. CCD Estimating/Scheduling recommendation:

APPROVED **APPROVED AS NOTED** **DISAPPROVED**
Notes:

V. CCD Construction Project Manager recommendation:

APPROVED **APPROVED AS NOTED** **DISAPPROVED**
Notes:

VI. CCD Assistant Deputy Manager (Construction) recommendation:

APPROVED **APPROVED AS NOTED** **DISAPPROVED**
Notes:

If approval is given, it is based on the information provided with particular emphasis on the list of variations. If any information is incorrect or incomplete, approval may be withdrawn at the Contractor's expense.



DIA
AIRFIELD SHUTDOWN REQUEST



Complete this form to request work on the AOA, including Runway and/or Taxiway closures planned to exceed one half hour. Forms must be completed and received by Airfield Operations 48 hours before the requested start time. This form is not required for closures due to emergency repairs.

DIA DEPT SUPV/PROJECT MGR.: _____
Office # _____ Cell# _____
DIA CONTACT PERSON: _____
RADIO CALL SIGN: _____ RADIO CHANNEL: _____
CELL # _____

DESCRIPTION OF WORK:

SPECIFIC LOCATION:

RUNWAY: _____ TAXIWAY: _____
REQUESTED SHUTDOWN: TIME: _____ DATE: _____

SCHEDULED COMPLETION: TIME: _____ DATE: _____

IF CRANE/BOOM WILL BE USED:

Location: _____ Boom Height: _____ Time: _____ - _____
Crane Information: _____
FAA FORM 7460 - AIRSPACE CASE NO: _____

REQUESTED BY: _____
COMPANY: _____ CONTACT PERSON: _____
PHONE NUMBERS:
Office: _____ Mobile: _____ Fax: _____
Home/24 hr. Emergency Contact#: _____

APPROVAL IS SUBJECT TO THE FOLLOWING CONDITIONS:

- Airport Operations reserves the right to deny or reschedule any shutdown to maintain safe and efficient airfield operations.
- Plan your runway and taxiway closures according to the Runway Closure Schedule posted on the share drive
- Weekend and Holiday closure requests may be made directly to the duty AOM (303-342-4200). Prior coordination is strongly recommended and may be required.
- All closures are dependent on wind, weather or the need for emergency repairs.

COMPLETED FORMS SHOULD BE FAXED TO THE FOLLOWING NUMBERS:

1)303-342-1681 2)303-342-4023 3.)303-342-4202 4.)303-342-4239

Signature of requesting individual: _____ Date: _____