

**SERIAL 15058 RFP BELL RD ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)  
DEPLOYMENT  
(Contract – TransCore ITS, LLC)**

**DATE OF LAST REVISION: September 07, 2016 CONTRACT END DATE: August 31, 2021**

**CONTRACT PERIOD THROUGH AUGUST 31, 2021**

TO: All Departments  
FROM: Office of Procurement Services  
SUBJECT: Contract for **BELL RD ADAPTIVE SIGNAL CONTROL TECHNOLOGY  
(ASCT) DEPLOYMENT**

Attached to this letter is published an effective purchasing contract for products and/or services to be supplied to Maricopa County activities as awarded by Maricopa County on **September 07, 2016**.

All purchases of products and/or services listed on the attached pages of this letter are to be obtained from the vendor holding the contract. Individuals are responsible to the vendor for purchases made outside of contracts. The contract period is indicated above.

  
\_\_\_\_\_  
Kevin Tyne, Chief Procurement Officer  
Office of Procurement Services

NP/at  
Attach

Copy to: Office of Procurement Services  
Sami Birchard, MCDOT  
April Wire, MCDOT



## CONTRACT PURSUANT TO RFP

**SERIAL 15058-RFP**

This Contract is entered into this 7<sup>th</sup> day of September, 2016 by and between Maricopa County ("County"), a political subdivision of the State of Arizona, and TransCore ITS, LLC ("TransCore") a limited liability company organized under the laws of the State of Delaware, with a principal place of business at 150 4<sup>th</sup> Avenue North, Suite 1200, Nashville, TN 37219 ("Contractor") for the purchase of adaptive signal control technology services.

### 1.0 CONTRACT TERM:

- 1.1 This Contract is for a term of five (5) years, beginning on the 7<sup>th</sup> day of September, 2016 and ending the 31st day of August, 2021.
- 1.2 The County may, at its option and with the agreement of the Contractor, renew the term of this Contract for additional terms up to a maximum of five (5) years, (or at the County's sole discretion, extend the contract on a month-to-month bases for a maximum of six (6) months after expiration). The County shall notify the Contractor in writing of its intent to extend the Contract term at least sixty (60) calendar days prior to the expiration of the original contract term, or any additional term thereafter.

### 2.0 FEE ADJUSTMENTS:

- 2.1 Any request for a fee adjustment must be submitted sixty (60) days prior to the current Contract expiration. Requests for adjustment in cost of labor and/or materials must be supported by appropriate documentation. If County agrees to the adjusted fee, County shall issue written approval of the change. The reasonableness of the request shall be determined by comparing the request with the lesser of 3% or Consumer Price Index – All Urban Consumers, Series ID CUUR0400AA0, Not Seasonally Adjusted, West Urban Area, All items old base (12/77).

### 3.0 PAYMENTS:

- 3.1 As consideration for performance of the duties described herein, County shall pay Contractor the sum(s) stated in Exhibit "A."

3.2 Payment shall be made upon the County's receipt of a properly completed invoice.

#### 3.3 INVOICES:

3.3.1 The Contractor/Consultant shall be paid a fee as awarded by the County for complete and satisfactory performance of work and/or materials delivered in accordance with the detailed scope of work and any technical specifications. The County does not guarantee any minimum or maximum fee during the period of this contract.

3.3.2 The County shall pay the Consultant/Contractor in full for each monthly payment request, upon approval by the County and subject to the limitations set forth in the Scope of Work under this contract. A **Project Specific Consultant Payment Request** form is enclosed in Exhibit E. and must include back-up documentation with each invoiced progress payment request. The backup documentation shall clearly indicate the hours

worked, date and employee's name, including subconsultants. All backup documentation shall include copies of any subconsultant or vendor invoices.

***The Small Business Enterprise Participation Reporting*** form, as shown in Exhibit E, is to be submitted with each invoice/progress payment request. Any payment request submitted to the County without this form may be rejected as an incomplete payment request, pursuant to the terms of the contract.

Upon completion of all deliverables under the scope(s) of work and related technical requirements in this contract, and final acceptance by Maricopa County Department of Transportation, the Contractor/Consultant shall submit a ***Certificate of Performance and Payment of ALL Claims*** form, as shown in Exhibit E.

- 3.3.3 Problems regarding billing or invoicing shall be directed to the using agency as listed on the Purchase Order.
- 3.3.4 Payment shall be made to the Contractor by Accounts Payable through the Maricopa County Vendor Express Payment Program. This is an Electronic Funds Transfer (EFT) process. After Contract Award the Contractor shall complete the Vendor Registration Form located on the County Department of Finance Vendor Registration Web Site (<http://www.maricopa.gov/Finance/Vendors.aspx>).
- 3.3.5 Discounts offered in the contract shall be calculated based on the date a properly completed invoice is received by the County (ROI).
- 3.3.6 EFT payments to the routing and account numbers designated by the Contractor shall include the details on the specific invoices that the payment covers. The Contractor is required to discuss remittance delivery capabilities with their designated financial institution for access to those details.

#### 3.4 PAYMENT RETENTION:

See Exhibit A System Verification & Acceptance, Milestone Payments

#### 3.5 APPLICABLE TAXES:

- 3.5.1 **Payment of Taxes:** The Contractor shall pay all applicable taxes. With respect to any installation labor on items that are not attached to real property performed by Contractor under the terms of this Contract, the installation labor cost and the gross receipts for materials provided shall be listed separately on the Contractor's invoices.
- 3.5.2 **State and Local Transaction Privilege Taxes:** Maricopa County is subject to all applicable state and local transaction privilege taxes. To the extent any state and local transaction privilege taxes apply to sales made under the terms of this contract, it is the responsibility of the seller to collect and remit all applicable taxes to the proper taxing jurisdiction of authority.
- 3.5.3 **Tax Indemnification:** Contractor and all subcontractors shall pay all Federal, state, and local taxes applicable to its operation and any persons employed by the Contractor. Contractor shall, and require all subcontractors to hold Maricopa County harmless from any responsibility for taxes, damages and interest, if applicable, contributions required under Federal, and/or state and local laws and regulations and any other costs including transaction privilege taxes, unemployment compensation insurance, Social Security and Worker's Compensation.

3.6 TAX: (SERVICES)

No tax shall be levied against labor. It is the responsibility of the Contractor to determine any and all taxes and include the same in proposal price.

4.0 AVAILABILITY OF FUNDS:

4.1 The provisions of this Contract relating to payment for services shall become effective when funds assigned for the purpose of compensating the Contractor as herein provided are actually available to County for disbursement. The County shall be the sole judge and authority in determining the availability of funds under this Contract. County shall keep the Contractor fully informed as to the availability of funds.

4.2 If any action is taken by any state agency, Federal department or any other agency or instrumentality to suspend, decrease, or terminate its fiscal obligations under, or in connection with, this Contract, County may amend, suspend, decrease, or terminate its obligations under, or in connection with, this Contract. In the event of termination, County shall be liable for payment only for services rendered prior to the effective date of the termination, provided that such services are performed in accordance with the provisions of this Contract. County shall give written notice of the effective date of any suspension, amendment, or termination under this Section, at least ten (10) days in advance.

5.0 DUTIES:

5.1 The Contractor shall perform all duties stated in Exhibit "B", or as otherwise directed in writing by the Procurement Officer.

5.2 During the Contract term, County may provide Contractor's personnel with adequate workspace for consultants and such other related facilities as may be required by Contractor to carry out its contractual obligations.

6.0 TERMS and CONDITIONS:

6.1 INDEMNIFICATION:

To the fullest extent permitted by law, and to the extent that claims, damages, losses or expenses are not covered and paid by insurance purchased by the Contractor, the Contractor shall defend indemnify and hold harmless the County (as Owner), its agents, representatives, agents, officers, directors, officials, and employees from and against all claims, direct damages, losses, and expenses (including, attorneys' fees, court costs, expert witness fees, and the costs and attorneys' fees for appellate proceedings) arising out of, or alleged to have resulted from the negligent acts, errors, omissions, or mistakes relating to the performance of this Contract.

Contractor's duty to defend, indemnify, and hold harmless the County, its agents, representatives, agents, officers, directors, officials, and employees shall arise in connection with any claim, direct damage, loss, or expense that is attributable to bodily injury, sickness, disease, death or injury to, impairment of, or destruction of tangible property, including loss of use resulting there from, caused by negligent acts, errors, omissions, or mistakes in the performance of this Contract, but only to the extent caused by the negligent acts or omissions of the Contractor, a subcontractor, any one directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. For professional liability claims, indemnification responsibility is limited to the Contractor's proportionate share of the negligence.

The scope of this indemnification does not extend to the sole negligence of County.

## 6.2 INSURANCE.

- 6.2.1 Contractor, at Contractor's own expense, shall purchase and maintain the herein stipulated minimum insurance from a company or companies duly licensed by the State of Arizona and possessing a current A.M. Best, Inc. rating of B++. In lieu of State of Arizona licensing, the stipulated insurance may be purchased from a company or companies, which are authorized to do business in the State of Arizona, provided that said insurance companies meet the approval of County. The form of any insurance policies and forms must be acceptable to County.
- 6.2.2 All insurance required herein shall be maintained in full force and effect until all work or service required to be performed under the terms of the Contract is satisfactorily completed and formally accepted. Failure to do so may, at the sole discretion of County, constitute a material breach of this Contract.
- 6.2.3 Contractor's insurance shall be primary insurance as respects County, and any insurance or self-insurance maintained by County shall not contribute to it.
- 6.2.4 Any failure to comply with the claim reporting provisions of the insurance policies or any breach of an insurance policy warranty shall not affect the County's right to coverage afforded under the insurance policies.
- 6.2.5 The insurance policies may provide coverage that contains deductibles or self-insured retentions. Such deductible and/or self-insured retentions shall not be applicable with respect to the coverage provided to County under such policies. Contractor shall be solely responsible for the deductible and/or self-insured retention and County, at its option, may require Contractor to secure payment of such deductibles or self-insured retentions by a surety bond or an irrevocable and unconditional letter of credit.
- 6.2.6 The insurance policies required by this Contract, except Workers' Compensation and Errors and Omissions, shall name County, its agents, representatives, officers, directors, officials and employees as Additional Insureds.
- 6.2.7 The policies required hereunder, except Workers' Compensation and Errors and Omissions, shall contain a waiver of transfer of rights of recovery (subrogation) against County, its agents, representatives, officers, directors, officials and employees for any claims arising out of Contractor's work or service.
- 6.2.8 **Commercial General Liability.**
- Commercial General Liability insurance and, if necessary, Commercial Umbrella insurance with a limit of not less than \$2,000,000 for each occurrence, \$4,000,000 Products/Completed Operations Aggregate, and \$4,000,000 General Aggregate Limit. The policy shall include coverage for premises liability, bodily injury, broad form property damage, personal injury, products and completed operations and blanket contractual coverage, and shall not contain any provisions which would serve to limit third party action over claims. There shall be no endorsement or modifications of the CGL limiting the scope of coverage for liability arising from explosion, collapse, or underground property damage.
- 6.2.9 **Automobile Liability.**
- Commercial/Business Automobile Liability insurance and, if necessary, Commercial Umbrella insurance with a combined single limit for bodily injury and property damage of not less than \$1,000,000 each occurrence with respect to any of the Contractor's owned, hired, and non-owned vehicles assigned to or used in performance of the Contractor's work or services or use or maintenance of the Premises under this Contract.

6.2.10 **Workers' Compensation.**

Workers' Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of Contractor's employees engaged in the performance of the work or services under this Contract; and Employer's Liability insurance of not less than \$1,000,000 for each accident, \$1,000,000 disease for each employee, and \$1,000,000 disease policy limit.

Contractor, its contractors and its subcontractors waive all rights against Contract and its agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the Workers' Compensation and Employer's Liability or commercial umbrella liability insurance obtained by Contractor, its contractors and its subcontractors pursuant to this Contract.

6.2.11 **Errors and Omissions (Professional Liability) Insurance.**

Errors and Omissions (Professional Liability) insurance and, if necessary, Commercial Umbrella insurance, which shall insure and provide coverage for errors or omissions or professional liability of the **CONTRACTOR**, with limits of no less than \$2,000,000 for each claim. Coverage shall include Network and Information Security (cyber liability)

6.2.12 **Professional Liability.**

Contractor shall maintain Professional Liability insurance which shall provide coverage for any and all acts arising out of the work or services performed by the Contractor under the terms of this Contract, with a limit of not less than \$1,000,000 for each claim, and \$3,000,000 aggregate claims.

6.2.13 Certificates of Insurance.

6.2.13.1 Prior to Contract **AWARD**, Contractor shall furnish the County with valid and complete certificates of insurance, or formal endorsements as required by the Contract in the form provided by the County, issued by Contractor's insurer(s), as evidence that policies providing the required coverage, conditions and limits required by this Contract are in full force and effect. Such certificates shall identify this contract number and title.

6.2.13.2 In the event any insurance policy (ies) required by this contract is (are) written on a "claims made" basis, coverage shall extend for two years past completion and acceptance of Contractor's work or services and as evidenced by annual Certificates of Insurance.

6.2.13.3 If a policy does expire during the life of the Contract, a renewal certificate must be sent to County prior to the expiration date.

6.2.14 Cancellation and Expiration Notice.

Insurance required herein shall not be permitted to expire, be canceled, or materially changed without thirty (30) days prior written notice to the County.

6.3 **WARRANTY**

6.3.1 All items furnished under this Contract shall conform to the requirements of this Contract and shall be free from defects in design, materials and workmanship.

6.3.2 The warranty period for workmanship and materials shall be for an initial period of twelve (12) months and commence upon acceptance by County.

6.3.3 The Contractor agrees that he will, at his own expense, provide all labor and parts required to remove, repair or replace, and reinstall any such defective workmanship and/or materials which becomes or is found to be defective during the term of this

warranty. The Contractor shall guarantee the equipment to be supplied complies with all applicable regulations.

6.4 WARRANTY OF SERVICES:

- 6.4.1 The Contractor warrants that all services provided hereunder shall conform to the requirements of the Contract, including all descriptions, specifications and attachments made a part of this Contract. County's acceptance of services or goods provided by the Contractor shall not relieve the Contractor from its obligations under this warranty.
- 6.4.2 In addition to its other remedies, County may, at the Contractor's expense, require prompt correction of any services failing to meet the Contractor's warranty herein. Services corrected by the Contractor shall be subject to all the provisions of this Contract in the manner and to the same extent as services originally furnished hereunder.

6.5 INSPECTION OF SERVICES:

- 6.5.1 The Contractor shall provide and maintain an inspection system acceptable to County covering the services under this Contract. Complete records of all inspection work performed by the Contractor shall be maintained and made available to County during contract performance and for as long afterwards as the Contract requires.
- 6.5.2 County has the right to inspect and test all services called for by the Contract, to the extent practicable at all times and places during the term of the Contract. County shall perform inspections and tests in a manner that shall not unduly delay the work.
- 6.5.3 If any of the services do not conform to Contract requirements, County may require the Contractor to perform the services again in conformity with Contract requirements, at no cost to the County. When the defects in services cannot be corrected by re-performance, County may:
  - 6.5.3.1 Require the Contractor to take necessary action to ensure that future performance conforms to Contract requirements; and
  - 6.5.3.2 Reduce the Contract price to reflect the reduced value of the services performed.
- 6.5.4 If the Contractor fails to promptly perform the services again or to take the necessary action to ensure future performance in conformity with Contract requirements, County may:
  - 6.5.4.1 By Contract or otherwise, perform the services and charge to the Contractor, through direct billing or through payment reduction, any cost incurred by County that is directly related to the performance of such service; or
  - 6.5.4.2 Terminate the Contract for default.

6.6 REQUIREMENTS CONTRACT:

- 6.6.1 Contractors signify their understanding and agreement by signing a bid submittal, that the Contract resulting from the bid is a requirements contract. However, the Contract does not guarantee any minimum or maximum number of purchases shall be made. It only indicates that if purchases are made for the materials or services contained in the Contract, they shall be purchased from the Contractor awarded that item if the Contractor can meet all the delivery requirements of the County. Orders shall only be placed when the County identifies a need and proper authorization and documentation have been approved.
- 6.6.2 County reserves the right to cancel Purchase Orders within a reasonable period of time after issuance. Should a Purchase Order be canceled, the County agrees to reimburse the Contractor for actual and documentable costs incurred by the Contractor in response to

the Purchase Order. The County shall not reimburse the Contractor for any costs incurred after receipt of County notice of cancellation, or for lost profits, shipment of product prior to issuance of Purchase Order, etc.

- 6.6.3 Contractors agree to accept verbal notification of cancellation of Purchase Orders from the County Procurement Officer with written notification to follow. By submitting a bid in response to this Invitation for Bids, the Contractor specifically acknowledges to be bound by this cancellation policy.

6.7 Suspension of Work

The Procurement Officer may order the Contractor, in writing, to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Procurement Officer determines appropriate for the convenience of the County. No adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor. No request for adjustment under this clause shall be granted unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

6.8 Stop Work Order

The Procurement Officer may, at any time, by written order to the Contractor, require the Contractor to stop all, or any part, of the work called for by this contract for a period of 90 days after the order is delivered to the Contractor, and for any further period to which the parties may agree. The order shall be specifically identified as a stop work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order during the period of work stoppage. Within a period of 90 days after a stop-work is delivered to the Contractor, or within any extension of that period to which the parties shall have agreed, the Procurement Officer shall either—

- 6.8.1 Cancel the stop-work order; or
- 6.8.2 Terminate the work covered by the order as provided in the Default, or the Termination for Convenience of the County, clause of this contract.
- 6.8.3 The Procurement Officer may make an equitable adjustment in the delivery schedule and/or contract price, or otherwise, and the contract shall be modified, in writing, accordingly, if the Contractor demonstrates that the stop work order resulted in an increase in costs to the Contractor.

6.9 UNCONDITIONAL TERMINATION FOR CONVENIENCE:

Maricopa County may terminate the resultant Contract for convenience by providing sixty (60) calendar days advance notice to the Contractor. In the event of a termination for convenience or a termination for default, as provided in Section 6.10 below, Maricopa County will only be entitled to a refund of unused license and maintenance fees if the ACDSS, as defined on Section 1 of Exhibit C.1 (ACDSS License Agreement), is fully decommissioned. Moreover, refunds of unused license and maintenance fees shall not be prorated for partial years of services not used. The refunds will only be assessed for complete years of service not used at \$19,611.83 per service year.

6.10 TERMINATION FOR DEFAULT:

The County may, by written notice of default to the Contractor, terminate this contract in whole or in part if the Contractor fails to:

- 6.10.1 Deliver the supplies or to perform the services within the time specified in this contract or any extension;
- 6.10.2 Make progress, so as to endanger performance of this contract; or
- 6.10.3 Perform any of the other provisions of this contract.
- 6.10.4 The County's right to terminate this contract under these subparagraph may be exercised if the Contractor does not cure such failure within 10 days (or more if authorized in writing by the County) after receipt of the notice from the Procurement Officer specifying the failure.

6.11 STATUTORY RIGHT OF CANCELLATION FOR CONFLICT OF INTEREST:

Notice is given that pursuant to A.R.S. § 38-511 the County may cancel any Contract without penalty or further obligation within three years after execution of the contract, if any person significantly involved in initiating, negotiating, securing, drafting or creating the contract on behalf of the County is at any time while the Contract or any extension of the Contract is in effect, an employee or agent of any other party to the Contract in any capacity or consultant to any other party of the Contract with respect to the subject matter of the Contract. Additionally, pursuant to A.R.S § 38-511 the County may recoup any fee or commission paid or due to any person significantly involved in initiating, negotiating, securing, drafting or creating the contract on behalf of the County from any other party to the contract arising as the result of the Contract.

6.12 CONTRACTOR LICENSE REQUIREMENT:

- 6.12.1 The Respondent shall procure all permits, insurance, licenses and pay the charges and fees necessary and incidental to the lawful conduct of his/her business, and as necessary complete any required certification requirements, required by any and all governmental or non-governmental entities as mandated to maintain compliance with and in good standing for all permits and/or licenses. The Respondent shall keep fully informed of existing and future trade or industry requirements, Federal, State and Local laws, ordinances, and regulations which in any manner affect the fulfillment of a Contract and shall comply with the same. Contractor shall immediately notify both Office of Procurement Services and the using agency of any and all changes concerning permits, insurance or licenses.
- 6.12.2 Respondents furnishing finished products, materials or articles of merchandise that shall require installation or attachment as part of the Contract, shall possess any licenses required. A Respondent is not relieved of its obligation to possess the required licenses by subcontracting of the labor portion of the Contract. Respondents are advised to contact the Arizona Registrar of Contractors, Chief of Licensing, at (602) 542-1525 to ascertain licensing requirements for a particular contract. Respondents shall identify which license(s), if any, the Registrar of Contractors requires for performance of the Contract.

6.13 SUBCONTRACTING:

- 6.13.1 The Contractor may not assign to another Contractor or Subcontract to another party for performance of the terms and conditions hereof without the written consent of the County. All correspondence authorizing subcontracting must reference the Bid Serial Number and identify the job project.
- 6.13.2 The Subcontractor's rate for the job shall not exceed that of the Prime Contractor's rate, as bid in the pricing section, unless the Prime Contractor is willing to absorb any higher rates or the County has approved the increase. The Subcontractor's invoice shall be invoiced directly to the Prime Contractor, who in turn shall pass-through the costs to the County, without mark-up. A copy of the Subcontractor's invoice must accompany the Prime Contractor's invoice.

6.14 AMENDMENTS:

All amendments to this Contract shall be in writing and approved/signed by both parties. Maricopa County Office of Procurement Services shall be responsible for approving all amendments for Maricopa County.

6.15 ADDITIONS/DELETIONS OF SERVICE:

6.15.1 The County reserves the right to add and/or delete materials and services to a Contract. If a service requirement is deleted, payment to the Contractor shall be reduced proportionately, to the amount of service reduced in accordance with the bid price. If additional materials or services are required from a Contract, prices for such additions shall be negotiated between the Contractor and the County.

6.15.2 The County reserves the right of final approval on proposed staff for all Task Orders. Also, upon request by the County, the Contractor shall be required to remove any employees working on County projects and substitute personnel based on the discretion of the County within two business days, unless previously approved by the County.

6.16 VALIDITY:

The invalidity, in whole or in part, of any provision of this Contract shall not void or affect the validity of any other provision of the Contract.

6.17 SEVERABILITY:

The invalidity, in whole or in part, of any provision of this Contract shall not void or affect the validity of any other provision of this Contract.

6.18 RIGHTS IN DATA:

The County shall have the use of data and reports resulting from a Contract without additional cost or other restriction except as may be established by law or applicable regulation. Each party shall supply to the other party, upon request, any available information that is relevant to a Contract and to the performance thereunder.

6.19 NON-DISCRIMINATION:

CONTRACTOR agrees to comply with all provisions and requirements of Arizona Executive Order 2009-09 including flow down of all provisions and requirements to any subcontractors. Executive Order 2009-09 supersedes Executive order 99-4 and amends Executive order 75-5 and may be viewed and downloaded at the Governor of the State of Arizona's website <http://azmemory.azlibrary.gov/cdm/singleitem/collection/execorders/id/680/rec/1> which is hereby incorporated into this contract as if set forth in full herein. During the performance of this contract, CONTRACTOR shall not discriminate against any employee, client or any other individual in any way because of that person's age, race, creed, color, religion, sex, disability or national origin.

6.20 CERTIFICATION REGARDING DEBARMENT AND SUSPENSION

6.20.1 The undersigned (authorized official signing for the Contractor) certifies to the best of his or her knowledge and belief, that the Contractor

6.20.1.1 is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal Department or agency;

6.20.1.2 have not within 3-year period preceding this Contract been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a

public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

6.20.1.3 are not presently indicted or otherwise criminally or civilly charged by a government entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

6.20.1.4 have not within a 3-year period preceding this Contract had one or more public transaction (Federal, State or local) terminated for cause of default.

6.20.2 The Contractor agrees to include, without modification, this clause in all lower tier covered transactions (i.e. transactions with subcontractors) and in all solicitations for lower tier covered transactions related to this Contract.

6.21 VERIFICATION REGARDING COMPLIANCE WITH ARIZONA REVISED STATUTES §41-4401 AND FEDERAL IMMIGRATION LAWS AND REGULATIONS:

6.21.1 By entering into the Contract, the Contractor warrants compliance with the Immigration and Nationality Act (INA using e-verify) and all other federal immigration laws and regulations related to the immigration status of its employees and A.R.S. §23-214(A). The contractor shall obtain statements from its subcontractors certifying compliance and shall furnish the statements to the Procurement Officer upon request. These warranties shall remain in effect through the term of the Contract. The Contractor and its subcontractors shall also maintain Employment Eligibility Verification forms (I-9) as required by the Immigration Reform and Control Act of 1986, as amended from time to time, for all employees performing work under the Contract and verify employee compliance using the E-verify system and shall keep a record of the verification for the duration of the employee's employment or at least three years, whichever is longer. I-9 forms are available for download at USCIS.GOV.

6.21.2 The County retains the legal right to inspect contractor and subcontractor employee documents performing work under this Contract to verify compliance with paragraph 6.20 of this Section. Contractor and subcontractor shall be given reasonable notice of the County's intent to inspect and shall make the documents available at the time and date specified. Should the County suspect or find that the Contractor or any of its subcontractors are not in compliance, the County shall consider this a material breach of the contract and may pursue any and all remedies allowed by law, including, but not limited to: suspension of work, termination of the Contract for default, and suspension and/or debarment of the Contractor. All costs necessary to verify compliance are the responsibility of the Contractor.

6.22 INFLUENCE

As prescribed in MC1-1202 of the Maricopa County Procurement Code, any effort to influence an employee or agent to breach the Maricopa County Ethical Code of Conduct or any ethical conduct may be grounds for Disbarment or Suspension under MC1-902.

An attempt to influence includes, but is not limited to:

6.22.1 A Person offering or providing a gratuity, gift, tip, present, donation, money, entertainment or educational passes or tickets, or any type valuable contribution or subsidy,

6.22.2 That is offered or given with the intent to influence a decision, obtain a contract, garner favorable treatment, or gain favorable consideration of any kind.

If a Person attempts to influence any employee or agent of Maricopa County, the Chief Procurement Officer, or his designee, reserves the right to seek any remedy provided by the

Maricopa County Procurement Code, any remedy in equity or in the law, or any remedy provided by this contract.

6.23 CONTRACTOR EMPLOYEE WHISTLEBLOWER RIGHTS AND REQUIREMENT TO INFORM EMPLOYEES OF WHISTLERBLOWER RIGHTS.

6.23.1 The Parties agree that this Contract and employees working on this Contract shall be subject to the whistleblower rights and remedies in the pilot program on contractor employee whistleblower protections established at 41 U.S.C. § 4712 by section 828 of the National Defense Authorization Act for Fiscal Year 2013 (Pub. L. 112-239) and section 3.908 of the Federal Acquisition Regulation;

6.23.2 Contractor shall inform its employees in writing, in the predominant language of the workforce, of employee whistleblower rights and protections under 41 U.S.C. § 4712, as described in section 3.908 of the Federal Acquisition Regulation. Documentation of such employee notification must be kept on file by Contractor and copies provided to County upon request.

6.23.3 Contractor shall insert the substance of this clause, including this paragraph (c), in all subcontracts over the simplified acquisition threshold (\$150,000 as of September 2013).

6.24 FEDERAL CLAUSES

6.24.1 **Title VI**

The Maricopa County Department of Transportation, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252.42 U.S.C. §§ 2000d-4) and the Regulations, hereby notifies all bidders that it shall affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises shall be afforded full and fair opportunity to submit bids in response to this invitation and shall not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

Additional Title VI Assurance language can be found in Exhibit E, Special Federal Terms, Conditions and Documents. This Exhibit contains a commitment by the Maricopa County Department of Transportation, as the recipient of the federal funding associated with this Contract and related project. This commitment pertains to complying with all referenced Acts and Regulations. Similar assurances are required of contractors and consultants and must also be included in any subcontracts. Maricopa County Department of Transportation's Title VI Plan details can be found at: <http://www.mcdot.maricopa.gov/technical/TitleVI/home.htm>.

6.24.2 **Buy America**

As applicable, the Contractor shall comply with CFR 23, § 635.410 Buy America requirements and provide proof of compliance with delivery of the pertinent materials.

6.24.3 **Small Business Enterprises**

It is the County's policy to facilitate and encourage participation by Small Business Enterprise concerns (SBE) in County contracts. The County encourages the Contractor/Consultant to take reasonable steps to eliminate obstacles to SBE participation and to utilize SBEs in performing contracts.

The Contractor/Consultant shall comply with 49 CFR 26.7, and further defined pursuant to Section 3 of the Small Business Act and Small Business Administration regulations implementing it (13 CFR Part 21) where possible. For more details on the SBE program and process requirements, reference the ADOT Business Engagement and Compliance (BECO) guidelines for SBEs, which are registered in the Arizona Unified Transportation Registration and Certification System (AZ UTRACS).

The Contractor/Consultant shall complete the SBE Participation Reporting Form included in Exhibit E and submit with each invoice/payment request.

6.24.4 **Prompt Pay Legislation**

In accordance with A.R.S. § 28-411 (Prompt Payment to Consultants and Subconsultants), the County must issue payments to Prime Consultants within a certain number of calendar days after receipt of an Payment Request/Invoice. The law also requires the Consultants to pay their Subconsultants within a specific number of calendar days after issuance of payment by the County, unless exceptions exist within the agreed-upon Consultant/Subconsultant agreement.

Upon any resolution of unapproved invoices/Payment Requests, Prime Consultants shall not withhold Subconsultants' payments if the County has paid for the full value of services rendered. Failure by the Prime Consultant to invoice the County in accordance with the terms of the contract and/or pay Subconsultants in accordance with A.R.S. § 28-411 shall be constituted as a material breach of contract, subjecting the Prime Consultant to disqualification under this contract. The County reserves the right to request the Prime Consultant provide proof of payment to Subconsultants at any time.

6.24.5 **Disadvantaged Business Enterprises (DBE)**

The Arizona Department of Transportation (hereinafter the Department or ADOT) has established a DBE program in accordance with the regulations of the U.S. Department of Transportation (USDOT), 49 CFR Part 26. This contract has no established contract goals for DBE participation. Consultants/Contractors are still encouraged to employ reasonable means to obtain DBE participation. Consultants/Contractors must retain records in accordance with the DBE specifications included in Exhibit E.

Consultants/Contractors are hereby notified that this recordkeeping is important to the ADOT, so that it can track DBE participation where only race neutral efforts are employed.

6.24.6 **Aid Contracts**

FHWA-1273 form is included in Exhibit E due to FHWA construction funding (USDOT) being utilized for this contract and related project activities and/or procurement. As applicable, all clauses in this form are to be complied with under this contract, and this form shall be inserted in any Contractor/Consultant's subcontracts.

6.25 **ACCESS TO AND RETENTION OF RECORDS FOR THE PURPOSE OF AUDIT AND/OR OTHER REVIEW:**

6.25.1 In accordance with section MCI 371 of the Maricopa County Procurement Code the Contractor agrees to retain all books, records, accounts, statements, reports, files, and other records and back-up documentation relevant to this Contract for six (6) years after final payment or until after the resolution of any audit questions which could be more than six (6) years, whichever is latest. The County, Federal or State auditors and any other persons duly authorized by the Department shall have full access to, and the right to examine, copy and make use of, any and all said materials.

6.25.2 If the Contractor's books, records, accounts, statements, reports, files, and other records and back-up documentation relevant to this Contract are not sufficient to support and document that requested services were provided, the Contractor shall reimburse Maricopa County for the services not so adequately supported and documented.

6.25.3 If at any time it is determined by the County that a cost for which payment has been made is a disallowed cost, the County shall notify the Contractor in writing of the disallowance. The course of action to address the disallowance shall be at sole discretion of the County, and may include either an adjustment to future invoices, request for credit, request for a check or deduction from current billings Submitted by the Contractor by the amount of

the disallowance, or to require reimbursement forthwith of the disallowed amount by the Contractor by issuing a check payable to Maricopa County.

6.26 AUDIT DISALLOWANCES:

If at any time, County determines that a cost for which payment has been made is a disallowed cost, such as overpayment, County shall notify the Contractor in writing of the disallowance. County shall also state the means of correction, which may be but shall not be limited to adjustment of any future claim submitted by the Contractor by the amount of the disallowance, or to require repayment of the disallowed amount by the Contractor.

6.27 OFFSET FOR DAMAGES;

In addition to all other remedies at Law or Equity, the County may offset from any money due to the Contractor any amounts Contractor owes to the County for damages resulting from breach or deficiencies in performance of the contract.

6.28 PUBLIC RECORDS:

Under Arizona law, all Offers submitted and opened are public records and must be retained by the Records Manager at the Office of Procurement Services. Offers shall be open to public inspection and copying after Contract award and execution, except for such Offers or sections thereof determined to contain proprietary or confidential information. by the Office of Procurement Services. If an Offeror believes that information in its Offer or any resulting Contract should not be released in response to a public record request under Arizona law, the Offeror shall indicate the specific information deemed confidential or proprietary and submit a statement with its offer detailing the reasons that the information should not be disclosed. Such reasons shall include the specific harm or prejudice which may arise from disclosure. The Records Manager of the Office of Procurement Services shall determine whether the identified information is confidential pursuant to the Maricopa County Procurement Code.

6.29 PRICES:

Contractor warrants that prices extended to County under this Contract are no higher than those paid by any other customer for these or similar services.

6.30 INTEGRATION:

This Contract represents the entire and integrated agreement between the parties and supersedes all prior negotiations, proposals, communications, understandings, representations, or agreements, whether oral or written, express or implied.

6.31 RELATIONSHIPS:

In the performance of the services described herein, the Contractor shall act solely as an independent contractor, and nothing herein or implied herein shall at any time be construed as to create the relationship of employer and employee, co-employee, partnership, principal and agent, or joint venture between the County and the Contractor.

6.32 GOVERNING LAW:

This Contract shall be governed by the laws of the state of Arizona. Venue for any actions or lawsuits involving this Contract shall be in Maricopa County Superior Court or in the United States District Court for the District of Arizona, sitting in Phoenix, Arizona

6.33 ORDER OF PRECEDENCE:

In the event of a conflict in the provisions of this Contract and any Exhibits incorporated below, if applicable, the terms of this Contract shall prevail.

6.34 INCORPORATION OF DOCUMENTS:

The following are to be attached to and made part of this Contract:

- 6.34.1 Exhibit A, Pricing;
- 6.34.2 Exhibit B, Scope of Work;
- 6.34.3 Exhibit C, Software License and Maintenance Agreements
- 6.34.4 Exhibit D, Office of Procurement Services Contractor Travel and Per Diem Policy
- 6.34.5 Exhibit E, Special Federal Terms, Conditions and Documents

NOTICES:

All notices given pursuant to the terms of this Contract shall be addressed to:

For County:

Maricopa County  
Office of Procurement Services  
ATTN: Contract Administration  
320 West Lincoln Street  
Phoenix, Arizona 85003-2494

For Contractor:

Contractual:  
Ricardo Perez  
Contract Manager  
TransCore  
150 4<sup>th</sup> Ave. North, Suite 1200  
Nashville, TN 37219

Technical:  
William L. Skillas, PE  
Vice President  
TransCore  
192 Technology Parkway, Suite 500  
Norcross, GA 30092

IN WITNESS WHEREOF, this Contract is executed on the date set forth above.

**CONTRACTOR**

  
\_\_\_\_\_  
AUTHORIZED SIGNATURE

Michael R. Mauritz, Senior Vice President  
\_\_\_\_\_  
PRINTED NAME AND TITLE

150 4<sup>th</sup> Avenue North, Nashville, TN 37219  
\_\_\_\_\_  
ADDRESS

July 7, 2016  
\_\_\_\_\_  
DATE

**MARICOPA COUNTY**

\_\_\_\_\_  
CHAIRMAN, BOARD OF SUPERVISORS

\_\_\_\_\_  
DATE

**ATTESTED:**

\_\_\_\_\_  
CLERK OF THE BOARD

\_\_\_\_\_  
DATE

**APPROVED AS TO FORM:**

\_\_\_\_\_  
DEPUTY COUNTY ATTORNEY

\_\_\_\_\_  
DATE

**EXHIBIT A**

**PRICING**

SERIAL 15058-RFP  
 NIGP CODE: 918-42  
 RESPONDENT'S NAME: TransCore ITS, LLC  
 COUNTY VENDOR NUMBER : 2011001538 0  
 ADDRESS: 15300 N. 90<sup>th</sup> Street, Ste 750  
 Scottsdale, Arizona 85260  
 P.O. ADDRESS: N/A  
 TELEPHONE NUMBER: (480) 551-4600  
 FACSIMILE NUMBER: (480) 661-5490  
 WEB SITE: [www.transcore.com](http://www.transcore.com)  
 CONTACT (REPRESENTATIVE): William L. Skillas  
 REPRESENTATIVE'S E-MAIL ADDRESS: [william.skillas@transcore.com](mailto:william.skillas@transcore.com)

	<u>YES</u>	<u>NO</u>	<u>REBATE</u>
WILL ALLOW OTHER GOVERNMENTAL ENTITIES TO PURCHASE FROM THIS CONTRACT	[X]	[ ]	
WILL ACCEPT PROCUREMENT CARD FOR PAYMENT:	[X]	[ ]	
WILL OFFER REBATE (CASH OR CREDIT) FOR UTILIZING PROCUREMENT CARD: (Payment shall be made within 48 hours of utilizing the Purchasing Card)	[ ]	[X]	_____ %

[X] NET 30 DAYS

**1.0 PRICING FOR: PROJECT AREA 3**

		Year 1	Year 2	Year 3	Year 4	Year 5
Implementation/ Professional Services	NTE	\$221,016.90	\$	\$	\$	\$
Licensing	NTE	\$58,750	included	included	included	included
Maintenance and Support	NTE	\$50,947.32	included	included	included	included
Proprietary Hardware	NTE	\$27,125.00	\$	\$	\$	\$
NOT TO EXCEED (NTE) TOTAL		<u>\$357,839.23</u>				

**1.0 PRICING FOR: PROJECT AREA 4**

		Year 1	Year 2	Year 3	Year 4	Year 5
Implementation/ Professional Services	NTE	\$199,170.42	\$	\$	\$	\$
Licensing	NTE	\$58,750	included	included	included	included
Maintenance and Support	NTE	\$50,947.32	included	included	included	included
Proprietary Hardware	NTE	\$42,586.25	\$	\$	\$	\$
NOT TO EXCEED (NTE) TOTAL		<u>\$351,454.00</u>				

EARLY TERMINATION OF MAINTENANCE

MCDOT shall have the option to discontinue maintenance and support on a yearly basis and receive a rebate of funds paid up front for the four-year subscription for unused years of maintenance, per the sliding scale shown below. Partial years of maintenance will not be refunded. The following schedule of rebates applies:

Termination of M&S after year 1:	\$50,947.32 refund
Termination of M&S after year 2:	\$38,210.49 refund
Termination of M&S after year 3:	\$25,473.66 refund
Termination of M&S after year 4:	\$12,736.83 refund

## **System Verification & Acceptance**

This section identifies required, but not limited to, verification activities that will lead to project Final Acceptance. System verification testing shall be conducted by the contracted system provider to verify that the ASCT complies with the functional requirements as listed in the Technical Requirements shown in Attachment C of "Serial 15058 - RFP Request for Proposal for Bell Road Adaptive Signal Control Technology (ASCT) Deployment".

The contracted system provider shall provide any and all necessary on-site and off-site support, labor and equipment as appropriate during the system implementation, integration and verification testing. A proposed System Verification Plan shall be provided by the contracted system provider within 15 working days after Notice to Proceed. The Proposed Verification Plan shall be submitted to and reviewed by MCDOT. Any deficiencies in the proposed plan will be identified by MCDOT. All deficiencies identified shall be addressed by the contracted system provider.

All system requirements listed in the Technical Requirements & Responses table identified by the contracted system provider as "Provided", and accounting for stated and MCDOT accepted concessions regarding to what extent they are met, shall be verified using one of the following verification methods:

- Demonstration is used for a requirement that the system can demonstrate without external test equipment.
- Test is used for a requirement that requires some external piece of test equipment.
- Analyze is used for a requirement that is met indirectly through a logical conclusion or mathematical analysis of a result. For example, algorithms for congestion: the contracted system provider may need to show that the requirement is met through the analysis of count and occupancy calculations in software or firmware.
- Inspection is used for verification through a visual comparison.

The proposed System Verification Plan submitted by the contracted system provider shall identify the specific verification method, location, stage at which the project verification is anticipated to occur, and verification procedure for each system requirement shown in the system Technical Requirements & Responses table. Additional details may be provided to or requested by MCDOT, in addition to identifying the verification method, as necessary to clarify the proposed verification procedure.

The proposed System Verification Plan shall contain as a minimum, but not limited to, a schedule showing all activities, testing procedures relative to other project schedule components, equipment needed, personnel and roles. The proposed System Verification Plan shall include examples of forms to be used during testing for documentation purposes, acceptance criteria, duration(s) of each test, compliance criteria, retesting timeframes and shall provide a place on the form to record results.

The proposed System Verification Plan responses to each system requirement will be subject to approval by MCDOT. Each system requirement, accounting for stated and MCDOT accepted concessions regarding to what extent they are met, shall be associated with a verification procedure.

The contracted system provider shall identify how the veracity of the items listed in System Requirements Reference Number 6.0-5 can be verified by the agency. The contracted system provider shall detail the method/source of data acquisition and calculation algorithm(s) (methodology) to the agency resulting in validating the veracity of providing accurate data back to the ASCT and producing accurate performance measures listed in the System Requirements Reference Number 6.0-5.

All deliverables included as part of the System Verification shall be listed as part of the proposed System Verification Plan submittal to MCDOT. MCDOT may request the proposed forms be revised. All forms shall be approved by MCDOT before use.

MCDOT will respond to a submitted proposed System Verification Plan within 20 working days, noting any specific requirement procedures that may require clarification, further detail or revision. The

contracted system provider shall revise the Proposed Verification Plan as directed, until acceptance of the System Verification Plan is granted by MCDOT.

All requirements listed in the Technical Requirements & Responses table shall be met. Requirements found to be deficient to any level other than full compliance shall be deemed not accepted and final acceptance shall not be granted until all items are resolved. No additional compensation will be given to bring the system into compliance if found to be non-compliant during the System Verification procedures for requirements noted as compliant by the contracted system provider in the Technical Requirements & Responses table as part of this agreement.

MCDOT shall identify a Verification Monitor, responsible for observing and documenting the results of each verification procedure. Any verification failure or lack of performance to meet the stated system requirements shall be recorded by the Verification Monitor and the contracted system provider shall prepare a report stating why a system requirement was not met. The report shall include a proposed solution to resolve the deficiency and shall be submitted to MCDOT within 10 working days after the failure is discovered. If the proposed solution includes a software revision or hardware replacement, upgrade, or repair, such mitigation shall be executed and retested. No additional payment shall be made for such solution.

If there is a system requirement that the contracted system provider is not able to meet, the contracted system provider shall document in a report, and develop a proposed plan to provide similar performance or operation to meet the requirement. The proposed revised approach to meet the system requirement shall be subject to review and approval by MCDOT, and new testing of the revised requirement shall be initiated within 10 working days of any approved approach.

Upon completion of all required verification testing, the contracted system provider shall prepare an final System Verification Report which will document:

- Verification procedures
- Verification Results
- Necessary mitigations/revisions
- Retesting procedures and results
- Final disposition of each system requirement listed in the Technical Requirements & Responses table
- Failures and detailed resolution to each of the failures

The Final System Verification Report shall be submitted to MCDOT for review. Any comments resulting from the review shall be transmitted to the contracted system provider. The report shall be revised as directed, and resubmitted to MCDOT. An Approved Final Verification Report is necessary for final project acceptance.

**Milestone Payments**

The parties acknowledge that payment for the Milestones hereunder be payable only upon the County’s acceptance of such Milestone, acceptance of which shall not be unreasonably withheld, delayed or conditioned. The Schedule of Milestones, as defined below, is inclusive of the terms and conditions within the Master Agreement.

**Milestone 1 – Mobilization**

Milestone Value - 10% of Total Project Cost (Area 3)	\$ 35,783.92
Milestone Value – 10% of Total Project Cost (Area 4)	\$ 35,145.40

**Milestone 2 - Intersection Detection Identification**

The system provider shall work cooperatively with MCDOT and MCDOT’s design consultant to identify specific detection to be provided on each approach, for each movement, resulting from the ASCT system configuration mutually agreed to by MCDOT and the system provider for this project. Such detection will be provided by MCDOT under separate contract, unless specifically made a part of the system provider's contract herein. System provider shall specify, detection distances, zone(s), output configuration (channels) and method of verification of suitable detection implementation resulting in the

optimum conditions for the system provider's ASCT system to operate successfully. MCDOT shall review and approve system providers recommendations for detection implementation. Final plans shall be the responsibility of MCDOT. System provider shall note that 15 specific locations are available for intrusive detection (loops). All others shall use non-intrusive detection methods that do not result in any ground disturbance.

Vendor shall also supply specifications for detection technologies and systems that are compatible with their system resulting in maximum system effectiveness. Vendor shall identify any detection technologies or systems that are incompatible with or unsuitable for use with their proposed system.

Milestone Value - 30% of Total Project Cost (Area 3)      \$ 107,351.77  
Milestone Value - 30% of Total Project Cost (Area 4)      \$ 105,436.20

**Milestone 3 - System Installation and Training**

The system provider shall deliver, install, configure and set up all hardware and software associated with the ASCT system, and conduct agency staff training per the terms and conditions of this agreement. System provider shall acknowledge that the field detection elements, installed by separate contract, unless specifically made a part of the system provider's contract herein, shall be in-place and functional prior to full ASCT implementation and agency staff training.

Milestone Value - 30% of Total Project Cost (Area 3)      \$ 107,351.77  
Milestone Value - 30% of Total Project Cost (Area 4)      \$ 105,436.20

**Milestone 3 - Final Acceptance**

The system provider shall attain Final Acceptance from MCDOT based on successfully passing the testing requirements of the MCDOT approved Verification Plan, which test functionality and compliance to the System Technical Requirements agreed to by the system provider under the terms and conditions of this agreement.

Milestone Value - 30% of Total Project Cost (Area 3)      \$ 107,351.77  
Milestone Value - 30% of Total Project Cost (Area 4)      \$ 105,436.20

**EXHIBIT B****SCOPE OF WORK****1 PROJECT APPROACH/METHODOLOGY****1.1 Solution Overview**

TransCore ITS, LLC, in association with KLD Engineering, P.C. (KLD) is proposing to deploy the Adaptive Control with Decision Support System (ACDSS) in response to the Bell Rd Adaptive Signal Control Technology (ASCT) Deployment RFP. ACDSS is a comprehensive adaptive traffic control module, developed by KLD, which is fully integrated with TransCore's TransSuite<sup>®</sup> Traffic Control System (TCS). ACDSS provides the following features:

- Fully NTCIP compatible, works with existing traffic control infrastructure, and supports multiple types of controllers (including Econolite ASC3 and Cobalt)
- Flexible detectorization requirements, supports sparse detector layouts
- Cutting-edge multi-objective, multi-regime signal optimization, capable of handling both unsaturated and oversaturated traffic conditions
- Applicable to small cluster of intersections, arterials, diamond interchanges, and grid networks of hundreds of intersections
- User definable periods to run the system according to a schedule, with ability to turn on or off manually
- Deals with short-term traffic variations, and long-term pattern drifting

ACDSS is operational on an arterial in Staten Island, NY similar to Bell Road. It is the ASCT component of one of the largest Active Traffic Management (ATM) systems in the U.S. – the Midtown in Motion (MIM) system deployed in New York City. In highly congested Midtown Manhattan, ACDSS has delivered an average 10% improvement in travel speeds, and a 5% reduction in vehicle emissions. On the Staten Island arterial, it has achieved a travel time saving of 10-15% during peak hours and 7-9% reductions in fuel consumption and pollutant emissions.

Figure 4-1 presents the ACDSS system architecture. ACDSS is integrated with the TransSuite TCS via a web services interface. Communications between ACDSS and the field controllers are accommodated through the TransSuite TCS system. This means no communications modifications shall be required for the Bell Road signals as the TransSuite system is fully compatible with the participating Cities' existing IP-based network architecture. ACDSS is highly flexible in terms of detection requiring minimal detectorization. Preferred detection includes advanced detection on the mainline and major side streets, as well as stop bar detection for left turns.

ACDSS is highly integrated with the TransSuite TCS making use of TransSuite's Unified Controller Manager (UCM) and Central Communications Server (CCS) to affect control selected intersections. Adaptive status is monitored by the TCS providing historical detector data when failover thresholds are not exceeded. Additionally, if intersections fail out of adaptive mode, the TCS reverts intersection control to the previously selected mode automatically. All statuses are viewable in the TCS Proper as well as all graphical reports, including ATMS Map and ATMS Explorer. Adaptive mode can be initiated both manually and via the TCS scheduler allowing more strategic control of the selected corridor.

**Figure 4-1 - ACDSS System Architecture**



## 1.2 Proposed Approach

TransCore's proposed solution is being offered for two of the four project areas identified in the RFP. Specifically our proposal is addressing Project Areas 3 and 4, the Cities of Scottsdale and Phoenix. TransCore's proposed ACDSS based solution shall leverage the existing TransSuite TCS deployment in each City. In addition, the Arizona Department of Transportation (ADOT) is a TransSuite TCS user allowing simpler integration of the ADOT intersection of Bell Road and I-17 in Project Area 4. The following Sections discuss the approach to deploying ASCT in Phoenix and Scottsdale.

### 1.2.1 Scottsdale Deployment

#### 1.2.1.1 System Deployment

TransCore shall deploy ACDSS integrated with the existing City of Scottsdale TCS. Currently TransSuite is deployed in a virtual environment hosted on City of Scottsdale servers. ACDSS shall be deployed in this virtual environment saving the cost of additional hardware for the City of Scottsdale ASCT. TransCore shall discuss this hardware deployment option with the City of Scottsdale and Scottsdale IT. We shall secure an additional virtual machine from the City of Scottsdale. The ACDSS virtual machine shall need to be configured as follows:

- 4 compute cores
- 16GB RAM
- 500GB Hard Drive
- Windows Server 2012R2

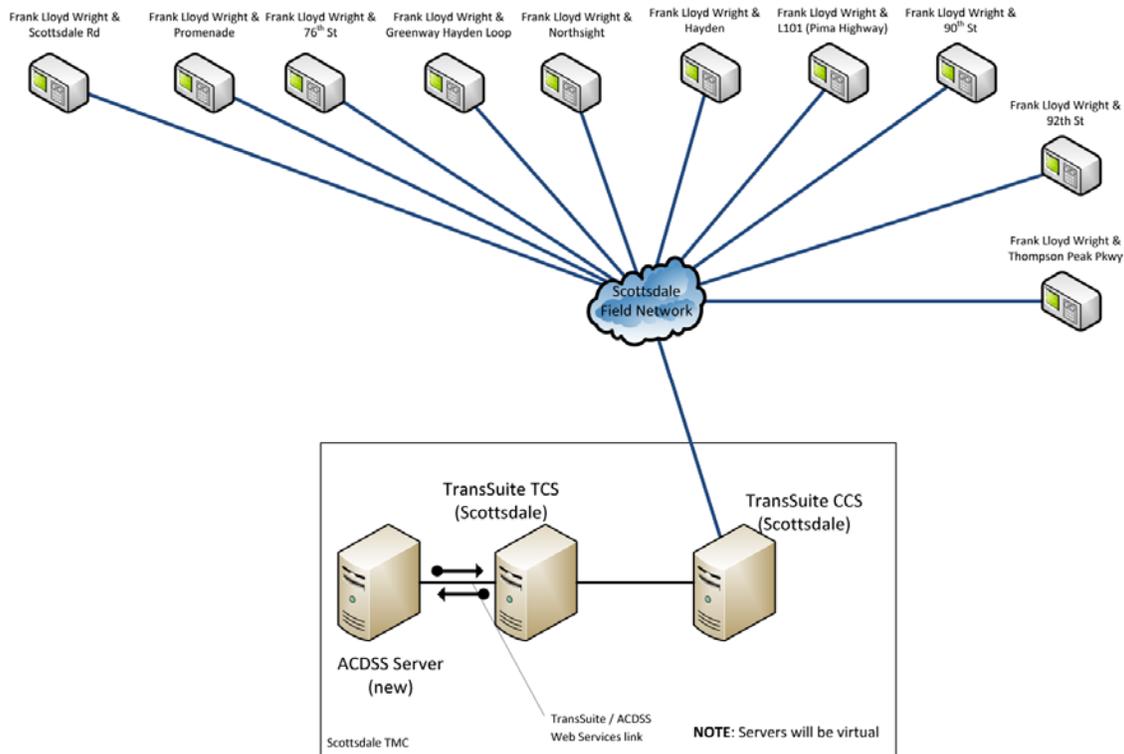
Optionally, TransCore can procure and install a new server specifically for the ACDSS implementation. TransCore has not included the cost of this server in this proposal. That server would serve as host for the ACDSS applications and shall reside in the City of Scottsdale TMC. The new server would consist of the following:

- Dell PowerEdge R730 rackmount server
- Intel Xeon E5-2650L Processor (12 processing cores)
- 64GB Memory
- 2 x 1.2TB 10K RPM Hard Drives (RAID-1)
- PERC H330 RAID Controller
- 4 x 1Gb Network Ports
- Windows Server 2012R2
- 3-year Pro Warranty

As part of the ACDSS deployment, TransCore shall update the City of Scottsdale TCS to the most recent release at the time of deployment. This shall ensure compatibility and ease support for both Project Area 3 and 4. The City of Scottsdale is also a user of the TransSuite Traveler Information System. We shall upgrade this TransSuite module as well, bringing it to current release standards.

ACDSS interfaces with TransSuite through a defined web service allowing data to be exchanged between the respective servers. TransCore shall activate the ACDSS web service on the City of Scottsdale server for ASCT. This shall allow ACDSS to actively manage intersections on the TCS for the Bell Rd. ASCT. Figure 1-2 is a high level diagram of the proposed system deployment for the City of Scottsdale and Project Area 3.

**Figure 1-2: Project Area 3 ASCT Architecture**



**1.2.1.2 Controller Modifications**

Deployment of ACDSS shall require upgrades to the controllers deployed in the City of Scottsdale. Those intersections are identified in Attachment B of the RFP and are listed here for reference:

- Frank Lloyd Wright Boulevard and Scottsdale Road
- Frank Lloyd Wright Boulevard and Promenade
- Frank Lloyd Wright Boulevard and 76<sup>th</sup> Street
- Frank Lloyd Wright Boulevard and Greenway-Hayden Loop
- Frank Lloyd Wright Boulevard and Northsight Boulevard
- Frank Lloyd Wright Boulevard and Hayden Road
- Frank Lloyd Wright Boulevard and L-101 (Pima Freeway)
- Frank Lloyd Wright Boulevard and 90<sup>th</sup> Street
- Frank Lloyd Wright Boulevard and 92<sup>nd</sup> Street/100<sup>th</sup> Street
- Frank Lloyd Wright Boulevard and Thompson Peak Parkway

ACDSS requires access to the ACS Lite objects available via NTCIP on the ACS-3 controllers. Activation of these objects requires the use of a data key obtained from Econolite. TransCore shall procure these data keys for the ASCT project and activate the ACS Lite objects on the Area 3 intersections above. TransCore shall review controller operation with City of Scottsdale staff prior to activating the ACS Lite modules. This shall minimize the likelihood of any adverse functionality of the upgraded controllers in the field.

**1.2.1.3 Detection Requirements**

Project Area 3 includes 10 intersections. ACDSS can be deployed for the Scottsdale ASCT using "AS IS" detection based on the following conditions:

1. Detection "AS IS" is supported by ACDSS, provided that all detectors are in working conditions and provide 30-second aggregated volume and occupancy data.
2. Using detection "AS IS", ACDSS adaptive over-saturated control (queue balancing and queue management) shall not be activated. At the critical intersections, the crossing arterials shall have to be treated as minor traffic (without additional advance detectors).
3. "AS IS" detection shall be suitable for light to medium-light traffic (no serious cycle failures, no queue spill backs of left turns) on the mainline, while there are no prevalent queuing issues at minor approaches with just random variations and no systematic capacity problems.

To make better use of the features of ACDSS, three detection scenarios are proposed. For all three scenarios, the data shall be volume and occupancy data, aggregated at minimum every 30 seconds. Since no ground disturbing activities are allowed, only Video or Radar based detection technology is considered.

All additional detection proposed is advance detection. Compared to stop line detection, advance detection provides better time/space dimensions of data for demand estimation and queue prediction, especially when a phase becomes saturated and when cycle failures occur.

*Scenario A* requires adding advanced detection on 4 critical intersections, namely,

- Frank Lloyd Wright Blvd @ Scottsdale Rd
- Frank Lloyd Wright Blvd @ Greenway-Hayden Loop
- Frank Lloyd Wright Blvd @ 101
- Frank Lloyd Wright Blvd @ Thompson Parkway

At these critical intersections, advanced detection is added at protected left turn lanes and thru lanes of ***both*** cross street ***and*** main line. Non-critical intersections use detection AS IS.

In Scenario A (Figure 1-3), critical intersections' cycle, offset and splits are continuously optimized on a cycle-by-cycle basis. Cycle optimization provides the needed capacity proactively with varying demand levels; offset optimization provides the progression for the prevailing pattern; and split optimization optimizes splits to either minimize delay when traffic is unsaturated, or perform queue management when traffic becomes oversaturated.

Those non-critical intersections that use detection AS IS shall have to depend on critical intersections to determine their optimal cycle and offsets in real-time. The splits of those intersections shall be optimized only if stop-line detection is available on all approaches, otherwise no split optimization shall be performed (splits shall be determined by the underlying base plans). **Scenario A provides the most cost-effective detection plan; it works best if those non-critical intersections have minor/random cross street traffic demand.**

**Figure 1-3: Project Area 3: Detection Proposal Scenario A**



Scenario A	Additional Per-Lane Advance Detectors											
	Cross Rd						FLW Boulevard					
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Frank Lloyd Wright Blvd & Scottsdale	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Promenade												
Frank Lloyd Wright Blvd & 76 St.												
Frank Lloyd Wright Blvd & Greenway Hayden Loop	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Northsight Blvd												
Frank Lloyd Wright Blvd & Hayden Rd												
Frank Lloyd Wright Blvd & L101	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & 90th St.												
Frank Lloyd Wright Blvd & 92nd St.												
Frank Lloyd Wright Blvd & Thompson Peak Parkway	Y	Y		Y	Y		Y	Y		Y	Y	

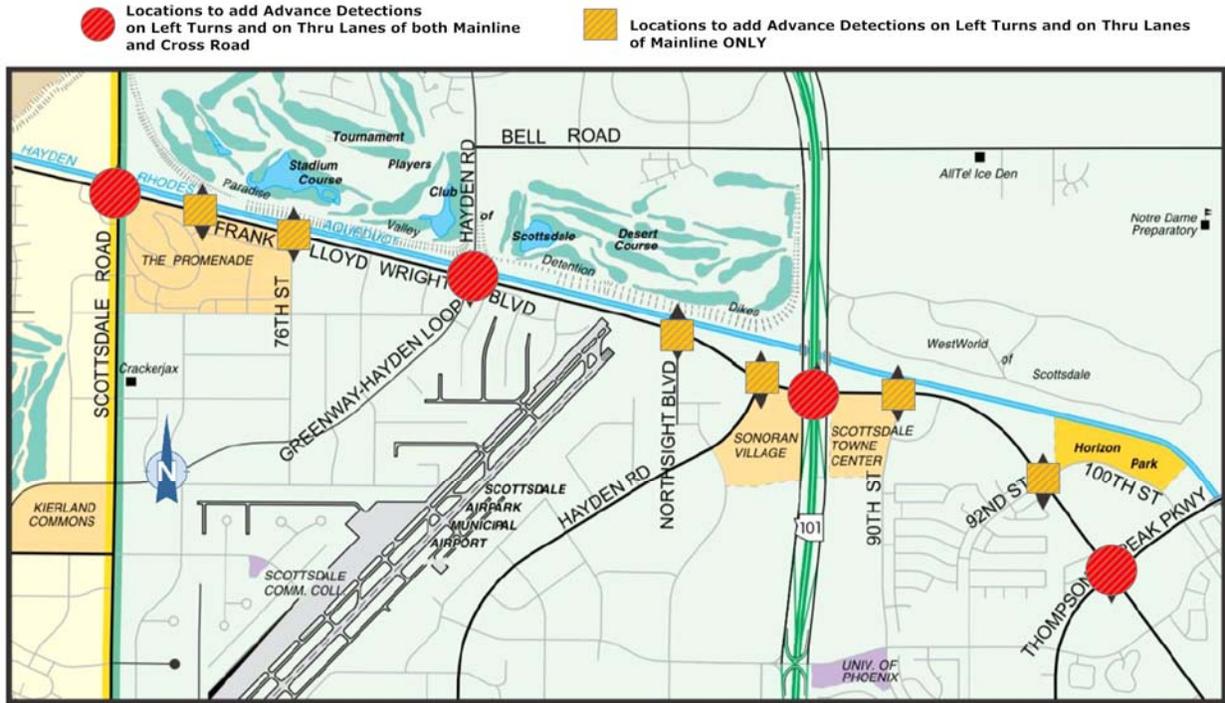
**Scenario B** is one step further of **Scenario A**. *In addition* to the four critical intersections, advance detection is added on mainline protected left turn lanes and thru lanes as well.

In Scenario B (Figure 1-4), all intersections cycle, offset and splits are continuously optimized on a cycle-by-cycle basis. Cycle optimization provides the needed capacity proactively with varying demand levels; offset optimization provides the progression for the prevailing pattern; and split optimization optimizes splits to either minimize delay when traffic is unsaturated, or perform queue management when traffic becomes oversaturated (such as special events).

In Scenario B, when traffic becomes oversaturated at critical intersections, ACDSS adaptive control system can automatically perform queue management (queue balancing) strategy to mitigate congestion (because advance detection is available on all approaches). Since non-critical intersections have no advance detection on minor approaches, queue management shall not be available.

**Scenario B provides a relatively cost-effective detection plan, with its capacity to support fully adaptive operation with cycle, offset and split optimized on a cycle by cycle basis for all intersections; it works best if those non-critical intersections have light to mid-level cross street traffic demand with variability and no significant queuing issues at minor approaches.**

Figure 1-4: Project Area 3: Detection Proposal Scenario B



Scenario B	Additional Per-Lane Advance Detectors											
	Cross Rd						FLW Boulevard					
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Frank Lloyd Wright Blvd & Scottsdale	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Promenade							Y	Y		Y	Y	
Frank Lloyd Wright Blvd & 76 St.							Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Greenway Hayden Loop	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Northsight Blvd							Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Hayden Rd							Y	Y		Y	Y	
Frank Lloyd Wright Blvd & L101	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & 90th St.							Y	Y		Y	Y	
Frank Lloyd Wright Blvd & 92nd St.							Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Thompson Peak Parkway	Y	Y		Y	Y		Y	Y		Y	Y	

Scenario C requires installing advance detection on all protected left turn lanes and thru lanes, of both mainline and minor approaches, at all intersections.

In Scenario C (Figure 1-5), all intersections' cycle, offset and splits are continuously optimized on a cycle-by-cycle basis. Cycle optimization provides the needed capacity proactively with varying demand levels; offset optimization provides the progression for the prevailing pattern; and split optimization optimizes splits to either minimize delay when traffic is unsaturated, or perform queue management when traffic becomes oversaturated (such as special events).

In Scenario C, when traffic becomes oversaturated at *critical* intersections or at minor intersections, ACDSS adaptive control system can automatically perform queue management (queue balancing) strategy to mitigate congestion (because advance detection is available on all approaches).

**Scenario C provides a basis for the most comprehensive adaptive signal operation, for multi-regime adaptive control of both unsaturated and oversaturated traffic. It works best that non-critical intersections have occasionally heavy cross street traffic demand with variability and significant queueing issues at both minor approaches and main approaches.**

Figure 1-5: Project Area 3: Detection Proposal Scenario C



Scenario C	Additional Per-Lane Advance Detectors											
	Cross Rd						FLW Boulevard					
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Frank Lloyd Wright Blvd & Scottsdale	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Promenade	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & 76 St.	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Greenway Hayden Loop	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Northsight Blvd	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Hayden Rd	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & L101	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & 90th St.	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & 92nd St.	Y	Y		Y	Y		Y	Y		Y	Y	
Frank Lloyd Wright Blvd & Thompson Peak Parkway	Y	Y		Y	Y		Y	Y		Y	Y	

## 1.2.2 Phoenix Deployment

### 1.2.2.1 System Deployment

TransCore shall deploy ACDSS integrated with the existing City of Phoenix and ADOT TransSuite TCSes. TransCore shall configure and deploy a new virtual machine on the City of Phoenix's existing TransSuite servers specifically for the ACDSS implementation. That server shall serve as host for the ACDSS applications and shall reside in the City of Phoenix TMC. The ACDSS virtual machine shall need to be configured as follows:

- 4 compute cores
- 16GB RAM
- 500GB Hard Drive
- Windows Server 2012R2

Optionally, TransCore can procure and install a new server specifically for the ACDSS implementation. TransCore has not included the cost of this server in this proposal. That server would serve as host for the ACDSS applications and shall reside in the City of Phoenix TMC. The new server would consist of the following:

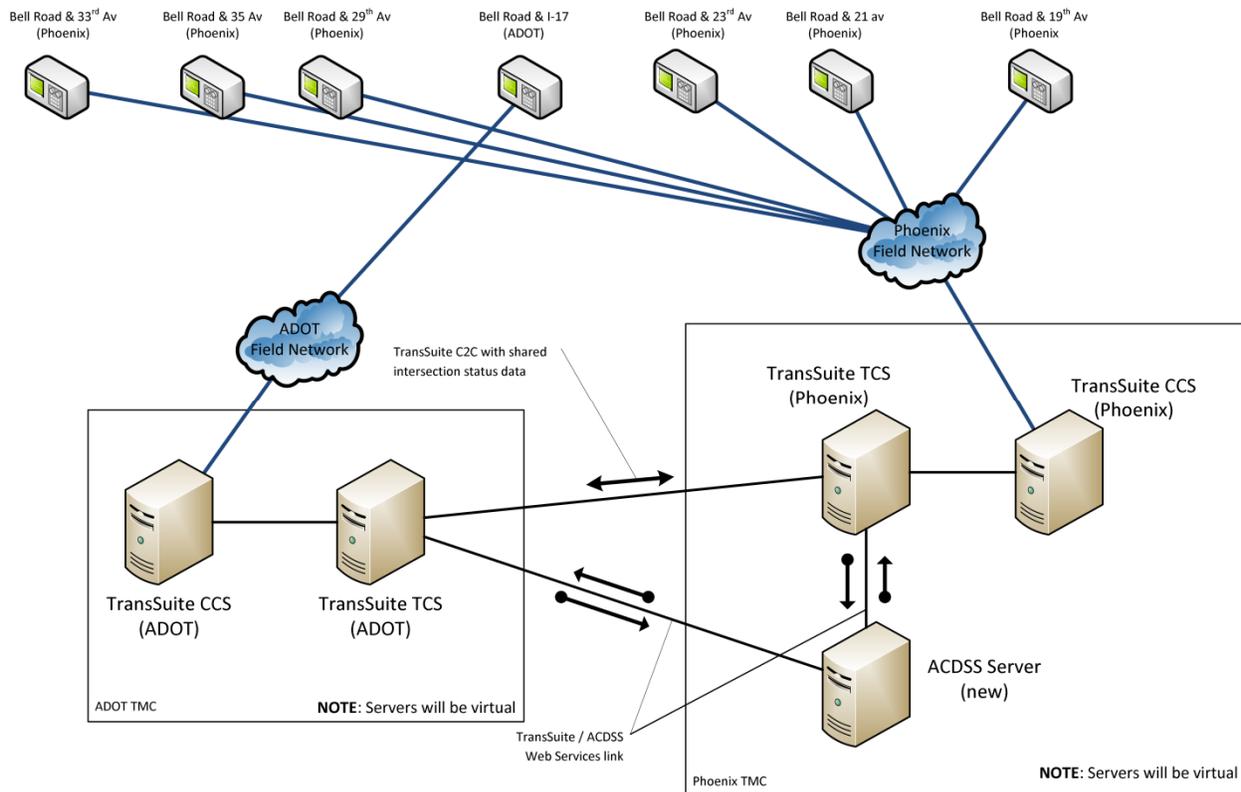
- Dell PowerEdge R730 rackmount server
- Intel Xeon E5-2650L Processor (12 processing cores)
- 64GB Memory
- 2 x 1.2TB 10K RPM Hard Drives (RAID-1)
- PERC H330 RAID Controller
- x 1Gb Network Ports
- Windows Server 2012R2

- 3-year Pro Warranty

As part of the ACDSS deployment, TransCore shall update the City of Phoenix and ADOT TCSes to the most recent release at the time of deployment. This shall ensure compatibility between the systems where jurisdictional boundaries intersect. Additionally, this shall allow TransCore to provide support to the selected contractor for Project Area 2, which has a single intersection identified for ASCT control as well.

ACDSS interfaces with TransSuite through a defined web service allowing data to be exchanged between the respective servers. TransCore shall activate the ACDSS web service on both the City of Phoenix and ADOT TCS servers for ASCT. This shall allow ACDSS to actively manage intersections on both TCS for the Bell Rd. ASCT. Figure 1-6 below is a high level diagram of the proposed system deployment for the City of Phoenix and Project Area 4.

**Figure 1-6: Project Area 4 ASCT Architecture**



TransCore has assumed network connectivity shall be available between the City of Phoenix TMC and ADOT TMC allowing ACDSS to communicate with intersections on both systems as required. In addition, TransCore shall enable the TransSuite center-to-center (C2C) interface on both systems allowing users of both systems to view the status of the Bell Rd. intersections. TransCore shall configure appropriate jurisdictions on each host TransSuite system, allowing users to monitor intersections on both systems. Control shall be authorized only for appropriate users of the individual systems. Shared viewing of ASCT enabled intersections shall also be available through TransSuite’s map-based and schematic graphics packages, ATMS Map and ATMS Explorer, further integrating ACDSS into the daily operations of the host systems.

### **1.2.2.2 *Controller Modifications***

Deployment of ACDSS shall require upgrades to the controllers deployed in both the City of Phoenix and ADOT. Currently the six intersections identified for ASCT in the City of Phoenix are operating with Econolite ASC2S controllers. Those intersections are identified in Attachment B of the RFP and are listed here for reference:

- Bell Road and 35th Avenue
- Bell Road and 33rd Avenue
- Bell Road and 29th Avenue/Holmes Boulevard
- Bell Road and 23rd Avenue
- Bell Road and 21st Avenue
- Bell Road and 19th Avenue

TransCore is proposing to upgrade each of these controllers to Econolite ASC3 controllers for the ASCT Deployment. ACDSS requires access to the ACS Lite objects available via NTCIP. ACS-3 provides the simplest access to the objects activating ACS Lite via a data key. TransCore shall be responsible for migrating existing ACS-2S databases to the ACS3 controllers. TransCore has assumed City staff shall be available for swapping out the existing ASC2S for the new ASC3 controllers. Econolite ASC-3 controllers are currently being used elsewhere within the City of Phoenix so this controller upgrade is consistent with current controller standards used by the City.

The remaining Project Area 4 intersection is owned by ADOT. This intersection, Bell Road and I-17, is currently using an Econolite Cobalt controller. This controller shall not need to be physically replaced. TransCore shall provide the required data key to activate the ACS Lite objects on the controller.

### **1.2.2.3 *Detection Requirements***

Project Area 4 (Figure 1-7) includes 7 intersections. ACDSS can be deployed for the Phoenix ASCT using "AS IS" detection based on the following conditions:

1. Detection "AS IS" is supported by ACDSS, provided that all detectors are in working conditions and provide 30-second aggregated volume and occupancy data.
2. Using detection "AS IS", ACDSS adaptive over-saturated control (queue balancing and queue management) shall not be activated. At the critical intersections, the crossing arterials shall have to be treated as minor traffic (without additional advance detectors).
3. "AS IS" detection shall be suitable for light to medium-light traffic (no serious cycle failures, no queue spill backs of left turns) on the mainline, while there are no prevalent queuing issues at minor approaches with just random variations and no systematic capacity problems.

To make better use of the features of ACDSS, TransCore proposes additional detectorization in Area 4. The required data are volume and occupancy data, aggregated at minimum every 30 seconds. Since all 7 intersections are identified as "Potential New Detection" in the RFP and have been cleared through a separate Federal funding process, we propose adding per-lane advance detection on all protected left turn lanes, and thru lanes of both minor and major approaches, of all the 7 intersections.

Advance detection provides better time/space dimensions of data for demand estimation and queue prediction, especially when a phase becomes saturated and when cycle failures occur.

Additional advance detection provides the basis for ACDSS to perform effective multi-regime adaptive control for both unsaturated and oversaturated traffic.

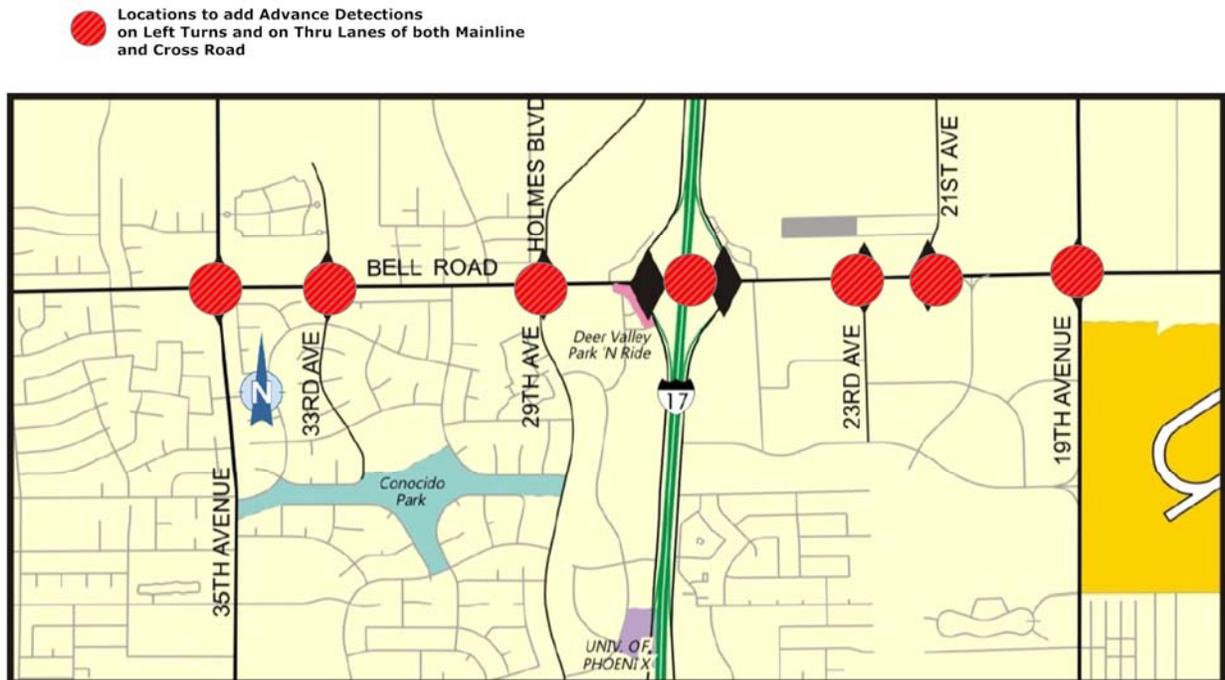
ACDSS optimizes cycle, offset and splits are continuously optimized on a cycle-by-cycle basis. Cycle optimization provides the needed capacity proactively with varying demand levels; offset optimization provides the progression for the prevailing pattern; and split optimization optimizes splits to either minimize delay when traffic is unsaturated, or perform queue management when traffic becomes oversaturated. Advance detectors allow ACDSS to identify the regime of traffic flow and automatically switch to queue management when traffic becomes oversaturated.

The operational advantage of advance detection is as follows:

With stop-line detection, the information available at best is the so called “phase saturation”, an equivalent of v/c ratio. When traffic becomes oversaturated on the approach, stop line detection provides little information regarding the existence, scale, duration, or severity of oversaturation. Even worse, stop line detectors may miscount due to tail-gating. Likewise, occupancy data from stop-line detection is of little value since higher values can be resulted from one single vehicle staying on the detector. Such data are misleading from an adaptive control perspective, especially when it comes to oversaturated control and queue management.

ACDSS multi-regime adaptive control takes advantage of advance detection to perform effective queue management when traffic becomes oversaturated. Using advanced detection, the severity of queueing conditions are more accurate, and can be incorporated into signal optimization for sophisticated congestion management and queue balance logs.

**Figure 1-7: Project Area 4: Detection Proposal**



Area 4	Additional Per-Lane Advance Detectors											
	Cross Rd						Bell Rd					
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Bell Rd & 35th Ave	Y	Y		Y	Y		Y	Y		Y	Y	
Bell Rd & 33th Ave	Y	Y		Y	Y		Y	Y		Y	Y	
Bell Rd & 29th Ave	Y	Y		Y	Y		Y	Y		Y	Y	
Bell Rd & I-17	Y	Y		Y	Y		Y	Y		Y	Y	
Bell Rd & 23th Ave	Y	Y		Y	Y		Y	Y		Y	Y	
Bell Rd & 21th Ave	Y	Y		Y	Y		Y	Y		Y	Y	
Bell Rd & 19th Ave	Y	Y		Y	Y		Y	Y		Y	Y	

2 WORK PLAN

2.1 Project Areas

Figure 2-1 and Figure 2-2 presents the 17 candidate intersections along Bell Road/ Frank Lloyd Wright Boulevard in Project Areas 3 and 4 per the RFP. These are the two Project Areas TransCore is addressing with this proposal. Preliminary field surveys shall be conducted to assess the general traffic conditions and shall be factored into determining any additional detector requirements.

Figure 2-1: Project Area 3

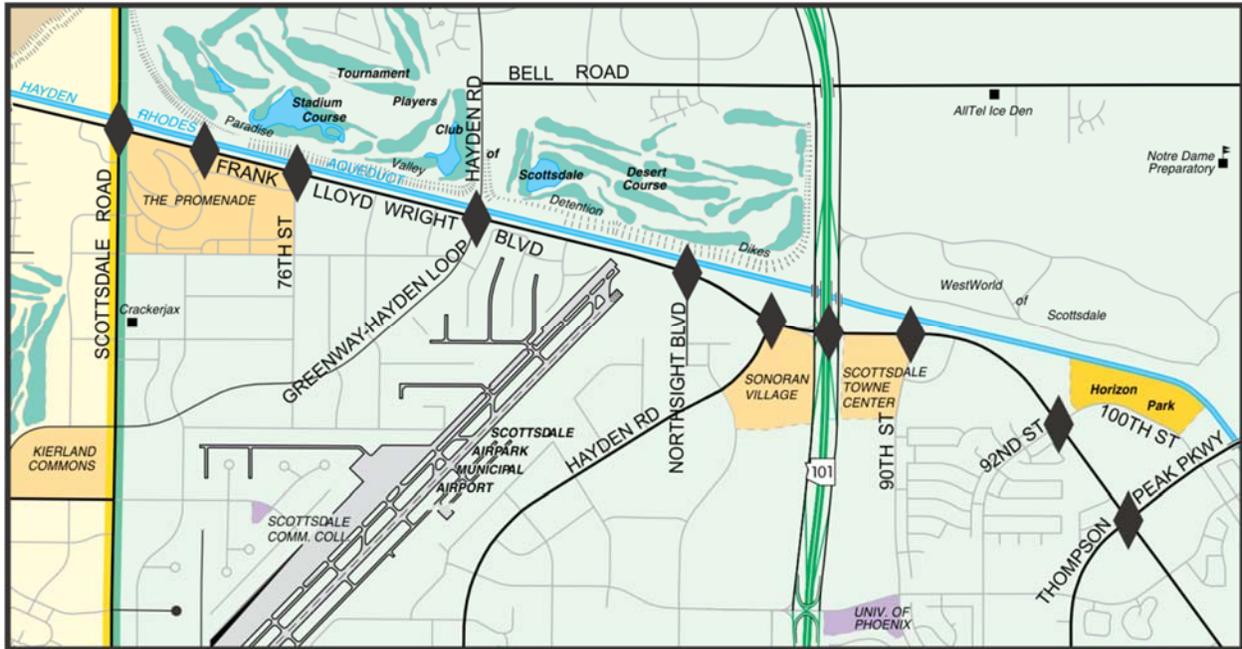


Figure 2-2: Project Area 4



## 2.2 Project Management

TransCore shall provide project management for the Bell Rd ASCT. A kick-off meeting shall be scheduled with each jurisdiction subsequent to notice to proceed. This kick-off meeting shall include a review of the requirements matrices for Project Areas 3 and 4. The purpose of the requirements review is to clarify any ambiguity in our proposal response for the deployment of ACDSS. Site visits to each existing TMC and field reviews for each corridor shall be scheduled subsequent to the kick-off meetings. TransCore shall submit meeting minutes from the kick-off meeting within 5 business days for comment.

Bi-weekly status meetings shall be held through final acceptance of the project. Final acceptance is discussed in Section 3.4 of the RFP. TransCore envisions these bi-weekly meetings as teleconferences between all involved parties.

The following sections present our proposed Scopes of Work for each Project Area.

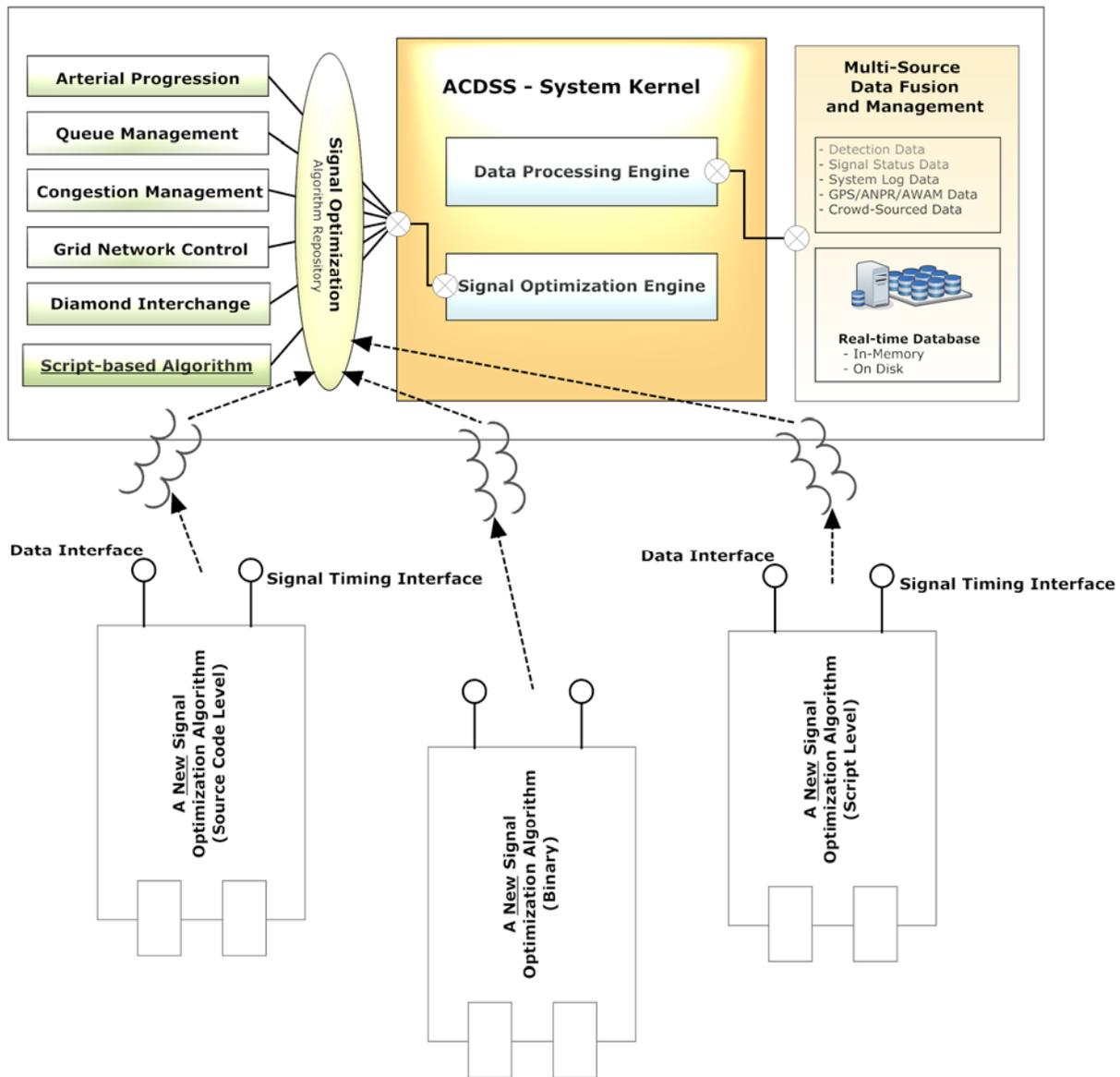
## 2.3 Scope of Work – Area 3

The proposed ACDSS adaptive signal control system supports multi-regime variable objective adaptive signal control (Figure 2-3). It handles oversaturated traffic and unsaturated traffic seamlessly on a cycle-by-cycle basis, providing delay minimization or queue management with varying traffic demands. For various geometry types, from diamond interchanges to urban grids, from CBD critical intersections or arterials to cluster of intersections, ACDSS applies differentiated adaptive treatments that better address the geometric characteristics for real time signal optimization.

Area 3 is featured by an E-W bound arterial of 10 intersections. Four (4) critical intersections are identified, including the following:

- Frank Lloyd Wright Blvd @ Scottsdale Rd
- Frank Lloyd Wright Blvd @ Greenway-Hayden Loop
- Frank Lloyd Wright Blvd @ 101 (SPUI)
- Frank Lloyd Wright Blvd @ Thompson Peak Parkway

Figure 2-3: ACDSS Multi-Regime Variable Objective Adaptive Signal Control for Different Geometric Characteristics and Traffic Flow Conditions



### 2.3.1 Project Area 3 - Detection Scenarios

**Four Detection Scenarios** are proposed for Project Area 3, for adaptive signal operations on this arterial, each with different operational characteristics, and pricing implications.

**Scenario “AS IS” uses detection “AS IS”**, with existing stop line detectors.

For this scenario, ACDSS operation shall primarily address unsaturated traffic (light to medium light traffic), providing optimized progression based on prevailing traffic directional pattern. No queue management or queue balancing optimizations are involved. Cycle length shall be optimized based on the real-time capacity needs of the critical intersections (up to a certain demand level under saturation). Offsets shall be determined based on the identified pattern. Splits shall be optimized based on stop line detections for delay minimization. At approaches where there is no stop line detection,

splits shall be adjusted based on the cycle length as determined by the critical intersections. This detection scenario is suitable if the arterial in question has no serious cycle failures and no left turn spill backs with existing signals, while minor approaches only have random traffic arrivals without queueing.

**Scenario A requires adding additional advance detectors, at the four critical intersections listed above**, both on mainline and minor approaches.

This scenario allows the system to perform adaptive signal operations as permitted by Scenario “AS IS”. Additionally, Scenario A allows ACDSS to perform the following two operations:

- **Queue Management at Critical Intersections**

Queue management shall be performed at the critical intersections when traffic on all approaches has queueing, typical of the intersection with two major arterials crossing each other. When queue management is active, signals are optimized to prevent cycle failure and queue spillbacks, giving all directions balanced treatment, without compromising the other crossing approaches (e.g., Scottsdale Rd, L101 Freeway off ramps)

Queue balancing when properly operated, can further provide more coherent platoons on the progression since the critical intersections by themselves can be utilized as the “metering” point for certain management strategies.

- **Diamond Interchange Adaptive Control at L101 (Pima Freeway)**

Diamond interchange (or similar geometry) is characterized by two closely spaced intersections (that may be controlled by one single controller), with left turns on the common approach connecting the two intersections. The common approach generally is a short block fed by movements from various phases. The primary objective of diamond interchange adaptive control is to ensure that queues do not block the common approach and spill back into the intersections, with the priority to not impact freeway operations. This is treated as a special type of over-saturated control by ACDSS, requiring advance detectors to be deployed for each phase. The phases of two intersections are processed in a combined manner. Each detector provides volume and occupancy data, which are converted to calculate slack time the subject phase can contribute, or additional green time the subject phase would need. The algorithm systematically distributes the slack time based on the needed extra time, while selectively applying traffic gating at certain phases to meet the control goal.

On top of Scenario A, **Scenario B requires adding additional advance detectors, at those non-critical intersections, mainline only.**

This scenario allows the system to perform adaptive signal operations as permitted by Scenario “AS IS” and Scenario A queue management. Additionally, Scenario B allows ACDSS to perform the following extra:

- Progression fine tuning due to secondary platoons along the arterial.

This scenario allows the system to further fine tune the progression when the arterial has non-trivial secondary platoons. Secondary platoons are generated by the left-turning or right-turning vehicles. On the contrary, primary platoons are those vehicles that go through from both ends of the arterial. Using these extra advance detectors, ACDSS shall be able to fine tune the progression for secondary platoons.

**Scenario C requires adding additional advance detectors, at all intersections, on both mainline and minor approaches.**

This scenario is the superset of all previous detection scenarios (AS IS, Scenario A and B). It provides the redundancy and robustness for a comprehensive adaptive system to perform both unsaturated and oversaturated control when needed at all intersections. Signals are optimized for facilitating progression, minimizing delay, and maximizing throughput. Queue management is performed systematically at relevant intersections when necessary.

This scenario is typically best for an arterial that carries significant directional traffic with non-trivial demands at minor approaches causing queuing and delays.

### 2.3.2 Project Area 3 – Tasks

Project Area 3 Scope of Work includes the following tasks.

#### 2.3.2.1 *Project Staging, Initial Project Meeting with the Agency.*

This task involves project staging, initial project kick-off meeting with the Agency and all stake holders. The Agency stipulates their expectation of the adaptive operations, for example, progression focused and/or perform queue management at critical intersections. The Agency provides policy guidelines when it comes to prioritized treatments over conflicting objectives.

Detection Scenario shall be determined by the time this task completes.

**DELIVERABLE:** Report documenting the project staging decisions, the operational goals and control objectives as stipulated (expected) by the Agency, and policy guidelines.

#### 2.3.2.2 *Review Existing Signal Plans, Signal Sequences, Field Survey*

This task reviews the existing signal plans and phase sequences. A field survey shall be performed to obtain insights of the existing and (potentially) future traffic flow conditions, and the existing detector set up. If the detection scenario calls for new installation of additional detectors, the preferred detector setbacks shall be determined by the time this task completes.

Test of Performance Plan shall be drafted and submitted for the Agency review and approval.

**DELIVERABLE:** Report of the findings of the field survey, and draft Test of Performance Plan. Recommended setbacks for additional advance detectors. Recommended phase sequences to be employed in adaptive (if change of existing sequence is in order).

#### 2.3.2.3 *Procure New Virtual Machine from Scottsdale IT*

TransCore shall negotiate the procurement of an additional virtual machine from the City of Scottsdale IT department. This virtual machine shall host the ACDSS server for the Project Area 3 ASCT. The virtual machine shall be configured as described in Section 1.2.1.1 of this proposal.

**DELIVERABLE:** New virtual machine configured as ACDSS Server for Project Area 3.

#### 2.3.2.4 *Configure and Install New Scottsdale TransSuite® Build*

TransCore shall configure and install a new Scottsdale specific TransSuite build updating their existing software to the latest available release. This version of TransSuite shall have the ACDSS interface enabled allowing integration with the new ACDSS server.

**DELIVERABLE:** Updated City of Scottsdale TransSuite software.

#### 2.3.2.5 *Install ACDSS Software on a Central Server*

ACDSS software shall be installed on the new virtual machine procured in Section 2.3.2.3 above. Relevant TransSuite TCS credentials shall be set up to allow the adaptive control system to retrieve detector data, controller status data, and perform adaptive control.

The communication between ACDSS adaptive control module and TransSuite TCS shall be tested and validated.

**DELIVERABLE:** Installed ACDSS software on the server. Login credentials of ACDSS software.

#### 2.3.2.6 *Verify (Existing and/or New) Detection and Set Up Data Feeds, Examine Detection Data Accuracy and Quality*

Depending on the Detection Scenario selected and operational goals set by the Agency, this task involves testing and validating the data stream of existing detectors via the TransSuite Adaptive Control Web Service interface. If it is decided by the Agency to have additional detectors installed, this task shall also verify that those new detectors (as configured as system detectors) can report the required volume and occupancy data at 30-sec intervals, and the data are accurate and reliable to meet adaptive control requirement.

**DELIVERABLE:** Report documenting the results, conclusions and suggestions. Suggestions to the additional detectors (if decided) regarding improvement on their data quality and accuracy if needed.

#### 2.3.2.7 *Update Existing ASC3 Controllers*

TransCore shall update the existing City of Scottsdale ASC3 controllers to enable the ACS Lite objects required for ACDSS. This update shall consist of the installation of a data key at each controller location. TransCore shall coordinate with City staff to accomplish these updates.

The updated controllers shall be tested to verify the needed adaptive control object has been correctly implemented to allow the adaptive control operations by ACDSS from the central system. Controller actions in response to pedestrian calls and vehicle calls are examined and tested with the presence of adaptive control objects.

**DELIVERABLE:** Data keys to enable ACS Lite objects on 10 existing City of Scottsdale Econolite ASC3 controllers

**DELIVERABLE:** Report documenting the testing results, conclusions and suggestions. Suggestions to fine tune certain actuated parameters to fit adaptive control operations when necessary.

#### 2.3.2.8 *Configure ACDSS*

In this task, ACDSS is configured for operating adaptive signals on 10 intersections. The configuration shall be based on the determined Detection

Scenario, the operational priority, and control objectives/goals as determined from the project staging task.

**DELIVERABLE:** Configured ACDSS, and a report documenting the configuration.

#### **2.3.2.9 System go-live**

In this task, ACDSS adaptive control shall be turned on in two steps. The first step is the “One-Way” burn-in, i.e., ACDSS receives all the needed real-time detector data and controller status data, performs signal optimizations and determines optimized timings, and logs all computation and data, *without* actually transmitting the new timing to the field controllers. This step is for double checking that the system configuration, the communication, and the optimization process are as designed. After verification of the first step, the system shall be turned on as “Two-Way” operation, with field controllers being fully controlled by ACDSS live and 7/24.

**DELIVERABLE:** Report documenting the go-live process, and the live system.

#### **2.3.2.10 System Fine Tuning**

In this task, ACDSS shall be fine-tuned to adjust relevant parameters to further improve the adaptive operation. For example, queue balancing might be turned on and off, with different priorities adjusted for different turning movements at the diamond interchange. This task may involve iterative discussions with the Agency on the operational objectives and policy guidelines when needed, after examining the impacted traffic flow conditions under adaptive.

**DELIVERABLE:** Report documenting the fine tuning process, and a fine-tuned live system.

#### **2.3.2.11 Training**

In this task, training is provided based on the items as stipulated in the requirement matrix, covering system operations, trouble shooting, configuration, administration and calibration. The training shall be presented at the designated locations for the designated staff of the Agency. Printed course materials and references, electronic copies of presentations and references shall be provided. The total number of training sessions and total hours are as stipulated in the Matrix.

**DELIVERABLE:** Training in the format as defined in the Requirement Matrix and relevant materials.

#### **2.3.2.12 90-day Test of Performance**

In this task, a 90-day performance test is performed. The system shall be monitored and support shall be provided to the Agency to assist the performance test and acceptance. Successful completion of the 90-day performance test marks final acceptance of the Project Area 3 ASCT for the City of Scottsdale.

**DELIVERABLE:** Technical and maintenance support during this 90-day period. Any corrective actions needed to improve the system operations.

#### **2.3.2.13 Final Deployment Report**

A final deployment report shall be provided documenting the system deployment. Project goals and objectives will be discussed at the project Kick Off Meeting. The final report will include these goals and objectives and how they have been met.

**DELIVERABLE:** Final report for this deployment.

**2.3.2.14 Warranty and Support**

TransCore shall provide one year of warranty and support for the Project Area 3 ASCT. This warranty and support period is being provided in accordance with Section 3.7 of the RFP and Section 16 of the Project Area 3 Requirements Matrix. The one-year warranty and support period shall commence upon the completion 90-dat performance test as described in Section 2.3.2.12 above.

TransCore has provided optional pricing for ongoing maintenance and support of the ACDSS system for years 2-5. Maintenance and support of the deployed City of Scottsdale TransSuite system shall be handled under the existing maintenance agreement with the City.

**DELIVERABLE:** One year warranty and support.

**DELIVERABLE:** Optional ongoing maintenance and support for years 2-5.

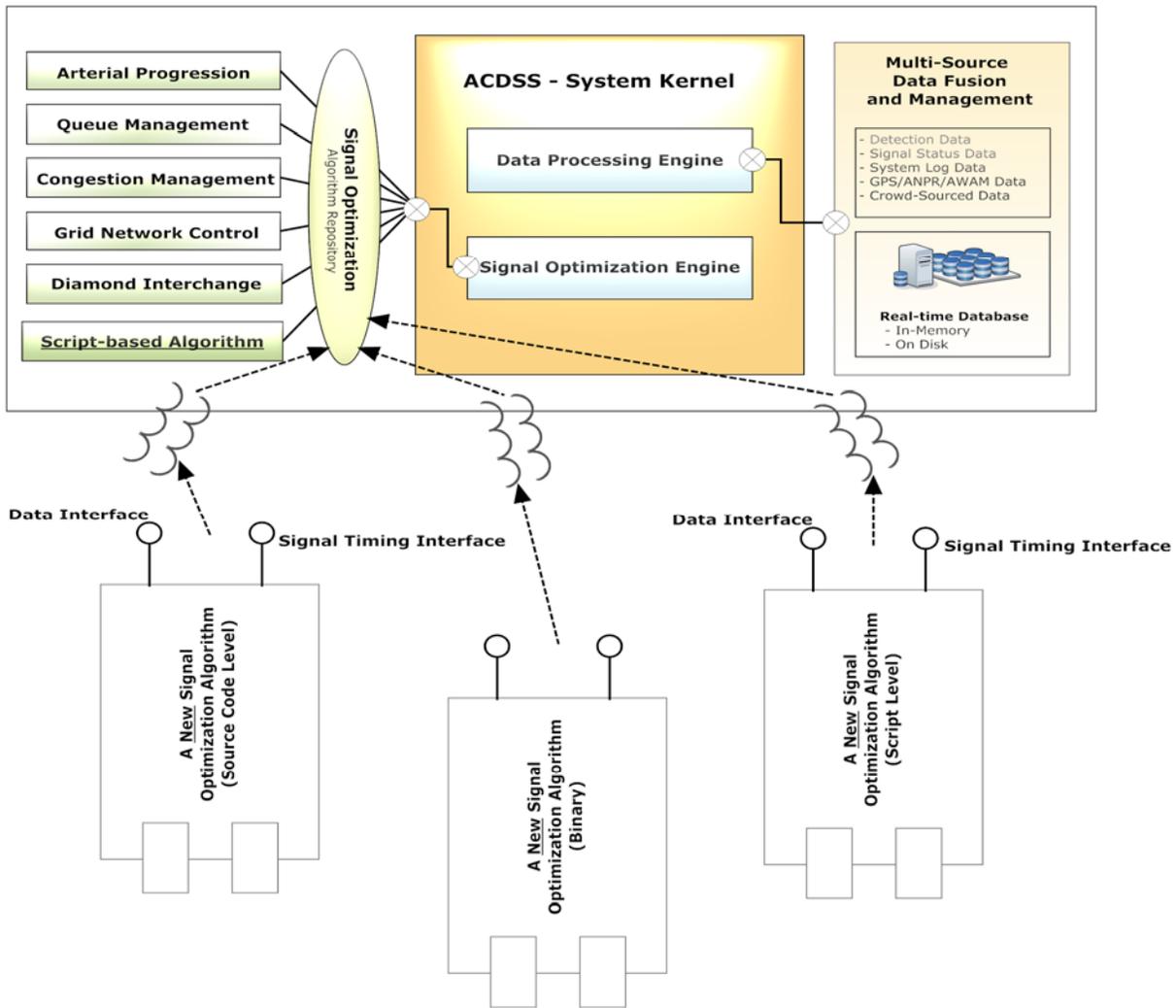
**2.4 Scope of Work – Area 4**

ACDSS adaptive signal control system supports multi-regime variable objective adaptive signal control (Figure 2-4). It handles oversaturated traffic and unsaturated traffic seamlessly on a cycle-by-cycle basis, providing delay minimization or queue management with varying traffic demands. For various geometry types, from diamond interchanges to urban grids, from CBD critical intersections or arterials to cluster of intersections, ACDSS applies differentiated adaptive treatments that better address the geometric characteristics for real time signal optimization.

Area 4 is featured by an E-W bound arterial of 7 intersections. Three (3) critical intersections are identified, including the following:

- 35th Ave @ Bell Rd
- I-17 @ Bell Rd
- 19th Ave @ Bell Rd

**Figure 2-4: ACDSS Multi-Regime Variable Objective Adaptive Signal Control for Different Geometric Characteristics and Traffic Flow Conditions**



#### 2.4.1 Project Area 4 - Detection Scenarios

**Four Detection Scenarios** are proposed for Project Area 3, for adaptive signal operations on this arterial, each with different operational characteristics, and pricing implications.

**Scenario “AS IS” uses detection “AS IS”**, with existing stop line detectors.

For this scenario, ACDSS operation shall primarily address unsaturated traffic (light to medium light traffic), providing optimized progression based on prevailing traffic patterns. No queue management or queue balancing optimizations are involved. Cycle shall be optimized based on the real-time capacity needs of the critical intersections (up to a certain demand level under saturation). Offsets shall be determined based on the identified pattern. Splits shall be optimized based on stop line detections for delay minimization. At approaches where there is no stop line detection, splits shall be adjusted based on the cycle length as determined by the critical intersections. This detection scenario is suitable if the arterial in question has no serious cycle failures and no left turn spill backs with existing signals, while minor approaches only have random traffic arrivals without queueing.

**Scenario A requires adding additional advance detectors, at the above three critical intersections**, both on mainline and minor approaches.

This scenario allows the system to perform adaptive signal operations as permitted by Scenario “AS IS”. Additionally, Scenario A allows ACDSS to perform the following two operations:

- **Queue Management at Critical Intersections**

Queue management shall be performed at the critical intersections when traffic on all approaches has queueing, typical of the intersection with two major arterials crossing each other. When queue management is active, signals are optimized to prevent cycle failures and queue spillbacks, giving all directions balanced treatment, without compromising the other crossing approaches (e.g., 35th Ave and 19th Ave)

Queue balancing when properly operated, can further provide more coherent platoons on the progression since the critical intersections by themselves can be utilized as the “metering” point for certain management strategies.

- **Diamond Interchange Adaptive Control at I-17**

Diamond interchange (or similar geometry) is characterized by two closely spaced intersections (that may be controlled by one single controller), with left turns on the common approach connecting the two intersections. The common approach generally is a short block fed by movements from various phases. The primary objective of diamond interchange adaptive control is to ensure that queues do not block the common approach and spill back into the intersections, with the priority to not impact freeway operations. This is treated as a special type of over-saturated control by ACDSS, requiring advance detectors to be deployed for each phase. The phases of two intersections are processed in a combined manner. Each detector provides volume and occupancy data, which are converted to calculate slack time the subject phase can contribute, or additional green time the subject phase would need. The algorithm systematically distributes the slack time based on the needed extra time, while selectively applying traffic gating at certain phases to meet the control goal.

On top of Scenario A, **Scenario B requires adding additional advance detectors, at those non-critical intersections, mainline only.**

This scenario allows the system to perform adaptive signal operations as permitted by Scenario “AS IS” and Scenario A queue management. Additionally, Scenario B allows ACDSS to perform the following extra:

- Progression fine tuning due to secondary platoons along the arterial.

This scenario allows the system to further fine tune the progression when the arterial has non-trivial secondary platoons. Secondary platoons are generated by the left-turning or right-turning vehicles. On the contrary, primary platoons are those vehicles that go through from both ends of the arterial. Using these extra advance detectors, ACDSS shall be able to fine tune the progression for secondary platoons.

**Scenario C requires adding additional advance detectors, at all intersections, on both mainline and minor approaches.**

This scenario is the super-set of all previous detection scenarios (AS IS, Scenario A and B). It provides the redundancy and robustness for a comprehensive adaptive system to perform both unsaturated and oversaturated control at all intersections. Signals are optimized for facilitating progression, minimizing delay, and maximizing throughput. Queue management is performed systematically at relevant intersections when necessary.

This scenario is typically best for an arterial that carries significant directional traffic with non-trivial demands at minor approaches causing queuing and delays.

#### 2.4.2 Project Area 4 - Tasks

Project Area 4 Scope of Work includes the following tasks.

##### 2.4.2.1 *Project Staging, Initial Project Meeting with the Agency*

This task involves project staging, initial project kick-off meeting with the Agency and all stake holders. The Agency stipulates their expectation of the adaptive operations, for example, progression focused and/or perform queue management at critical intersections. The Agency provides policy guidelines when it comes to prioritized treatments over conflicting objectives.

This task shall particularly determine the adaptive operation at I-17@Bell Rd, which is operated by ADOT. ACDSS can be configured to run I-17@Bell Rd as an isolated Diamond Interchange Adaptive Control, while the rest of the arterial as arterial adaptive control with designated critical intersections. Or ACDSS can treat the entire arterial as one single system, transparently communicating with two separate TransSuite TCS by the respective Agency for a unified adaptive control operation. ACDSS fully supports both operations. This shall be discussed and determined in this task.

Detection Scenario shall be determined by the time this task completes.

**DELIVERABLE:** Report documenting the project staging decisions, the operational goals and control objectives as stipulated (expected) by the Agency, and policy guidelines. Treatment on I-17@Bell Rd (as isolated Diamond Interchange Adaptive Control operation, or as unified adaptive control).

##### 2.4.2.2 *Review Existing Signal Plans, Signal Sequences, Field Survey*

This task reviews the existing signal plans and phase sequences. A field survey shall be performed to obtain insights of the existing and (potentially) future traffic flow conditions, and the existing detector set up. If the detection scenario

calls for new installation of additional detectors, the preferred detector setbacks shall be determined by the time this task completes.

Test of Performance Plan shall be drafted and submitted for the Agency review and approval.

**DELIVERABLE:** Report of the findings of the field survey, and draft Test of Performance Plan. Recommended setbacks for additional advance detectors. Recommended phase sequences to be employed in adaptive (if change of existing sequence is in order).

#### **2.4.2.3 *Deploy New Virtual Machine on City of Phoenix TransSuite® Servers***

TransCore shall deploy an additional virtual machine on the existing City of Phoenix TransSuite server. This virtual machine shall host the ACDSS server for the Project Area 4 ASCT. The virtual machine shall be configured as described in Section 1.2.2.1 of this proposal.

**DELIVERABLE:** New virtual machine configured as ACDSS Server for Project Area 4.

#### **2.4.2.4 *Configure and Install New Phoenix TransSuite® Build***

TransCore shall configure and install a new Phoenix specific TransSuite build updating their existing software to the latest available release. This version of TransSuite shall have the ACDSS interface enabled allowing integration with the new ACDSS server.

**DELIVERABLE:** Updated City of Phoenix TransSuite software.

#### **2.4.2.5 *Configure and Install New ADOT TransSuite® Build***

TransCore shall configure and install a new ADOT specific TransSuite build updating their existing software to the latest available release. This version of TransSuite shall have the ACDSS interface enabled allowing integration with the new ACDSS server.

**DELIVERABLE:** Updated City of ADOT TransSuite software.

#### **2.4.2.6 *Install ACDSS Software on a Central Server***

ACDSS software shall be installed on the new virtual machine procure in Section 2.4.2.3 above. Relevant TransSuite TCS credentials shall be set up to allow the adaptive control system to retrieve detector data, controller status data, and perform adaptive control.

The communication between ACDSS adaptive control module and TransSuite TCS shall be tested and validated.

**DELIVERABLE:** Installed ACDSS software on the server. Login credentials of ACDSS software.

#### **2.4.2.7 *Verify (Existing and/or New) Detection and Set Up Data Feeds, Examine Detection Data Accuracy and Quality***

Depending on the Detection Scenario selected and operational goals set by the Agency, this task involves testing and validating the data stream of existing detectors via the TransSuite Adaptive Control Web Service interface. If it is decided by the Agency to have additional detectors installed, this task shall also verify that those new detectors (as configured as system detectors) can report the

required volume and occupancy data at 30-sec intervals, and the data are accurate and reliable to meet adaptive control requirement.

**DELIVERABLE:** Report documenting the results, conclusions and suggestions. Suggestions to the additional detectors (if decided) regarding improvement on their data quality and accuracy if needed.

#### 2.4.2.8 *Update Existing Controllers*

TransCore shall update the 6 existing City of Phoenix ASC2S controllers. As part of the Project Area 4 ASCT TransCore shall procure 6 new Econolite ASC3 controllers. Existing controller databases shall be converted from ASC2S to ASC3. TransCore has assumed City staff shall undertake the actual controller swap in the field.

In addition all seven of the project Area 4 controllers (including ADOT) shall be equipped with data keys enabling the ACS Lite objects required for ACDSS. This update shall consist of the installation of a data key at each controller location. TransCore shall coordinate with City and ADOT staff to accomplish these updates.

Controller firmware shall be tested to verify the needed adaptive control object has been correctly implemented to allow the adaptive control operations by ACDSS from a central system. Controller actions in response to pedestrian calls and vehicle calls are examined and tested with the presence of adaptive control objects.

**DELIVERABLE:** Six new Econolite ASC3 controllers for City of Phoenix locations. These controllers shall include translated ASC2S databases.

**DELIVERABLE:** Data keys to enable ACS Lite objects on 7 City of Phoenix and ADOT Econolite controllers.

**DELIVERABLE:** Report documenting the testing results, conclusions and suggestions. Suggestions to fine tune certain actuated parameters to fit adaptive control operations when necessary.

#### 2.4.2.9 *Configure ACDSS*

In this task, ACDSS shall be configured for operating adaptive signals on 7 intersections. The configuration shall be based on the determined Detection Scenario, the operational priority, and control objectives/goals as determined from the project staging task.

I-17@Bell Rd is operated by ADOT, while the rest of intersections by the City of Phoenix. In this task, ACDSS is configured to be able to perform adaptive control communicating with two separate central TransSuite ATMS. Systematic coordination between the 7 signals shall be handled by one single ACDSS adaptive server communicating with two TransSuite centrals. This can be accomplished by treating I-17@Bell Rd as an isolated Diamond Interchange Adaptive Control, and the rest of the arterial as arterial adaptive control. Alternatively, the entire system can be treated as one single arterial system with designated critical intersections. The actual configuration shall be based on the outcome of Task 1, upon discussion with the Agency.

**DELIVERABLE:** Configured ACDSS, and a report documenting the configuration.

#### **2.4.2.10 System go-live**

In this task, ACDSS adaptive control shall be turned on in two steps. The first step is the “One-Way” burn-in, i.e., ACDSS receives all the needed real-time detector data and controller status data, performs signal optimizations and determines optimized timings, and logs all computation and data, *without* actually transmitting the new timing to the field controllers. This step is for double checking that the system configuration, the communication, and the optimization process are as designed. After verification of the first step, the system shall be turned on as “Two-Way” operation, with field controllers being fully controlled by ACDSS live and 7/24.

**DELIVERABLE:** Report documenting the go-live process, and the live system.

#### **2.4.2.11 System Fine Tuning**

In this task, ACDSS shall be fine-tuned to adjust relevant parameters to further improve the adaptive operation. For example, queue balancing might be turned on and off, with different priorities adjusted for different turning movements at the diamond interchange. This task may involve iterative discussions with the Agency on the operational objectives and policy guidelines when needed, after examining the impacted traffic flow conditions under adaptive.

**DELIVERABLE:** Report documenting the fine tuning process, and a fine-tuned live system.

#### **2.4.2.12 Training**

In this task, training is provided based on the items as stipulated in the requirement matrix, covering system operations, trouble shooting, configuration, administration and calibration. The training shall be presented at the designated locations for the designated staff of the Agency. Printed course materials and references, electronic copies of presentations and references shall be provided. The total number of training sessions and total hours are as stipulated in the Matrix.

**DELIVERABLE:** Training in the format as defined in the Requirement Matrix and relevant materials.

#### **2.4.2.13 90-Day Test of Performance**

In this task, a 90-day performance test is performed. The system shall be monitored and support shall be provided to the Agency to assist the performance test and acceptance. Successful completion of the 90-day performance test marks final acceptance of the Project Area 4 ASCT for the City of Phoenix and ADOT.

**DELIVERABLE:** Technical and maintenance support during this 90-day period. Any corrective actions needed to improve the system operations.

#### **2.4.2.14 Final deployment report**

A final deployment report shall be provided documenting the system deployment. Project goals and objectives will be discussed at the project Kick Off Meeting. The final report will include these goals and objectives and how they have been met.

**DELIVERABLE:** Final report for this deployment.

**2.4.2.15 Warranty and Support**

TransCore shall provide one year of warranty and support for the Project Area 4 ASCT. This warranty and support period is being provided in accordance with Section 3.7 of the RFP and Section 16 of the Project Area 4 Requirements Matrix. The one-year warranty and support period shall commence upon the completion 90-day performance test as described in Section 2.4.2.13 above.

TransCore has provided optional pricing for ongoing maintenance and support of the ACDSS system for years 2-5. Maintenance and support of the deployed City of Phoenix and ADOT TransSuite systems shall be handled under the existing maintenance agreements with the Agencies.

**DELIVERABLE:** One year warranty and support.

**DELIVERABLE:** Optional ongoing maintenance and support for years 2-5.

**3 PROJECT SCHEDULE**

TransCore is proposing the following schedule for the Bell Rd ASCT Project Area 3 and Area 4 deployments. The schedules for each Project Area run concurrently and are expected to be complete approximately 8 months after Notice-to-Proceed.

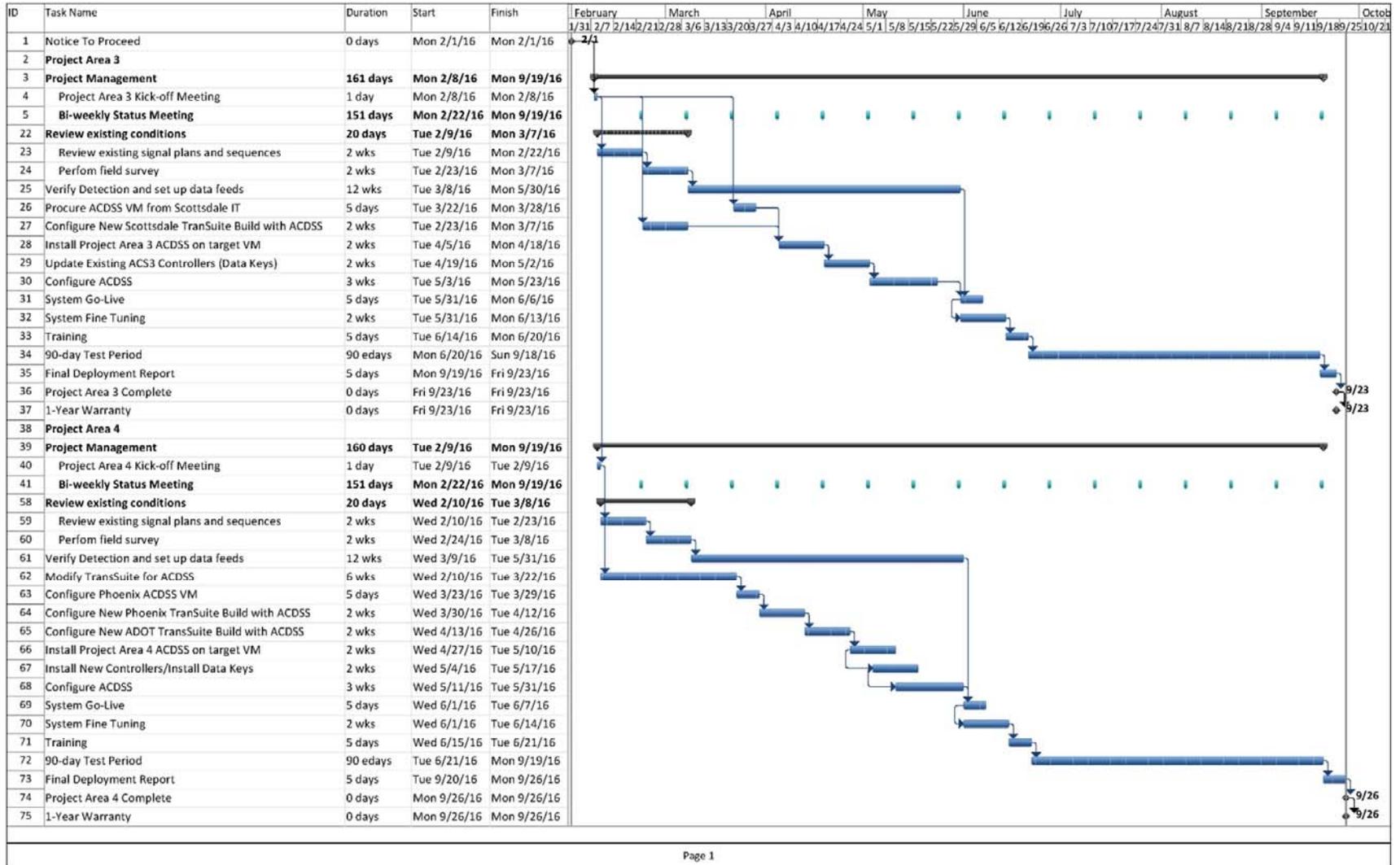
For Project Area 3, City of Scottsdale IT shall be engaged at Notice-to-Proceed to facilitate procurement of the required virtual machine. It is suggested that Scottsdale IT representatives attend the Project Area 3 Kick-off Meeting.

TransCore is assuming timely review on all updated controllers and databases in Project Area 4, allowing us to maintain this aggressive schedule.

Enabling of ACS Lite objects is required on all Project Area 3 and Area 4 controllers. Data keys shall be provided to the representative agencies allowing testing for any unsafe operation.

This schedule shall be reviewed at each Project Area Kick-off meeting. Adjustments to the schedule shall be discussed at that time to incorporate any other existing agency projects that may impact the ASCT Deployment.

# Maricopa County Solicitation 15058-RFP for Bell Rd Adaptive Signal Control Technology (ASCT) Deployment



## 4 DELIVERABLES

### 4.1 Project Area 3 Deliverables

The following deliverables shall be provided for Project Area 3 of the Bell Rd ASCT Deployment. These deliverables are further discussed in Section 2.3.2 of this proposal.

- **DELIVERABLE:** Report documenting the project staging decisions, the operational goals and control objectives as stipulated (expected) by the Agency and policy guidelines.
- **DELIVERABLE:** Report of the findings of the field survey, and draft Test of Performance Plan. Recommended setbacks for additional advance detectors. Recommended phase sequences to be employed in adaptive (if change of existing sequence is in order).
- **DELIVERABLE:** New virtual machine configured as ACDSS Server for Project Area 3.
- **DELIVERABLE:** Updated City of Scottsdale TransSuite software.
- **DELIVERABLE:** Installed ACDSS software on the server. Login credentials of ACDSS software.
- **DELIVERABLE:** Report documenting the results, conclusions and suggestions. Suggestions to the additional detectors (if decided) regarding improvement on their data quality and accuracy if needed.
- **DELIVERABLE:** Data keys to enable ACS Lite objects on 10 existing City of Scottsdale Econolite ASC3 controllers
- **DELIVERABLE:** Report documenting the testing results, conclusions and suggestions. Suggestions to fine tune certain actuated parameters to fit adaptive control operations when necessary.
- **DELIVERABLE:** Configured ACDSS, and a report documenting the configuration.
- **DELIVERABLE:** Report documenting the go-live process, and the live system.
- **DELIVERABLE:** Report documenting the fine tuning process, and a fine-tuned live system.
- **DELIVERABLE:** Training in the format as defined in the Requirement Matrix and relevant materials.
- **DELIVERABLE:** Technical and maintenance support during this 90-day period. Any corrective actions needed to improve the system operations.
- **DELIVERABLE:** Final report for this deployment.
- **DELIVERABLE:** One year warranty and support.
- **DELIVERABLE:** Optional ongoing maintenance and support for years 2-5.

### 4.2 Project Area 4 Deliverables

The following deliverables shall be provided for Project Area 4 of the Bell Rd ASCT Deployment. These deliverables are further discussed in Section 2.4.2 of this proposal.

- **DELIVERABLE:** Report documenting the project staging decisions, the operational goals and control objectives as stipulated (expected) by the Agency, and policy guidelines. Treatment on I-17@Bell Rd (as isolated Diamond Interchange Adaptive Control operation, or as unified adaptive control).
  - **DELIVERABLE:** Report of the findings of the field survey, and draft Test of Performance Plan. Recommended setbacks for additional advance detectors. Recommended phase sequences to be employed in adaptive (if change of existing sequence is in order).
  - **DELIVERABLE:** New virtual machine configured as ACDSS Server for Project Area 4.
  - **DELIVERABLE:** Updated City of Phoenix TransSuite software.
  - **DELIVERABLE:** Updated City of ADOT TransSuite software.
  - **DELIVERABLE:** Installed ACDSS software on the server. Login credentials of ACDSS software.
  - **DELIVERABLE:** Report documenting the results, conclusions and suggestions. Suggestions to the additional detectors (if decided) regarding improvement on their data quality and accuracy if needed.
  - **DELIVERABLE:** Six new Econolite ASC3 controllers for City of Phoenix locations. These controllers shall include translated ASC2S databases.
  - **DELIVERABLE:** Data keys to enable ACS Lite objects on 7 City of Phoenix and ADOT Econolite controllers.
  - **DELIVERABLE:** Report documenting the testing results, conclusions and suggestions. Suggestions to fine tune certain actuated parameters to fit adaptive control operations when necessary.
  - **DELIVERABLE:** Configured ACDSS, and a report documenting the configuration.
  - **DELIVERABLE:** Report documenting the go-live process, and the live system.
  - 
  - **DELIVERABLE:** Report documenting the fine tuning process, and a fine-tuned live system.
  - **DELIVERABLE:** Training in the format as defined in the Requirement Matrix and relevant materials.
  - **DELIVERABLE:** Technical and maintenance support during this 90-day period. Any corrective actions needed to improve the system operations.
  - **DELIVERABLE:** Final report for this deployment.
  - **DELIVERABLE:** One year warranty and support.
  - **DELIVERABLE:** Optional ongoing maintenance and support for years 2-5.
-

ATTACHMENT C-3

TECHNICAL REQUIREMENTS & RESPONSES

PROJECT AREA 3

Version 2.1		March 26, 2015		Project Area #3: Frank Lloyd Wright Boulevard and Loop 101 from Scottsdale Road through Thompson Peak Parkway		Proposer Response	
Sys Reqs Reference Number	Level of Importance	System Requirements	Concept of Operations Need Statements from Final FHWA Model Documents, FHWA-HOP-11-027, Appendix B	Meet Requirements (Yes or No)	Proposer Written Description of How Proposed System Fulfills Requirement	Verification Method	
<b>1</b>		<b>1 Network Characteristics</b>					
1.0-1	5	The ASCT shall control a minimum of 10 signals concurrently	4.2.0-1 The system operator needs to eventually adaptively control up to 10 signals from the Scottsdale TMC at 9191 East San Salvador Drive, Scottsdale, AZ 85258 and from a satellite TMC (e.g., at Corp Yard, major event center, or local EOC). The exact location of the satellite TMC has not been determined at this time.	Yes	No limitation. TransSuite TCS has been deployed on systems ranging from 50 to 12,000 intersections. ACDSS in Manhattan performs adaptive control at more than 300 intersections.	TransSuite TCS can show the signals status as being "adaptive".	
1.0-2	5		4.2.0-2 The system operator needs to be able to adaptively control up to 3 independent groups of signals (Hayden & L101, east of L101, west of L101).				

			4.2.0-3		day schedule.	
			The system operator needs to vary the number of signals in an adaptively controlled group to accommodate the prevailing traffic conditions.			
1.0-2.0-1	5	The boundaries surrounding signal controllers that operate in a coordinated fashion shall be defined by the user.	4.2.0-2	Yes	The boundaries are inputs to the system and specified by the user.	System configuration UI.
			The system operator needs to be able to adaptively control up to 3 independent groups of signals (Hayden & L101, east of L101, west of L101).			
1.0-2.0-2	4	The ASCT shall control a minimum of 3 groups of signals	4.2.0-2	Yes	No limitation. The number of groups can be as many as needed. For example, ACDSS in Manhattan controls 18 signal groups; in Arcadia 4 groups.	System config UI & actual operations
			The system operator needs to be able to adaptively control up to 3 independent groups of signals (Hayden & L101, east of L101, west of L101).			
1.0-2.0-3	4	The size of a group shall range from 1 to 10 signals.	4.2.0-3	Yes	No limitation. ACDSS can set the group size ranging from 1 to 10.	System config UI & actual operations
			The system operator needs to vary the number of signals in an adaptively controlled group to accommodate the prevailing traffic conditions.			
1.0-2.0-4	4	Each group shall operate independently	4.2.0-2	Yes	Each group operates independent of each other.	System config UI & actual operations
			The system operator needs to be able to adaptively control up to 3 independent groups of signals (Hayden & L101, east of L101, west of L101).			
1.0-2.0-5	4	The boundaries surrounding signal controllers that operate in a	4.2.0-3	Yes	The boundaries of coordinated signals can be altered by the system based on the configured	System config UI & actual operations
			The system operator needs to vary the number of signals in an adaptively controlled			



		coordinated fashion shall be altered by the system according to configured parameters	group to accommodate the prevailing traffic conditions.		parameters.	
1.0-2.0-5.0-1	4	The boundaries surrounding signal controllers that operate in a coordinated fashion shall be altered by the system according to a time of day schedule. (For example: this may be achieved by assigning signals to different groups or by combining groups.)		Yes	Each signal group has a TOD schedule, resulting in boundaries of coordinated signals being altered on a schedule. Multiple groups with overlapping signals running on different schedule result in dynamic boundaries.	System config UI & actual operations
1.0-2.0-5.0-2	4	The boundaries surrounding signal controllers that operate in a coordinated fashion shall be altered by the system according to traffic conditions. (For example: this may be achieved by assigning signals to different groups or by combining groups.)		Yes	Boundaries can be determined by the ACDSS based on traffic flow conditions such as overall demand level (light, medium, heavy or special event), prevalent directional patterns, critical intersections left turns and queueing.	System config UI & actual operations
1.0-2.0-5.0-3	5	The boundaries surrounding signal controllers that		Yes	The user can command to alter the boundaries. The candidate boundary	System config UI & actual



		operate in a coordinated fashion shall be altered by the system when commanded by the user.			must be pre-specified by the user.	operations
<b>2</b>		<b>2 Type of Operation</b>				
<b>2.1</b>		<b>2.1 General</b>				
<b>2.1.1</b>		<b>2.1.1 Mode of Operation</b>				
2.1.1.0-2	5	The ASCT shall operate non-adaptively when the adaptive control equipment fails.	<i>4.14.0-1</i> The system operator needs to fall back to TOD coordination, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and software failure.	Yes	ACDSS requires NO special adaptive equipment in field. Only NTCIP controllers required.	Actual operations
2.1.1.0-2.0-1	3	The ASCT shall operate non-adaptively when a user-specified detector fails.		Yes	ACDSS reverts to default TOD, when user-specified critical detector fails.	System config UI and actual ops
2.1.1.0-2.0-2	4	The ASCT shall operate non-adaptively when the number of failed detectors connected to a signal controller exceeds a user-defined value.		Yes	ACDSS reverts to default TOD, when total failed detectors of a controller exceeding a user-specified threshold.	System config UI and actual ops
2.1.1.0-2.0-3	4	The ASCT shall operate non-adaptively when the number of failed detectors in a group exceeds a user-		Yes	ACDSS reverts to default TOD, when total failed detectors of a group exceeding a threshold.	System config UI and actual ops

		defined value.				
2.1.1.0-2.0-4	3	The ASCT shall operate non-adaptively when a user-defined communications link fails.		Yes	ACDSS reverts to default TOD when critical intersections have COM failure.	System config UI and actual ops
2.1.1.0-3	5	The ASCT shall operate non-adaptively when a user manually commands the ASCT to cease adaptively controlling a group of signals.	4.7.0-3	Yes	The user can turn off an adaptive signal group and revert to default TOD when need as need.	Actual operations
			The system operator needs to over-ride adaptive operation. When the system operator is advised of an incident that shall increase demand, the operator may select an appropriate flush plan. The operator shall schedule an ending time for the event. The flush plan shall remain in place until either the scheduled end time passes or the operator cancels the plan.			
2.1.1.0-4	5	The ASCT shall operate non-adaptively when a user manually commands the ASCT to cease adaptive operation.	4.7.0-3	Yes	The user can turn off the adaptive operation for the entire area when needed and revert to default TOD control.	Actual operations
			The system operator needs to over-ride adaptive operation. When the system operator is advised of an incident that shall increase demand, the operator may select an appropriate flush plan. The operator shall schedule an ending time for the event. The flush plan shall remain in place until either the scheduled end time passes or the operator cancels the plan.			
2.1.1.0-5	4	The ASCT shall operate non-adaptively in accordance with a user-defined time-of-day schedule.	4.7.0-2	Yes	ACDSS adaptive operation can be set to run on a time of day, day of week, date of month, or holiday schedule.	System config UI and actual operations.
			The system operator needs to schedule pre-determined operation by time of day. There are event centers located at Westworld of Scottsdale and the TPC golf course. Some events occur (e.g., a concert) where its start			

			time is scheduled and the end time is predictable.			
			4.7.0-3			
			The system operator needs to over-ride adaptive operation. When the system operator is advised of an incident that shall increase demand, the operator may select an appropriate flush plan. The operator shall schedule an ending time for the event. The flush plan shall remain in place until either the scheduled end time passes or the operator cancels the plan.			
2.1.1.0-6	3	The ASCT shall operate non-adaptively when commanded by an external system process.	4.17.0-2	Yes	External command has higher priority and shall override adaptive operation. This is accomplished by via TransSuite TCS Manual Override function.	Actual operations & TransSuite TCS console.
			The system operator needs to react to commands issued by an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan shall remain in operation until the command from the external source is removed.			
2.1.1.0-7	4	The ASCT shall alter the adaptive operation to achieve required objectives in user-specified conditions.	4.1.0-1.0-1	Yes	ACDSS supports multi-regime variable objective adaptive control. It handles oversaturated & unsaturated traffic seamlessly by adjusting cycle, offset and split on	System config UI and actual operatoins.
			Maximize the throughput on coordinated routes			
			4.1.0-1.0-3			
			Distribute green time among competing movements at critical intersections to provide an equitable distribution of delays.			
			4.1.0-3			



			<p>The system operator needs to change the operational strategy (for example, from smooth flow to maximizing throughput or managing queues) based on changing traffic conditions. For example, an incident is blocking the freeway and traffic is diverting onto the arterial. The system shall adaptively respond and the off-ramp shall become the coordinated phase. Outside peak hours, the diverted traffic may not be so severe that a specific flush plan is required. The ASCT shall recognize if an increase in demand is within the level accommodated by the adaptive operation. If so, it shall then allow adaptive operation to react to the change in demand. If the demand is outside this level, the ASCT shall go to appropriate flush plan, and continue operating that plan until demand drops below the maximum acceptable level.</p>		<p>a cycle-by-cycle basis, providing delay minimization, equitable green time distribution, or queue management with increasing demands. ACDSS intelligently applies differentiated adaptive treatments that better address geometric characteristics for freeway interchanges, arterials, and urban grids. The user can specify locations to activate queue management, while the adaptive system can dynamically activate/deactivate designated coordinated phase for special events.</p>	
2.1.1.0-7.0-1	5	When current measured traffic conditions meet user-specified criteria, the	<p>4.1.0-1.0-1</p> <p>Maximize the throughput on coordinated routes</p> <p>4.1.0-3</p>	Yes	ACDSS can proactively identify capacity insufficiency and adjust cycle lengths to provide	Actual operations.

		ASCT shall alter the state of the signal controllers, maximizing the throughput of the coordinated route.	The system operator needs to change the operational strategy (for example, from smooth flow to maximizing throughput or managing queues) based on changing traffic conditions. For example, an incident is blocking the freeway and traffic is diverting onto the arterial. The system shall adaptively respond and the off-ramp shall become the coordinated phase. Outside peak hours, the diverted traffic may not be so severe that a specific flush plan is required. The ASCT shall recognize if an increase in demand is within the level accommodated by the adaptive operation. If so, it shall then allow adaptive operation to react to the change in demand. If the demand is outside this level, the ASCT shall go to appropriate flush plan, and continue operating that plan until demand drops below the maximum acceptable level.		the needed extra capacity for through movements or critical left turns (so it won't spill back blocking thru lanes causing capacity drop). It also optimizes offsets to maximize throughput of the coordinated route (mainline direction). In oversaturated conditions, ACDSS shall seamlessly switch to queue management at critical intersections to prevent queue spillback and system break down.	
2.1.1.0-7.0-2	5	When current measured traffic conditions meet user-specified criteria, the ASCT shall alter the state of signal controllers, preventing queues from exceeding the storage capacity at user-specified locations.	<p><i>4.1.0-1.0-4</i></p> <p>The objective of the coordination shall be to manage the lengths of queues stored at critical locations within the coordinated group so that long queues do not block upstream intersections or otherwise reduce the capacity available during the green phases. This shall involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon shall be stopped. It shall also involve control of offsets and phase lengths so that queues may be stored in locations where they shall not adversely affect capacity of the system.</p>	Yes	Traffic signal optimization is all about allocating time or space resource. When traffic becomes oversaturated with cycle failures and significant queueing, ACDSS switches to queue management, balancing queue storage ratio to prevent queue spillbacks and further capacity drops while minimizing gridlock potential at selected	Actual operations.

					critical locations.	
2.1.1.0-7.0-3	4	When current measured traffic conditions meet user-specified criteria, the ASCT shall alter the state of signal controllers providing equitable distribution of green times.	4.1.0-1.0-3	Yes	Equitable distribution of green time is also known as "Webster Philosophy", only meaningful with unsaturated traffic to minimize average vehicle delay. ACDSS seamless handles unsaturated and oversaturated traffic. If unsaturated, ACDSS shall apply equitable distribution of green times (actually, v/c ratio, or equivalently but termed otherwise, phase saturation ratio) among conflicting movements.	Actual operations.
			Distribute green time among competing movements at critical intersections to provide an equitable distribution of delays.			
			4.1.0-3			
2.1.1.0-	4	When current	4.1.0-1.0-2	Yes	ACDSS can proactively	Actual



<p>7.0-4</p>		<p>measured traffic conditions meet user-defined criteria, the ASCT shall alter the state of signal controllers providing two-way progression on a coordinated route.</p>	<p>Provide smooth flow along coordinated routes. The operator shall be able to define for each group of intersections the appropriate operational objective. For example, near a freeway interchange or in a location with heavy turning movements, the queue management strategy may be specified, while on an arterial with long signal spacing the smooth flow objective may be specified.</p> <p><i>4.1.0-3</i></p> <p>The system operator needs to change the operational strategy (for example, from smooth flow to maximizing throughput or managing queues) based on changing traffic conditions. For example, an incident is blocking the freeway and traffic is diverting onto the arterial. The system shall adaptively respond and the off-ramp shall become the coordinated phase. Outside peak hours, the diverted traffic may not be so severe that a specific flush plan is required. The ASCT shall recognize if an increase in demand is within the level accommodated by the adaptive operation. If so, it shall then allow adaptive operation to react to the change in demand. If the demand is outside this level, the ASCT shall go to appropriate flush plan, and continue operating that plan until demand drops below the maximum acceptable level.</p>		<p>identify the directional patterns such as prevalent East Bound, West Bound, or Balanced Patterns. If it is determined as Balanced Pattern, ACDSS shall alter the signals to achieve two-way progression on the coordinated route.</p>	<p>operations.</p>
<p>2.1.1.0-8</p>	<p>2</p>	<p>The ASCT shall provide maximum and minimum phase times</p>	<p><i>4.1.0-1.0-3</i></p> <p>Phase sequence of lead-lag phases, and the operation of left turn phases twice per cycle,</p>	<p>Yes</p>	<p>Each phase has minimum split as input. Maximum split time is implicitly determined</p>	<p>System config UI.</p>

			<p>shall be determined by the system. The entire corridor may be set by the operator to operate as one coordinated group, or the system may have the freedom to operate it as one group subject to user-specified criteria, such as similar required cycle lengths in different parts of the corridor are similar or the volume of traffic in the peak direction exceeds a threshold.</p>		from other phases min.	
2.1.1.0-8.0-1	2	The ASCT shall provide a user-specified maximum value for each phase at each signal controller.		Yes	Max phase split is determined jointly by the minimum splits of phases of the same ring.	System config UI.
2.1.1.0-8.0-1.0-1	2	The ASCT shall not provide a phase length longer than the maximum value.		Yes	ACDSS shall not generate a phase split longer than the maximum value.	Actual operations.
2.1.1.0-8.0-2	2	The ASCT shall provide a user-specified minimum value for each phase at each signal controller.		Yes	Phase minimum is an explicit input of ACDSS.	System config UI and actual ops.
2.1.1.0-8.0-2.0-1	2	The ASCT shall not provide a phase length shorter than the minimum value.		Yes	ACDSS shall not generate a phase split shorter than the min.	Actual operations.
2.1.1.0-9	4	The ASCT shall detect repeated phases that do not serve all waiting vehicles. (These phase failures may be inferred, such as by detecting repeated max-out.)	4.1.0-4	Yes	ACDSS identifies repeated phases with residual queues by checking if the phase has been forced-off (i.e., keep extending till the allocated split time).	Actual operations and system logs.
			The system operator needs to detect repeated phase failures and control signal timing to prevent phase failures building up queues. The operator in this case is trying to prevent a routine queue from forming where it shall block another movement in the cycle unnecessarily. The system shall determine the optimal order of phases to provide the			
2.1.1.0-	4	The ASCT shall alter		Yes	When repeated phase	Actual



<p>9.0-1</p>		<p>operations, to minimize repeated phase failures.</p>	<p>best coordination. If the green time required for a left turn phase is longer the time required to service a queue fully occupying the left turn bay, and the queue would overflow and block the adjacent lane, the operator shall be able to specify the phase to operate twice for each occurrence of the opposing through movement, in order to avoid queue overflow. The user shall specify a maximum elapsed time between successive occurrences of a phase when the phase is called.</p>		<p>failures are detected, ACDSS shall adjust the phase split if such failures are local; or increase cycle length if such failures are determined as insufficient intersection capacity, or perform queue management if the system has become oversaturated.</p>	<p>operations and system logs.</p>
<p>2.1.1.0-10</p>	<p>5</p>	<p>The ASCT shall determine the order of phases at a user-specified intersection. (The calculation shall be based on the optimization function.)</p>	<p><i>4.1.0-1.0-1</i>                  Maximize the throughput on coordinated routes  <i>4.1.0-1.0-2</i>                  Provide smooth flow along coordinated routes. The operator shall be able to define for each group of intersections the appropriate operational objective. For example, near a freeway interchange or in a location with heavy turning movements, the queue management strategy may be specified, while on an arterial with long signal spacing the smooth flow objective may be specified.  <i>4.1.0-1.0-4</i>                  The objective of the coordination shall be to manage the lengths of queues stored at critical locations within the coordinated group so that long queues do not block upstream intersections or otherwise reduce the capacity available during the green phases. This shall involve controlling phase</p>	<p>Yes</p>	<p>ACDSS shall determine the order of phases at user specified intersections by a feature called TP mapper, which allows phase sequences to be optimized based on the prevalent traffic patterns.</p>	<p>Actual operations and system logs.</p>



			lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon shall be stopped. It shall also involve control of offsets and phase lengths so that queues may be stored in locations where they shall not adversely affect capacity of the system.			
<b>2.1.2</b>		<b>2.1.2 Allowable Phases</b>				
2.1.2.0-1	4	The ASCT shall not prevent permissive/protected left turn phase operation.	4.9.0-1.0-14 Permissive/protected phasing and alternate left turn phase sequences. Where leading and lagging left turn phases are used, the system shall determine the optimal phase sequence in order to provide the best coordination. This would be linked to the direction of offset, such as providing a lagging left turn in the heavy, coordinated direction. If the green time required for a left turn phase is longer the time required to service a queue fully occupying the left turn bay, and the queue would overflow and block the adjacent lane, the operator shall be able to specify the phase to operate twice per cycle in order to avoid queue overflow.	Yes	ACDSS does not prevent perm/prot left turn phases.	Actual operations and system logs.
2.1.2.0-2	5	The ASCT shall not prevent the protected left turn phase to lead or lag the opposing through phase based upon user-specified conditions.		Yes	ACDSS selects the best phase sequence (lead/lag combinations) based on a prespecified set of sequence candidates. Phase recycling is only possible when the conflicting thru has gapped out and sufficient time left before crossing the barrier with the compatible phases.	Actual operations and system logs.
2.1.2.0-3	4	The ASCT shall prevent skipping a user-specified phase when the user-specified phase sequence is operating.	4.9.0-1.0-6 Prevent one or more phases being skipped under certain traffic conditions or signal states.	Yes	ACDSS prevents skipping a use specified phase by placing a phase min recall for that phase.	Actual operations and system logs.



2.1.2.0-4	3	The ASCT shall prevent skipping a user-specified phase based on the state of a user-specified external input.	4.17.0-2	Yes	User specified external input (a special plan) shall override ACDSS adaptive command. This can be accomplished by using TransSuite TCS Manual Override functionality.	Actual operations and system logs.
			The system operator needs to react to commands issued by an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan shall remain in operation until the command from the external source is removed.			
2.1.2.0-5	3	The ASCT shall prevent skipping a user-specified phase according to a time of day schedule.	4.9.0-1.0-6	Yes	This is accomplished by placing min recall to that phase on a time of day schedule.	Actual operations and system logs.
			Prevent one or more phases being skipped under certain traffic conditions or signal states.			
2.1.2.0-6	2	The ASCT shall omit a user-specified phase when the cycle length is below a user-specified value.	4.9.0-1.0-5	Yes	This is accomplished by associating cycle length candidates with phase sequences.	Actual operations and system logs.
			Allow one or more phases to be omitted (disabled) under certain traffic conditions or signal states.			
2.1.2.0-7	2	The ASCT shall omit a user-specified phase based on measured traffic conditions.		Yes	If there is no call, a (non coordinated) phase shall be skipped.	Actual operations and system logs.
2.1.2.0-8	2	The ASCT shall omit a user-specified phase based on the state of a user-specified external input.	4.17.0-2	Yes	The user can use Manual Override functionality via TransSuite TCS to command a special plan (that omits a phase). The special plan shall override ACDSS adaptive control commands.	Actual operations and system logs.
			The system operator needs to react to commands issued by an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan shall remain in operation until the command from the external source is removed.			

2.1.2.0-9	2	The ASCT shall omit a user-specified phase according to a time of day schedule	4.9.0-1.0-5	Yes	This is accomplished by an ACDSS feature called TP mapper and associate the TP mapper with a schedule.	Actual operations and system logs.
		Allow one or more phases to be omitted (disabled) under certain traffic conditions or signal states.				
2.1.2.0-10	5	The ASCT shall assign unused time from a preceding phase that terminates early to a user-specified phase as follows:	4.9.0-1.0-10	Yes	This is configured using different force-off modes (floating force off or fixed force off) at individual controller level to specify whether the extra green is returned to next coordinated phase, or next phase in the same ring.	Actual operations and system logs.
		* Next phase;	Allow the operator to specify which phase receives unused time from a preceding phase			
		* Next coordinated phase;				
		* User-specified phase.				
2.1.2.0-11	5	The ASCT shall assign unused time from a preceding phase that is skipped to a user-specified phase as follows:		Yes	Unused green due to preceding phase skipping shall be returned to user designated phases according to the specified force-off mode (fixed force off or floating force off).	Actual operations and system logs.
		* Previous phase;				
		* Next phase;				
		* Next coordinated				



		phase;				
		* User-specified phase.				
2.1.2.0-12	5	The ASCT shall have the ability to hold the position of uncoordinated phases within a cycle.	The option to hold the position of uncoordinated phases within a cycle.	Yes	The position can be held by the specified phase sequence subject to the relevant ring-barrier structure.	Actual operations and system logs.
<b>2.1.3</b>		<b>2.1.3 Oversaturation</b>				
2.1.3.0-1	5	The ASCT shall detect the presence of queues at pre-configured locations.	<p><i>4.1.0-1.0-4</i></p> <p>The objective of the coordination shall be to manage the lengths of queues stored at critical locations within the coordinated group so that long queues do not block upstream intersections or otherwise reduce the capacity available during the green phases. This shall involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon shall be stopped. It shall also involve control of offsets and phase lengths so that queues may be stored in locations where they shall not adversely affect capacity of the system.</p>	Yes	ACDSS relies on advance detectors to identify queues. Shockwave theory is utilized to predict queue dynamics and identify existing queue.	Actual operations and system logs.
2.1.3.0-2	5	When queues are detected at user-specified locations, the ASCT shall execute user-specified timing plan/operational mode.	<p><i>4.1.0-1.0-5</i></p> <p>Manage queues in a manner that minimizes the impact of queues on intersection efficiency. Queues often overflow from turn bays at the FLW/Hayden and FLW/L101 intersections during peak periods.</p>	Yes	ACDSS performs queue balancing and queue management when queues are identified at specified locations.	Actual operations and system logs.
2.1.3.0-3	5	When queues are	<i>4.1.0-4</i>	Yes	ACDSS can apply	Actual



		detected at user-specified locations, the ASCT shall execute user-specified adaptive strategy in accordance with requirements 2.1.1.0-2.	The system operator needs to detect repeated phase failures and control signal timing to prevent phase failures building up queues. The operator in this case is trying to prevent a routine queue from forming where it shall block another movement in the cycle unnecessarily. The system shall determine the optimal order of phases to provide the best coordination. If the green time required for a left turn phase is longer the time required to service a queue fully occupying the left turn bay, and the queue would overflow and block the adjacent lane, the operator shall be able to specify the phase to operate twice for each occurrence of the opposing through movement, in order to avoid queue overflow. The user shall specify a maximum elapsed time between successive occurrences of a phase when the phase is called.		diamond interchange control logic for off ramps traffic, special phase sequence for queueing left turns, or systematic queue management to handle queues at specified locations. Metering a designated phase is also a candidate strategy for oversaturated control.	operations and system logs.
2.1.3.0-4	2	When queues are detected at user-specified locations, the ASCT shall omit a user-specified phase at a user-specified signal controller.	4.5.0-4 The system operator needs to store queues in locations where they can be accommodated without adversely affecting adaptive operation. Beyond the coordinated system, there is a capacity constraint that regularly results in queuing back into the system. This reduces the throughput available during green on the coordinated movement, and increasing congestion is measured within the system. While the normal response to increased congestion	Yes	ACDSS shall possibly omit a user-specified phase to provide the needed capacity for other phases.	Actual operations and system logs.
2.1.3.0-5	4	The ASCT shall meter traffic into user-specified bottlenecks by storing queues at user-specified locations.		Yes	"Metering" is accomplished by adjusting offsets and splits to create a band tapering for on-coming traffic.	Actual operations and system logs.



2.1.3.0-6	4	The ASCT shall store queues at user-specified locations	within the system would normally be to increase cycle length, phase times and other parameters to increase the capacity for the relevant movements, when the queuing originates outside the system, this shall not be the appropriate response. In these circumstances, it is normally more appropriate for the system to reduce the throughput into the bottleneck or reduce the size of platoons, so that the queuing does not block other movements within the system. The system shall detect the presence of this condition or the presence of queues and take appropriate action to reduce the volume of traffic joining the queue, such as reducing green time or omitting phases.	Yes	Queues are stored at designated locations as a result of the above metering strategy. If the detector is an advance detector, ACDSS can set an alarm based on the estimated queue length (which internally is derived from the volume/occupancy time series).	Actual operations and system logs.
2.1.3.0-7	4	The ASCT shall maintain capacity flow through user-specified bottlenecks.		Yes	Capacity flow at bottlenecks are maintained by jointly applying queue balance and metering strategy.	Actual operations and system logs.
2.1.3.0-8	4	When queues are detected at user-specified locations, the ASCT shall limit the cycle length of the group to a user-specified value.		Yes	Longer cycle may further deteriorate oversaturation. The user can specify a proper and applicable cycle length for queue management to be used by ACDSS.	Actual operations and system logs.
<b>2.2</b>		<b>2.2 Sequence-based Adaptive Coordination</b>				
2.2.0-2	4	The ASCT shall select cycle length based on a time of day schedule.	4.1.0-1.0-1 Maximize the throughput on coordinated routes 4.1.0-1.0-2	Yes	ACDSS supports selecting cycle length based on a time of day schedule. Depending on	Actual operations and system logs.



			<p>Provide smooth flow along coordinated routes. The operator shall be able to define for each group of intersections the appropriate operational objective. For example, near a freeway interchange or in a location with heavy turning movements, the queue management strategy may be specified, while on an arterial with long signal spacing the smooth flow objective may be specified.</p> <p><i>4.1.0-1.0-3</i></p> <p>Distribute green time among competing movements at critical intersections to provide an equitable distribution of delays.</p> <p><i>4.1.0-1.0-4</i></p> <p>The objective of the coordination shall be to manage the lengths of queues stored at critical locations within the coordinated group so that long queues do not block upstream intersections or otherwise reduce the capacity available during the green phases. This shall involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon shall be stopped. It shall also involve control of offsets and phase lengths so that queues may be stored in locations where they shall not adversely affect capacity of the system.</p>		the schedule, applicable cycle lengths vary.	
2.2.0-3	5	The ASCT shall calculate phase lengths for all phases at each signal controller to suit the	<p><i>4.1.0-1.0-3</i></p> <p>Distribute green time among competing movements at critical intersections to provide an equitable distribution of delays.</p> <p><i>4.1.0-1.0-5</i></p>	Yes	ACDSS performs cycle, offset and split optimization. For a given cycle, phase splits and offset are optimized to	Actual operations and system logs.

		<p>current coordination strategy.</p>	<p>Manage queues in a manner that minimizes the impact of queues on intersection efficiency. Queues often overflow from turn bays at the FLW/Hayden and FLW/L101 intersections during peak periods.</p>		<p>provide the needed bandwidth and progression for the current directional pattern (e.g., EB, WB or Balanced).</p>	
			<p>4.1.0-4</p>			
			<p>The system operator needs to detect repeated phase failures and control signal timing to prevent phase failures building up queues. The operator in this case is trying to prevent a routine queue from forming where it shall block another movement in the cycle unnecessarily. The system shall determine the optimal order of phases to provide the best coordination. If the green time required for a left turn phase is longer the time required to service a queue fully occupying the left turn bay, and the queue would overflow and block the adjacent lane, the operator shall be able to specify the phase to operate twice for each occurrence of the opposing through movement, in order to avoid queue overflow. The user shall specify a maximum elapsed time between successive occurrences of a phase when the phase is called.</p>			
<p>2.2.0-4</p>	<p>5</p>	<p>The ASCT shall calculate offsets to suit the current coordination strategy</p>	<p>4.1.0-1.0-1</p>	<p>Yes</p>	<p>Offset can be optimized for progression along the coordinated arterial. The anchor point (reference</p>	<p>System config UI and actual operations.</p>
			<p>Maximize the throughput on coordinate routes</p>			
			<p>4.1.0-1.0-2</p>			



		for the user-specified reference point for each signal controller along a coordinated route within a group.	<p>Provide smooth flow along coordinated routes. The operator shall be able to define for each group of intersections the appropriate operational objective. For example, near a freeway interchange or in a location with heavy turning movements, the queue management strategy may be specified, while on an arterial with long signal spacing the smooth flow objective may be specified.</p> <p><i>4.1.0-1.0-4</i></p> <p>The objective of the coordination shall be to manage the lengths of queues stored at critical locations within the coordinated group so that long queues do not block upstream intersections or otherwise reduce the capacity available during the green phases. This shall involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon shall be stopped. It shall also involve control of offsets and phase lengths so that queues may be stored in locations where they shall not adversely affect capacity of the system.</p>		point) can be user specified.	
2.2.0-4.0-1	5	The ASCT shall apply offsets for the user-specified reference point of each signal controller along a coordinated route.	<p><i>4.1.0-1.0-1</i></p> <p>Maximize the throughput on coordinate routes</p> <p><i>4.1.0-1.0-2</i></p> <p>Provide smooth flow along coordinated routes. The operator shall be able to define for each group of intersections the appropriate operational objective. For example, near a freeway interchange or in a</p>	Yes	The optimized offset is implemented at each signal controller along the coordinated route.	Actual operations and system logs.

			<p>location with heavy turning movements, the queue management strategy may be specified, while on an arterial with long signal spacing the smooth flow objective may be specified.</p> <p><i>4.1.0-1.0-4</i></p> <p>The objective of the coordination shall be to manage the lengths of queues stored at critical locations within the coordinated group so that long queues do not block upstream intersections or otherwise reduce the capacity available during the green phases. This shall involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon shall be stopped. It shall also involve control of offsets and phase lengths so that queues may be stored in locations where they shall not adversely affect capacity of the system.</p>			
2.2.0-5	5	The ASCT shall calculate a cycle length for each cycle based on its optimization objectives (as required elsewhere, e.g., progression, queue management, equitable distribution of green).	<p><i>4.1.0-1.0-1</i></p> <p>Maximize the throughput on coordinate routes</p> <p><i>4.1.0-1.0-2</i></p> <p>Provide smooth flow along coordinated routes. The operator shall be able to define for each group of intersections the appropriate operational objective. For example, near a freeway interchange or in a location with heavy turning movements, the queue management strategy may be specified, while on an arterial with long signal spacing the smooth flow objective may be specified.</p>	Yes.	ACDSS optimizes cycle based on the objective. When a new cycle is implemented, the entire system shall hold on that cycle (Pattern On Hold) for a user specified period, e.g., 10 minutes. The system shall be snappier to increase from shorter cycle to longer cycle (for example, 90-sec to 135 sec cycle), but shall drop	Actual operations and system logs.

					cycle length slowly (e.g., from 135 to 120, then 90) with decreasing demand.	
2.2.0-5.0-1	4	The ASCT shall limit cycle lengths to user-specified values.	4.1.0-1.0-3 Distribute green time among competing movements at critical intersections to provide an equitable distribution of delays.	Yes	The user can specify the set of candidate cycle lengths.	System config UI and actual operations.
2.2.0-5.0-2	5	The ASCT shall limit cycle lengths to a user-specified range.	4.1.0-1.0-4	Yes	The user can specify the range of candidate cycle lengths.	System config UI and actual ops
2.2.0-5.0-3	5	The ASCT shall calculate optimum cycle lengths according to the user-specified coordination strategy.	The objective of the coordination shall be to manage the lengths of queues stored at critical locations within the coordinated group so that long queues do not block upstream intersections or otherwise reduce the capacity available during the green phases. This shall involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon shall be stopped. It shall also involve control of offsets and phase lengths so that queues may be stored in locations where they shall not adversely affect capacity of the system.	Yes	Cycle lengths are determined based on the objective and whether queue management is activated or not.	
2.2.0-5.0-4	4	The ASCT shall limit changes in cycle length to a user-specified value.		Yes	The user can limit the changes (delta) in cycle length.	System config UI and actual ops
2.2.0-5.0-4.0-1	3	The ASCT shall increase the limit for the following 3 cycles based on a change in conditions		No	This is not supported as part of ACDSS logic.	
2.2.0-5.0-4.0-1.0-1	3	The change in conditions shall be defined by 3 successive adaptive increases in cycle length at the maximum rate.	No	This is not supported as part of ACDSS logic.		



2.2.0-5.0-4.0-1.0-2	3	The increase shall be user-defined.		No	This is not supported as part of ACDSS logic.	
2.2.0-5.0-5	4	The ASCT shall adjust offsets to minimize the chance of stopping vehicles approaching a signal that have been served by a user-specified phase at an upstream signal.	4.1.0-5	Yes	Offsets are adjusted for an intended progression pattern of primary platoons, while facilitating secondary platoon.	Actual operations.
			The system operator needs to minimize the chance that a queue forms at a specified location.			
<b>2.3</b>		<b>2.3 Non-sequence-based adaptive coordination</b>				
2.3.0-2	4	The ASCT shall calculate the appropriate state of the signal at the critical signal controller. (A critical signal controller is defined by the user.)	4.1.0-1.0-1	Yes	Signal state of critical intersections are optimized on a cyclic basis. ACDSS adjust cycle, offset and splits maintaining coordination using common cycles and offsets.	Actual operations.
			Maximize the throughput on coordinate routes			
			4.1.0-1.0-2			
		Provide smooth flow along coordinated routes. The operator shall be able to define for each group of intersections the appropriate operational objective. For example, near a freeway interchange or in a location with heavy turning movements, the queue management strategy may be specified, while on an arterial with long signal spacing the smooth flow objective may be specified.				
2.3.0-3	4	At non-critical intersections within a group, the ASCT shall calculate the time at which a user-specified phase shall be green,	4.1.0-1.0-3	No	ACDSS is a cyclic system. Acyclic operations are not supported.	
			Distribute green time among competing movements at critical intersections to provide an equitable distribution of delays.			
			4.1.0-1.0-4			



		relative to a reference point at the critical intersection, to suit the current coordination strategy.				
2.3.0-4	3	When demand is present, the ASCT shall implement a user-specified maximum time between successive displays of each phase at each intersection.	The objective of the coordination shall be to manage the lengths of queues stored at critical locations within the coordinated group so that long queues do not block upstream intersections or otherwise reduce the capacity available during the green phases. This shall involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon shall be stopped. It shall also involve control of offsets and phase lengths so that queues may be stored in locations where they shall not adversely affect capacity of the system.	No	ACDSS is a cyclic system. Acyclic operations are not supported.	
2.3.0-5	4	The ASCT shall adjust signal timing so that vehicles approaching a signal that have been served during a user-specified phase at an upstream signal do not stop.	<p>4.1.0-5</p> <p>The system operator needs to minimize the chance that a queue forms at a specified location.</p>	Yes	The signal timing can be adjusted on a cycle by cycle basis to facilitate progression of second and primary platoons.	Actual operations.
2.4		<b>2.4 Single intersection adaptive operation</b>	NOT USED			
2.5		<b>2.5 Phase-based adaptive coordination</b>	NOT USED			
2.6		<b>2.6 Responsiveness</b>				



2.6.0-3	3	The ASCT shall limit the changes in the direction of primary coordination to a user-specified frequency.	4.8.0-2	Yes	The optimization frequency can be up to every 1 cycle.	Actual operations.
			The system operator needs to constrain the selection of cycle lengths to those that provide acceptable operations. During peak periods when one or more intersections are oversaturated, the primary objective of the system shall be to maximize the throughput along the corridor in the peak direction. The cycle length chosen by the system shall be the maximum permitted by the operator, or determined by a user-specified maximum duration between successively servicing a phase with demand present. The system shall determine the direction with peak flow and provide the maximum bandwidth possible within the selected cycle length. This shall be subject to user-specified constraints, such as allowable phase sequences, and minimum and maximum phase times.			
2.6.0-4	4	When a large change in traffic demand is detected, the ASCT shall respond more quickly than normal operation, subject to user-specified limits.	4.8.0-3	Yes	The fastest response would be next local zero with new cycle length, offset and/or splits.	Actual operations.
			The system operator needs to respond quickly to sudden large shifts in traffic conditions.			
2.6.0-5	3	The ASCT shall select	4.8.0-2	Yes	The user can specify the	System



		cycle length from a list of user-defined cycle lengths.	The system operator needs to constrain the selection of cycle lengths to those that provide acceptable operations. During peak periods when one or more intersections are oversaturated, the primary objective of the system shall be to maximize the throughput along the corridor in the peak direction. The cycle length chosen by the system shall be the maximum permitted by the operator, or determined by a user-specified maximum duration between successively servicing a phase with demand present. The system shall determine the direction with peak flow and provide the maximum bandwidth possible within the selected cycle length. This shall be subject to user-specified constraints, such as allowable phase sequences, and minimum and maximum phase times.		list of candidate cycle lengths.	config UI and actual operations.
<b>3</b>		<b>3 External/Internal Interfaces</b>				
3.0-1		The ASCT shall support external interfaces according to the <b>MAG Regional ITS Architecture</b> and the following detailed requirements. Interface requirements include:				
	3	· Information layer protocol	4.3.0-1	Yes	ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Actual operations.
			The system operator needs to adaptively control signals operated by the City of			



			Scottsdale.			
	3	· Application layer protocol	4.3.0-2 The system operator needs to send data to another system that would allow the other system to coordinate with the ASCT system.	Yes	ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Actual operations.
	2	· Lower layer protocol	4.3.0-4 The system operator needs to receive data from another system that shall allow the ASCT system to coordinate its operation with the adjacent system.	Yes	ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Actual operations.
	3	· Data aggregation	4.11.0-5 The system operator needs to report performance data in real time to the Regional Archive Data Server (RADS).	Yes	ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Actual operations.
	3	· Frequency of storage	4.17.0-2	Yes	ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Actual operations.
	3	· Frequency of reporting	The system operator needs to react to commands issued by an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan shall remain in operation until the command from the external source is removed.	Yes	ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Actual operations.
3.0-1.0-1	4	The ASCT shall send operational data to the TranSuite and Regional Archive Data Server (RADS) external system.	4.3.0-2 The system operator needs to send data to another system that would allow the other system to coordinate with the ASCT system. 4.11.0-5 The system operator needs to report performance data in real time to the	Yes	ACDSS is integrated adaptive control module of TransSuite. All operational data are sent to TransSuite. TransSuite sends controller status and detector data to ACDSS,	Actual operations; TransSuite TCS console

			Regional Archive Data Server (RADS).		and ACDSS returns optimized signal timing back to TransSuite. TransSuite then downloads the optimized timing in field controllers via NTCIP.	
3.0-1.0-3	4	The ASCT shall send monitoring data to the TransSuite system.	4.11.0-1 The agency needs the (specify external decision support system) to be able to monitor the ASCT system automatically.	Yes	ACDSS is part of TransSuite. ACDSS archives all monitoring data in dedicated database.	Actual operations; TransSuite TCS console/ACDSS DB.
3.0-1.0-4	4	The ASCT shall send coordination data to the TransSuite system.	4.3.0-2 The system operator needs to send data to another system that would allow the other system to coordinate with the ASCT system.	Yes	ACDSS as an adaptive control module controls signals through TransSuite. All data and control are via TransSuite.	Actual operations; TransSuite TCS console.
3.0-1.0-5	4	The ASCT shall send performance data to the TransSuite and Regional Archive Data Server (RADS) external system.	4.11.0-5 The system operator needs to report performance data in real time to the Regional Archive Data Server (RADS).	No	ACDSS logs all the performance data in its own database. ACDSS logs the following direct data: - detector volume/occupancy - cycle, offset and splits - intermediate calculations log	
3.0-1.0-6	4	The ASCT shall receive commands from the TransSuite system.	4.17.0-2 The system operator needs to react to commands issued by an external decision	Yes	As TransSuite adaptive module, ACDSS receives commands via adaptive control web service	Actual operations.

			support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan shall remain in operation until the command from the external source is removed.		interface.	
3.0-1.0-7		The ASCT shall implement the following commands from the TranSuite system when commanded:		Yes	As TransSuite module, ACDSS support all these.	Actual operations.
	4	· Specified cycle length				
	4	· Specified direction of progression				
	4	· Specified adaptive strategy				
<b>4</b>		<b>4 Crossing Arterials and Boundaries</b>				
4.0-1	4	The ASCT shall conform its operation to an external system's operation.	4.3.0-4	Yes	TransSuite can perform "Manual Override" to issue commands to an adaptive signal overriding ACDSS decisions.	Actual operations.
			The system operator needs to receive data from another system that shall allow the ASCT system to coordinate its operation with the adjacent system.			
			4.17.0-2			
		The system operator needs to react to commands issued by an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan shall remain in operation until the command from the external source is removed.				
4.0-1.0-1	4	The ASCT shall alter its operation to minimize interruption of traffic entering the system. (This may be	4.3.0-4	Yes	ACDSS can apply gating/metering strategies to smooth the traffic entering the system.	Actual operations.
			The system operator needs to receive data from another system that shall allow the ASCT system to coordinate its operation with the adjacent system.			



		achieved via detection, with no direct connection to the other system)				
4.0-1.0-2	3	The ASCT shall be based on a fixed cycle length to match an adjacent system.	4.3.0-5 The system operator needs to constrain the adaptive system to operate a cycle length compatible with the crossing arterial.	Yes	At selected locations, the cycle length can be "locked" to match adjacent systems.	Actual operations.
4.0-1.0-3	4	The ASCT shall alter its operation based on data received from another system.	4.3.0-4 The system operator needs to receive data from another system that shall allow the ASCT system to coordinate its operation with the adjacent system.	Yes	ACDSS can adjust signals based on detection data from another system.	Actual operations.
4.0-1.0-4	3	The ASCT shall support adaptive coordination on crossing routes.	4.3.0-3 The system operator needs to adaptively coordinate signals on two crossing routes simultaneously.	Yes	This is handled by ACDSS grid network control logic.	Actual operations.
<b>5</b>		<b>5 Access and Security</b>				
5.0-1		The ASCT shall be implemented with a security policy that addresses the following selected elements:	4.4.0-1			
5.0-1.0-1	4	Local access to the ASCT.	The system operator needs to have a security management and administrative system that allows access and operational privileges to be assigned, monitored and controlled by an administrator, and conform to the agency's access and network infrastructure security policies.	Yes	This is supported via TransSuite	Actual operations
5.0-1.0-2	4	Remote access to the ASCT.		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-3	4	System monitoring.		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-4	4	System manual override.		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-5	4	Development		Yes	This is supported via	Actual

					TransSuite	operations
5.0-1.0-6	4	Operations		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-7	4	User login		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-8	4	User password		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-9	4	Administration of the system		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-10	4	Signal controller group access		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-11	4	Access to classes of equipment		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-12	4	Access to equipment by jurisdiction		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-13	4	Output activation		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-14	4	System parameters		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-15	4	Report generation		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-16	4	Configuration		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-17	4	Security alerts		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-18	4	Security logging		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-19	4	Security reporting		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-20	4	Database		Yes	This is supported via TransSuite	Actual operations
5.0-1.0-21	4	Signal controller		Yes	This is supported via TransSuite	Actual operations



5.0-2		The ASCT shall provide monitoring and control access at the following locations:				
5.0-2.0-1	5	Agency TMC	4.10.0-1.0-1 Scottsdale TMC at 9191 East San Salvador Drive, Scottsdale, AZ 85258	Yes	ACDSS shall be running from a virtual server at the TMC	Actual operations
5.0-2.0-5	4	Local controller cabinets	4.10.0-1.0-5 Local controller cabinets	Yes	This is via TransSuite TCS	Actual operations
5.0-3	4	The ASCT shall comply with the agency's security policy.	4.4.0-1 The system operator needs to have a security management and administrative system that allows access and operational privileges to be assigned, monitored and controlled by an administrator, and conform to the agency's access and network infrastructure security policies.	Yes	As TransSuite module, this is transparently handled by TransSuite TCS.	Actual operations
5.0-4	5	The ASCT shall not prevent access to the local signal controller database, monitoring or reporting functions by any installed signal management system.	4.10.0-2 The operator needs to access to the database management, monitoring and reporting features and functions of the signal controllers and any related signal management system from the access points defined for those system components.	Yes	ACDSS does not prevent any of these.	Actual operations
<b>6</b>		<b>6 Data Log</b>				
6.0-1		The ASCT shall log the following events:	4.11.0-6 The system operator needs to be able to report the exact state of signal timing and input data for a specified period, to allow historical analysis of the system operation. The agency needs to maintain a complete record of the actions and performance of the	Yes	This is managed by TransSuite TCS	TransSuite TCS console
6.0-1.0-1	4	Time-stamped vehicle phase calls		No	This function is not currently supported by TransSuite TCS. The capability can be added if needed.	TransSuite TCS console

6.0-1.0-2	4	Time-stamped pedestrian phase calls	<p>adaptive system. This shall allow staff to monitor the effectiveness of the system, and also respond to requests for information and review the operation when complaints are received. The system shall maintain a complete record of all its calculations, changes of output state, inputs received from other systems and commands to local signal controllers. All calculations that are affected by calibration parameters (including the results of intermediate calculations that are inputs to optimization routines and selection tables) shall be reported, to facilitate set-up, fine tuning and troubleshooting. The log shall include a record of all inputs received from external sources, and all external outputs generated by the system. It shall also record the actual values of all parameters that are subject to a user-specified maximum, minimum or range.</p>	No	This function is not currently supported by TransSuite TCS. The capability can be added if needed.	TransSuite TCS console
6.0-1.0-3	4	Time-stamped emergency vehicle preemption calls		Yes	This is managed by TransSuite TCS	TransSuite TCS console
6.0-1.0-6	4	Time-stamped start and end of each phase		Yes	ACDSS logs this type of data.	ACDSS DB
6.0-1.0-7	4	Time-stamped controller interval changes		Yes	ACDSS logs this type of data.	ACDSS DB
6.0-1.0-8	4	Time-stamped start and end of each transition to a new timing plan		Yes	ACDSS logs this type of data.	ACDSS DB
6.0-2	4	The ASCT shall export its systems log in the following formats:	4.11.0-4		System log export in Excel or CSV format supported.	Actual operation.
		* MS Excel	<p>The system operator needs to store all operational data and signal timing parameters calculated by the adaptive system, and export selected data to TransSuite. The log shall be maintained on-line in a format able to be queried by a user, for a user specified period. The log shall be able to be exported in .csv or MS Excel format for further analysis. The log shall be able to be archived in .csv or MS Excel format.</p>	Yes		
		* CSV				
6.0-3	3	The ASCT shall store the event log for a minimum of 14 days		Yes	Event logs are archived from 1 month to permanent	ACDSS DB



6.0-4	3	The ASCT shall store results of all signal timing parameter calculations for a minimum of 14 days.	4.11.0-2	Yes	Calculations are archived from 1 month to permanent	ACDSS DB	
			The system operator needs to store and report data used to calculate signal timing and have the data available for subsequent analysis.				
			4.11.0-3				
			The system operator needs to store and report data that can be used to measure traffic performance under adaptive control.				
6.0-5	4	The system shall store the following measured data in the form used as input to calculations for a minimum of 14 days:	4.11.0-2	Yes	ACDSS archives volume and occupancy data. Queue length data are not direct measurement but estimate	ACDSS DB	
			* Volume				The system operator needs to store and report data used to calculate signal timing and have the data available for subsequent analysis.
			* Occupancy				4.11.0-3
			* Queue length				The system operator needs to store and report data that can be used to measure traffic performance under adaptive control.
			4.11.0-7				
			Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.				
6.0-6	3	The ASCT system shall archive all data automatically after a user-specified period not less than 14 days.	4.11.0-4	Yes.	ACDSS archives all the data minimum 1 month.	ACDSS DB/TransSuite TCS	
			The system operator needs to store all operational data and signal timing parameters calculated by the adaptive				



6.0-7	4	The ASCT shall provide data storage for a system size of 10 signal controllers. The data to be stored shall include the following:	system, and export selected data to TranSuite. The log shall be maintained on-line in a format able to be queried by a user, for a user specified period. The log shall be able to be exported in .csv format for further analysis. The log shall be able to be archived in .csv format.	Yes	All these data are archived for a minimum 1 month time.	ACDSS DB/TransSuite TCS
		* Controller state data				
		* Reports				
		* Log data				
		* Security data				
		* ASCT parameters				
6.0-8	4	The ASCT shall calculate and report relative data quality including:	4.11.0-7	Yes	ACDSS shall generate report on the required items.	ACDSS distiller and dashboard
		* The extent data is affected by detector faults	Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.			
		* Other applicable items				
6.0-9	4	The ASCT shall report comparisons of logged data when requested by the user:			Yes	This functionality is provided through TransSuite TCS console.
		* Day to day				
		* Hour to hour				
		* Hour of day to hour of day				
		* Hour of week to hour of week				



		* day of week to day week				
		* Day of year to day of year				
6.0-10	4	The ASCT shall store data logs in a standard database.	<p>4.11.0-4</p> <p>The system operator needs to store all operational data and signal timing parameters calculated by the adaptive system, and export selected data to TransSuite. The log shall be maintained on-line in a format able to be queried by a user, for a user specified period. The log shall be able to be exported in .csv format for further analysis. The log shall be able to be archived in .csv format.</p>	Yes	All data are stored in SQL-2003 compatible standard database.	TransSuite TCS/ACDSS DB
6.0-11	3	The ASCT shall report stored data in a form suitable to provide explanations of system behavior to public and politicians and to troubleshoot the system.	<p>4.11.0-7</p> <p>Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.</p>	Yes	The data are reported by a dashboard and can be exported as separate files.	ACDSS Dashboard
<b>7</b>		<b>7 Advanced Controller Operation</b>				
7.0-1	3	When specified by the user, the ASCT shall display a vehicle phase more than once for each time the coordinated phase is served.	<p>4.9.0-1.0-1</p> <p>Service a phase more than once per cycle</p>	Yes	This is configured at the controller level to enable phase reservice.	Actual operation.
7.0-2	4	The ASCT shall provide a minimum of	<p>4.9.0-1.0-2</p> <p>Operate at least 8 overlap phases</p>	Yes	This is configured at the controller level as	Actual operations.

		8 phase overlaps.			supported by the controller firmware.	
7.0-3	4	The ASCT shall accommodate a minimum of 8 phases at each signal	4.9.0-1.0-3	Yes	This is configured at the controller level as supported by the controller firmware.	Actual operations.
7.0-4	4	The ASCT shall accommodate a minimum of 4 rings at each signal.	Operate four rings, eight phases and up to four phases per ring	Yes	This is configured at the controller level as supported by the controller firmware.	Actual operations.
7.0-5	4	The ASCT shall accommodate a minimum of 4 phases per ring		Yes	This is configured at the controller level as supported by the controller firmware.	Actual operations.
7.0-6	5	The ASCT shall provide a minimum of 16 different user-defined phase sequences for each signal.		4.1.0-6	Yes	This is configured at the controller level as supported by the controller firmware.
			The system operator needs to modify the sequence of phases to support the various operational strategies.			
7.0-6.0-1	5	Each permissible phase sequence shall be user-assignable to any signal timing plan.	4.9.0-1.0-4	Yes	This is configured at the controller level as supported by the controller firmware.	Actual operations.
7.0-6.0-2	3	Each permissible phase sequence shall be executable by a time of day schedule.	Permit different phase sequences under different traffic conditions			
7.0-6.0-3	3	Each permissible phase sequence shall be executable based on measured traffic conditions				
				Yes	Permissible phase sequence can be set to run on a TOD schedule	Actual operations.
				Yes	Permissible phase sequence can be selected based on traffic conditions.	Actual operations.



7.0-7	3	The ASCT shall not prevent a phase/overlap output by time-of-day.	4.1.0-6	Yes	Phase /overlap is not prevented by time of day.	Actual operations.
			The system operator needs to modify the sequence of phases to support the various operational strategies.			
7.0-8	3	The ASCT shall not prevent a phase/overlap output based on an external input.	4.1.0-6	Yes	ACDSS does not prevent phase/overlap based on an external input.	Actual operations.
			The system operator needs to modify the sequence of phases to support the various operational strategies.			
			4.17.0-2			
7.0-10	3	The ASCT shall have the option for a coordinated phase to be released early based on a user-definable point in the phase or cycle.	4.9.0-1.0-12	Yes	Early return to green can be adjusted by selecting fixed force-off or floating force-off.	Actual operations.
			Allow the coordinated phase to terminate early under prescribed traffic conditions			
7.0-11	5	The ASCT shall not prevent the controller from displaying flashing yellow arrow left turn.	4.9.0-1.0-15	Yes	FLA is not prevented.	Actual operations.
			Use flashing yellow arrow to control permissive left turns.			
7.0-13	2	When adaptive operation is used in conjunction with normal coordination, the ASCT shall not prevent a controller	4.9.0-1.0-16	Yes	ACDSS does not prevent a controller to run a cycle different from adjacent intersections, if configured as such.	Actual operations.
			Service side streets and pedestrian phases at minor locations more often than at adjacent signals when this can be done without compromising the quality of the			

		<p>serving a cycle length different from the cycles used at adjacent intersections.</p>	<p>coordination. (E.g., double-cycle mid-block pedestrian crossing signals.)</p>			
7.0-14	5	<p>The ASCT shall operate adaptively with coordinated turning movement phases between FLW/Hayden and FLW/L101.</p>	<p>4.9.0-1.0-8 Accommodate the following custom features currently used in coordination patterns. This feature shall need to remain available in fallback operation should the ASCT fail: Coordinated turning movement phases between FLW/Hayden and FLW/L101.</p>	Yes	<p>ACDSS can be configured to support the required coordination.</p>	<p>Actual operations.</p>
<b>8</b>		<p><b>8 Pedestrians and Bicyclists</b></p>				
8.0-1	1	<p>When a pedestrian phase is called, the ASCT shall execute pedestrian phases before the vehicle green of the related vehicle phase.</p>	<p>4.6.0-5 The system operator needs to accommodate early start of walk and exclusive pedestrian phases.</p>	Yes	<p>This requires the controller firmware to support Lead Pedestrian Interval (LPI).</p>	<p>Actual operations.</p>
8.0-2	5	<p>When the pedestrian phase is called, the ASCT shall accommodate pedestrian crossing times during adaptive operations.</p>	<p>4.6.0-2 The system operator needs to accommodate infrequent pedestrian operation while maintaining adaptive operation. (This is appropriate for pedestrian calls that are common but not so frequent that they drive the operational needs.) 4.6.0-3 The system operator needs to incorporate frequent pedestrian operation into routine adaptive operation. (This is appropriate when pedestrians are frequent enough that they must be assumed to be present every</p>	Yes	<p>Pedestrian WK + FLDW has higher priority over adaptive timing. If WK+FLDW is longer than the current adaptive timing, WK+FLDW shall be honored.</p>	<p>Actual operations.</p>

			cycle or nearly every cycle.)			
8.0-5	4	The ASCT shall have the option for a phase to start late, when there is not a pedestrian call for that phase, provided the minimum green time is available.	4.6.0-3 The system operator needs to incorporate frequent pedestrian operation into routine adaptive operation. (This is appropriate when pedestrians are frequent enough that they must be assumed to be present every cycle or nearly every cycle.)	Yes	Pedestrian phase can start late as long as there is sufficient time remaining on the compatible vehicle phase. This is subject to the controller firmware.	Actual operations.
8.0-6	5	When specified by the user, the ASCT shall execute pedestrian recall on pedestrian phase adjacent to coordinated phases.	4.9.0-1.0-13 Allow flexible timing of non-coordinated phases (such as late start of a phase) while maintaining coordination	Yes	Ped recall can be specified on ped phase adjacent to non coordinated phases.	Actual operations.
8.0-7	5	When specified by the user, the ASCT shall execute pedestrian recall on pedestrian phase adjacent to coordinated phases.	4.6.0-3 The system operator needs to incorporate frequent pedestrian operation into routine adaptive operation. (This is appropriate when pedestrians are frequent enough that they must be assumed to be present every cycle or nearly every cycle.)	Yes	Ped recall can be specified on ped phase adjacent to non coordinated phases.	Actual operations.
8.0-8	5	When pedestrian phases are on recall, the ASCT shall accommodate pedestrian timing during adaptive operation.	4.6.0-3 The system operator needs to incorporate frequent pedestrian operation into routine adaptive operation. (This is appropriate when pedestrians are frequent enough that they must be assumed to be present every cycle or nearly every cycle.)	Yes	Pedestrian WK + FLDW has higher priority over adaptive timing. If WK+FLDW is longer than the current adaptive timing, WK+FLDW shall be honored.	Actual operations.
8.0-9	4	The ASCT shall	The system operator needs to incorporate	Yes	Bicycle crossing times	Actual

		accommodate bicycle crossing times during adaptive operations.	operation suitable for bicyclists into routine adaptive operation. Hayden Road has bike lanes north of Frank Lloyd Wright Boulevard.		are honored to override adaptive timing.	operations.
<b>9</b>		<b>9 Special Functions</b>				
<b>9.0-1</b>	5	The ASCT shall allow for Special Functions, including Remote Stop Time, and Remote Preemption to be activated remotely by the TMC User during any operation mode. The system shall readjust and transition back to the specified operation mode once Special Function is deactivated.	This is an essential part of operation, especially if adaptive mode fails to handle traffic.	Yes	Special function shall take precedence over adaptive. Adaptive operation shall be halted when special function is activated, and recovered if special function is deactivated.	Actual operation; TransSuite TCS console.
<b>10</b>		<b>10 Detection</b>				
10.0-1	5	The ASCT shall be compatible with the following detector technologies:	The ASCT shall be compatible with existing and furnished detector technologies. Furnished detection sensors or detection equipment shall not be battery operated.	Yes	ACDSS support any detector technology as long as volume and occupancy data are provided.	Actual operation
		* Existing standard loop detectors				
		* Existing Econolite Autoscope video detector technology				
		* Furnished detection (shall not be battery operated)				

11		11 EV Pre-emption				
11.0-2	5	The ASCT shall maintain adaptive operation at non-preempted intersections during emergency vehicle preemption.	<p><i>4.13.0-2</i></p> <p>The system operator needs to accommodate emergency vehicle preemption. The City of Scottsdale uses intersection-based preemption. The request is received at the controller directly from the emergency vehicle.</p>	Yes	Non-preempted intersections shall operate normal adaptive operations.	Actual operations
11.0-4	5	The ASCT shall operate normally at non-preempted signal controllers when special functions are engaged by a preemption event. (An example of such a special functions is a phase omit, a phase maximum recall or a fire route.)		Yes	Special function that omits phase or put a max recall shall not impact normal adaptive operation.	Actual operations.
11.0-6	5	The ASCT shall return to normal adaptive operation when preemption of a signal controller is released.		Yes	Adaptive operation shall be resumed when preemption is released.	Actual operations.
11.0-7	4	The ASCT shall preempt a user-specified group of signal controllers when a user-specified preemption is requested.		Yes	Preemption always has higher priority than adaptive operations. ACDSS supports preempting signal groups.	Actual operations.
11.0.8	4	The ASCT shall not		Yes	ACDSS doesn't prevent	Actual

		prevent the local signal controller from operating in normally detected limited-service actuated mode during preemption.			local actuated mode.	operations.
<b>12</b>		<b>12 Transit Priority</b>	<b>NOT USED</b>			
<b>13</b>		<b>13 Failure Events and Fallback</b>				
<b>13.1</b>		<b>13.1 Detector Failure</b>				
13.1.0-1	4	The ASCT shall take user-specified action in the absence of valid detector data from one or more vehicle detectors within a group.	<i>4.14.0-1</i> The system operator needs to fall back to TOD coordination, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and software failure.	Yes	ACDSS allows to use historical data or adjacent detector data to compensate missing data.	Actual operations.
13.1.0-1.0-1	3	The ASCT shall release control to central system control.		Yes	ACDSS shall release adaptive. The system shall revert to the default mode, central system control or local TOD	Actual operations.
13.1.0-1.0-2	3	The ASCT shall release control to local operations to operate under its own time-of-day schedule.		Yes	ACDSS shall revert to local TOD, if such is set as the default fall back.	Actual operations.
13.1.0-2		The ASCT shall use the following alternate data sources for operations in the		Yes		



		absence of the real-time data from a detector:				
13.1.0-2.0-1	4	* Data from a user-specified alternate detector. * Historical Archived Data.		Yes	ACDSS can use historical data or specified alternative detectors data to compensate the missing data.	Actual operation.
13.1.0-2.0-3	4	The ASCT shall switch to the alternate source in real time without operator intervention.		Yes	ACDSS can switch to alternate source transparently.	Actual operation.
13.1.0-3	4	In the event of a detector failure, the ASCT shall issue an alarm to user-specified recipients. (This requirement may be fulfilled by sending the alarm to a designated list of recipients by a designated means, or by using an external maintenance management system.	4.12.0-1	Yes	Alarm shall be send as txt messages or emails.	Actual operation.
			The system operator needs to immediately notify maintenance and operations staff of alarms and alerts.			
			4.12.0-2			
			The system operator needs to immediately and automatically pass alarms and alerts to the TranSuite system.			
13.1.0-4	4	In the event of a failure, the ASCT shall log details of the failure in a permanent log.	4.12.0-3	Yes	Detection failures are log in a database.	ACDSS DB
			The system operator needs to maintain a complete log of alarms and failure events.			
13.1.0-5	4	The permanent failure log shall be		Yes	The log is searchable/achievable,	ACDSS DB

		searchable, archivable, and exportable.			and exportable.	
<b>13.2</b>		<b>13.2 Communications Failure</b>				
13.2-1	4	The ASCT shall execute user-specified actions when communications to one or more signal controllers fails within a group.	4.14.0-1 The system operator needs to fall back to TOD coordination, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and software failure.	Yes	In case of COMM failure, ACDSS can either revert back to default TOD, or ignore such failure if only split changes are involved.	Actual operation
13.2-1.0-1	3	In the event of loss of communication to a user-specified signal controller, the ASCT shall release control of all signal controllers within a user-specified group to local control.		Yes	COMM failure with a critical intersection can cause ACDSS release adaptive and revert back to TOD	Actual operation
13.2-1.0-2	3	The ASCT shall switch to the alternate operation in real time without operator intervention.		Yes	The release and revert is transparently handled by ACDSS	Actual operation
13.2-2	4	In the event of communications failure, the ASCT shall issue an alarm to user-specified	4.12.0-1 The system operator needs to immediately notify maintenance and operations staff of alarms and alerts. 4.12.0-2	Yes	The TransSuite Alarm System shall send alarms.	Actual operation



		recipients. (This requirement may be fulfilled by sending the alarm to a designated list of recipients by a designated means, or by using an external maintenance management system.	The system operator needs to immediately and automatically pass alarms and alerts to the existing TranSuite system.			
13.2-3	4	The ASCT shall issue an alarm within 1 minute of detection of a failure.		Yes	This is supported.	Actual operation
13.2-4	4	In the event of a communications failures, the ASCT shall log details of the failure in a permanent log.	4.12.0-3 The system operator needs to maintain a complete log of alarms and failure events.	Yes	The failures are logged permanently in a DB.	Actual operation
13.2-5	4	The permanent failure log shall be searchable, archivable, and exportable.		Yes	The log is in a RDB and meeting the requirement.	Actual operation
<b>13.3</b>		<b>13.3 Adaptive Processor Failure</b>				
13.3-1	4	The ASCT shall execute user-specified actions when adaptive control fails:	4.14.0-1 The system operator needs to fall back to TOD coordination, as specified by the operator, without causing disruption to	Yes	ACDSS has no hardware-based adaptive processor.	



13.3-1.0-1	4	The ASCT shall release control to central system control.	traffic flow, in the event of equipment, communications and software failure.	Yes	Adaptive shall be released if the central ACDSS server fails. The system reverts to central system control if configured so as fallback.	Actual operation
13.3-1.0-2	3	The ASCT shall release control to local operations to operate under its own time-of-day schedule.				TOD control shall be the fallback if configured so.
13.3-2	4	In the event of adaptive processor failure, the ASCT shall issue an alarm to user-specified recipients. (This requirement may be fulfilled by sending the alarm to a designated list of recipients by a designated means, or by using an external maintenance management system.)	4.12.0-1	Yes	Alarms by text message or by email.	Actual operation
			The system operator needs to immediately notify maintenance and operations staff of alarms and alerts.			
			4.12.0-2			
13.3-3	4	The permanent failure log shall be searchable, archivable, and exportable.		Yes	The logged failure is searchable, achievable, and exportable.	Actual operation
13.3-4	4	During adaptive	4.14.0-1	Yes	ACDSS does not	Actual

		processor failure, the ASCT shall provide all local detector inputs to the local controller.	The system operator needs to fall back to TOD coordination, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and software failure.		intercept local detector inputs to local controller.	operation
<b>14</b>		<b>14 Software</b>				
14.0-1	4	The vendor's adaptive software shall be fully operational within the following platform:	4.15.0-2	No	ACDSS is a Windows based software running on a Windows Server. TransSuite TCS is Windows/Linux based software.	
		* Linux	The system operator needs to use equipment and software acceptable under current agency IT policies and procedures.			
14.0-2		The system shall interface with detectors from Econolite Autoscope and standard loop detectors.	4.15.0-1.0-2 Detector type: inductive loops, Econolite Autoscope video	Yes	ACDSS interface the detectors via TransSuite TCS.	TransSuite TCS console
14.0-3	4	The system shall interface with Econolite ASC/3 controllers.	4.15.0-1.0-1 Controller type: Econolite ASC/3	Yes	ASC/3 is supported.	Actual operation
<b>15</b>		<b>15 Training</b>				
15.0-1		The vendor shall provide the following training.	4.16.0-1 The agency needs all staff involved in operation and maintenance to receive appropriate training.	Yes	This is part of our standard training package.	
15.0-1.0-1	5	The vendor shall provide training on the operations of the adaptive system.		Yes	This is part of our standard training package.	



15.0-1.0-2	5	The vendor shall provide training on troubleshooting the system.		Yes	This is part of our standard training package.	
15.0-1.0-3	5	The vendor shall provide training on preventive maintenance and repair of equipment.		Yes	This is part of our standard training package.	
15.0-1.0-4	5	The vendor shall provide training on system configuration.		Yes	This is part of our standard training package.	
15.0-1.0-5	5	The vendor shall provide training on administration of the system.		Yes	This is part of our standard training package.	
15.0-1.0-6	5	The vendor shall provide training on system calibration.		Yes	This is part of our standard training package.	
15.0-1.0-7	5	The vendor's training delivery shall include: printed course materials and references, electronic copies of presentations and references. The vendor shall provide training materials seven days in advance of each training session.		Yes	This is part of the deliverable.	
15.0-1.0-8	5	The vendor's training shall be delivered at		Yes	The training shall be provided at the	



		the Scottsdale TMC at 9191 East San Salvador Drive, Scottsdale, AZ 85258.			designated location.	
15.0-1.0-9	5	The vendor shall provide a minimum of 40 hours training to a minimum of 5 City personnel after the system is installed and fully operational.		Yes	The training shall be provided for the designated staff of the City.	
15.0-1.0-10	4	The vendor shall provide a minimum of 2 training sessions, one at the start of the project and one six months after commissioning.		Yes	This is part of our standard training package.	
<b>16</b>		<b>16 Maintenance, Support and Warranty</b>				
16.0-1	5	The Maintenance Vendor shall provide maintenance according to a separate maintenance contract. That contract should identify repairs necessary to preserve requirements fulfillment, responsiveness in	<p><i>4.16.0-2</i></p> <p>The agency needs the system to fulfill all requirements for the life of the system. The agency therefore needs the system to be maintained to repair faults that are not defects in materials and workmanship.</p>	Yes	This is part of our standard maintenance and support agreement. Full terms and conditions of the maintenance and support contract shall be negotiated when appropriate.	



		effecting those repairs, and all requirements on the maintenance provider while performing the repairs.				
16.0-2	5	The Vendor shall provide routine updates to the software and software environment necessary to preserve the fulfillment of requirements for a period of 1 year from Final Acceptance. Preservation of requirements fulfillment especially includes all IT management requirements as previously identified.	<p><i>4.16.0-4</i></p> <p>The agency needs the system to fulfill all requirements for the life of the system. The agency therefore needs support to keep software and software environment updated as necessary to prevent requirements no longer being fulfilled.</p>	Yes	This is part of our standard maintenance and support agreement. Full terms and conditions of the maintenance and support contract shall be negotiated when appropriate.	
16.0-3	5	The Vendor shall	<i>4.16.0-3</i>	Yes	Warranty shall be	



		warrant the system to be free of defects in materials and workmanship for a period of one year. Warranty is defined as correcting defects in materials and workmanship (subject to other language included in the purchase documents). Defect is defined as any circumstance in which the material does not perform according to its specification. Said instrument shall provide for support with the following response times: * Support provided by telephone - 24 hours * Support provided via remote login to the system - 24 hours * Support requiring vendor staff onsite - 3 business days	The agency needs the system to fulfill all requirements for the life of the system. The agency therefore needs the system to remain free of defects in materials and workmanship that result in requirements no longer being fulfilled.		provided as specified.	
<b>17</b>		<b>17 Schedule</b>				
17.0-1	4	The ASCT shall set the state of external input/output states	4.17.0-1 The TPC Scottsdale Champions Golf Course	Yes	This is accomplished via TransSuite TCS	TransSuite TCS console



		according to a time-of-day schedule.	and Westworld of Scottsdale are located north of the corridor. When an event occurs			
17.0-2	4	The ASCT output states shall be settable according to a time-of-day schedule	(e.g., the Phoenix Open), its start and end time are not predictable (e.g., events throughout the day for several days). The agency shall program the system so that at a scheduled time it begins operation in a mode	Yes	This is accomplished via TransSuite TCS	TransSuite TCS console
17.0-3	4	The ASCT operational parameters shall be settable according to a Time of Day schedule	that accommodates the arrival of patrons to the event. The schedule shall allow normal operation while the event is in progress and there is little associated traffic. The schedule shall also place the system in an appropriate mode of operation to accommodate patrons leaving the event. An operator shall be able to manually implement the appropriate signal operation during any time of the event.	Yes	This is accomplished via TransSuite TCS	TransSuite TCS console
<b>18</b>		<b>18 Performance Measurement, Monitoring and Reporting</b>				
18.0-1	4	The ASCT shall report measures of current traffic conditions on which it bases signal state alterations.	<i>4.11.0-2</i> The system operator needs to store and report data used to calculate signal timing and have the data available for subsequent analysis.	Yes	ACDSS logs all data and measures of traffic conditions in the database.	ACDSS DB
18.0-2	4	The ASCT shall report all intermediate calculated values that are affected by calibration parameters.		Yes	All intermediate calculated values are logged.	ACDSS DB
18.0-3	4	The ASCT shall	<i>4.11.0-2</i>	Yes	All signal state change	ACDSS DB



		maintain a log of all signal state alterations directed by the ASCT.	The system operator needs to store and report data used to calculate signal timing and have the data available for subsequent analysis. <i>4.11.0-7</i>		(detailed controller status data including cycle, offset, and individual splits, cycle start and end time). Whether the signal is in transition, and transition cycles are also logged.	
			Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.			
18.0-3.0-1	4	The ASCT log shall include all events directed by the external inputs.	<i>4.11.0-7</i>	No	This is not supported right now.	
18.0-3.0-2	4	The ASCT log shall include all external output state changes.	Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.	No	This is not supported right now.	
18.0-3.0-3	4	The ASCT log shall include all actual parameter values that are subject to user-specified values.		Yes	All the configurable inputs are logged in the DB	ACDSS DB
18.0-3.0-4	4	The ASCT shall maintain the records in this ASCT log for a minimum of 60 days.		Yes	The log can be kept from minimum 1 month to permanent	ACDSS DB
18.0-3.0-5	4	The ASCT shall archive all stored data automatically after a user-specified period not less than 60 days and when commanded by the user.		Yes	All data can be kept from minimum 1 month to permanent	ACDSS DB

<b>ATTACHMENT C-4</b>						
<b>TECHNICAL REQUIREMENTS &amp; RESPONSES</b>						
<b>PROJECT AREA 4</b>						
<b>Version 2.1</b>	<b>March 26, 2015</b>		<b>Project Area #4: Bell Road and I-17 from 35th Avenue through 19th Avenue</b>		<b>Proposer Response</b>	
<b>Sys Reqs Reference Number</b>	<b>Level of Importance</b>	<b>System Requirements</b>	<b>Concept of Operations Need Statements from Final FHWA Model Documents, FHWA-HOP-11-027, Appendix B</b>	<b>Meet Requirements (Yes or No)</b>	<b>Proposer Written Description of How Proposed System Fulfills Requirement</b>	<b>Verification Method</b>
<b>1</b>		<b>1 Network Characteristics</b>				
1.0-1	5	The ASCT shall control a minimum of 8 signals concurrently	<p><i>4.2.0-1</i></p> <p>The agencies have plans to adaptively control a total of 8 intersections from the City of Phoenix TMC located at 200 West Washington Street, Phoenix, AZ 85003 and the ADOT TOC located at 2302 West Durango Street, Phoenix, AZ 85009.</p>	Yes	No limitation. TransSuite TCS has been deployed on systems of 50 to 12,000 intersections. ACDSS in Manhattan controls at more than 300 intersections.	Demonstration
<b>2</b>		<b>2 Type of Operation</b>				
<b>2.1</b>		<b>2.1 General</b>				
<b>2.1.1</b>		<b>2.1.1 Mode of Operation</b>				
2.1.1.0-2	5	The ASCT shall operate	<i>4.14.0-1</i>	Yes	ACDSS requires NO	Demonstration



		non-adaptively when the adaptive control equipment fails.	The system operator needs to fall back to TOD operation without causing disruption to traffic flow, in the event of equipment, communications and software failure.		special adaptive equipment in field. Only NTCIP controllers required.	
2.1.1.0-2.0-1	1	The ASCT shall operate non-adaptively when a user-specified detector fails.		Yes	ACDSS reverts to default TOD, when user-specified critical detector fails.	Demonstration
2.1.1.0-2.0-2	3	The ASCT shall operate non-adaptively when the number of failed detectors connected to a signal controller exceeds a user-defined value.		Yes	ACDSS reverts to default TOD, when total failed detectors of a controller exceeding a user-specified threshold.	Demonstration
2.1.1.0-2.0-3	5	The ASCT shall operate non-adaptively when the number of failed detectors in a group exceeds a user-defined value.		Yes	ACDSS reverts to default TOD, when total failed detectors of a group exceeding a threshold.	Demonstration
2.1.1.0-2.0-4	1	The ASCT shall operate non-adaptively when a user-defined communications link fails.		Yes	ACDSS reverts to default TOD when critical intersections have COM failure.	Demonstration
2.1.1.0-3	5	The ASCT shall operate non-adaptively when a user manually commands the ASCT to cease adaptively controlling a group of signals.		4.7.0-3	Yes	The user can turn off an adaptive signal group and revert to default TOD when need as need.
2.1.1.0-4	5	The ASCT shall operate	The system operator needs to over-ride adaptive operation. When operator is advised of an incident that shall increase demand, the operator selects an appropriate flush plan. The operator shall schedule an ending time for the event. The flush plan shall remain in place until either	Yes		

		non-adaptively when a user manually commands the ASCT to cease adaptive operation.	the scheduled end time passes or the operator cancels the plan.		the adaptive operation for the entire area and revert to default TOD control.	
2.1.1.0-6	3	The ASCT shall operate non-adaptively when commanded by an external system process.	<p><i>4.17.0-2</i></p> <p>The system operator needs to react to commands issued by an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan shall remain in operation until the command from the external source is removed.</p>	Yes	External command has higher priority and shall override adaptive operation. This is accomplished by via TransSuite TCS Manual Override function	Demonstration
2.1.1.0-7	5	The ASCT shall alter the adaptive operation to achieve required objectives in user-specified conditions.	<p><i>4.1.0-1.0-1</i></p> <p>Maximize the throughput on coordinated routes</p> <p><i>4.1.0-1.0-3</i></p> <p>Distribute phase times in an equitable fashion</p> <p><i>4.1.0-3</i></p> <p>The system, or the operator, shall select the appropriate coordination objective, depending on the current traffic conditions. For example, during commuter peaks the primary objective may be to maximize the throughput along the road in the peak direction and at accommodate the turning movements at the freeway interchange. Then during the business hours the objective may be to balance delays between traffic associated with the adjacent activity and traffic simply traveling through the system.</p>	Yes	ACDSS supports multi-regime variable objective control. It handles over & unsaturated traffic seamlessly adjusting cycle, offset and split cyclically, providing delay minimization, equitable green time distribution, or queue management with increasing demands. ACDSS applies differentiated adaptive treatments to address geometric characteristics for freeway interchanges, arterials, and urban	Demonstration



					grids. Queue management can be activated at selected locations. Designated coordinated phase can be changed for special events.	
2.1.1.0-7.0-1	5	When current measured traffic conditions meet user-specified criteria, the ASCT shall alter the state of the signal controllers, maximizing the throughput of the coordinated route.	4.1.0-1.0-1	Yes	ACDSS can proactively identify capacity insufficiency and adjust cycle to provide the needed extra capacity for through movements or critical left turns. It also optimizes offsets to maximize throughput of the coordinated route (mainline direction). In oversaturated conditions, ACDSS shall seamlessly switch to queue management at critical intersections to prevent queue spillback and system break down.	Demonstration
			Maximize the throughput on coordinated routes			
			4.1.0-3			
			The system, or the operator, shall select the appropriate coordination objective, depending on the current traffic conditions. For example, during commuter peaks the primary objective may be to maximize the throughput along the road in the peak direction and at accommodate the turning movements at the freeway interchange. Then during the business hours the objective may be to balance delays between traffic associated with the adjacent activity and traffic simply traveling through the system.			
2.1.1.0-7.0-2	5	When current measured traffic conditions meet user-specified criteria, the ASCT shall alter the state of signal	4.1.0-1.0-4	Yes	For oversaturated traffic with cycle failures/queueing, ACDSS switches to queue management, balancing queue	Demonstration
			Manage the lengths of queues			



		controllers, preventing queues from exceeding the storage capacity at user-specified locations.			storage ratio to prevent spillbacks/capacity drops while minimizing gridlock potential at critical locations.	
2.1.1.0-7.0-3	3	When current measured traffic conditions meet user-specified criteria, the ASCT shall alter the state of signal controllers providing equitable distribution of green times.	4.1.0-1.0-3	Yes	Equitable distribution of green time is also known as "Webster Philosophy", only meaningful with unsaturated traffic to minimize average vehicle delay. ACDSS seamless handles unsaturated and oversaturated traffic. If unsaturated, ACDSS shall apply equitable distribution of green times (actually, v/c ratio, or equivalently but termed otherwise, phase saturation ratio) among conflicting movements.	Demonstration
			Distribute phase times in an equitable fashion			
			4.1.0-3			
			The system, or the operator, shall select the appropriate coordination objective, depending on the current traffic conditions. For example, during commuter peaks the primary objective may be to maximize the throughput along the road in the peak direction and at accommodate the turning movements at the freeway interchange. Then during the business hours the objective may be to balance delays between traffic associated with the adjacent activity and traffic simply traveling through the system.			
2.1.1.0-7.0-4	3	When current measured traffic conditions meet user-defined criteria, the ASCT shall alter the state of signal controllers providing	4.1.0-1.0-2	Yes	ACDSS can proactively identify the directional patterns such as EB/WB, or Balanced Patterns. If it is determined as Balanced Pattern,	Demonstration
			Provide smooth flow along coordinated routes			
			4.1.0-3			
			The system, or the operator, shall select the appropriate coordination objective,			



		two-way progression on a coordinated route.	depending on the current traffic conditions. For example, during commuter peaks the primary objective may be to maximize the throughput along the road in the peak direction and at accommodate the turning movements at the freeway interchange. Then during the business hours the objective may be to balance delays between traffic associated with the adjacent activity and traffic simply traveling through the system.		ACDSS shall alter the signals to achieve two-way progression on the coordinated route.	
2.1.1.0-7	5	The ASCT shall alter the state of the signal controllers based on current measured traffic conditions. (The alteration may be made by adjusting parameters or by directly controlling the state of signal controllers.)		Yes	See above	Demonstration
2.1.1.0-8	5	The ASCT shall provide maximum and minimum phase times	4.1.0-1.0-3 Distribute phase times in an equitable fashion	Yes	Each phase has minimum split as input. Maximum split time is implicitly determined from other phases min.	Demonstration
2.1.1.0-8.0-1	5	The ASCT shall provide a user-specified maximum value for each phase at each signal controller.		Yes	Max phase split is determined jointly by the minimum splits of phases of the same ring.	Demonstration
2.1.1.0-8.0-1.0-1	5	The ASCT shall not provide a phase length longer than the maximum value.		Yes	ACDSS shall not generate a phase split longer than the maximum value.	Demonstration
2.1.1.0-8.0-2	5	The ASCT shall provide a user-specified minimum value for each phase at each		Yes	Phase minimum is an explicit input of ACDSS.	Demonstration



		signal controller.				
2.1.1.0-8.0-2.0-1	5	The ASCT shall not provide a phase length shorter than the minimum value.		Yes	ACDSS shall not generate a phase split shorter than the min.	Demonstration
2.1.1.0-9	5	The ASCT shall detect repeated phases that do not serve all waiting vehicles. (These phase failures may be inferred, such as by detecting repeated max-out.)	4.1.0-4	Yes	ACDSS identifies repeated phases with residual queues by checking if the phase has been forced-off (i.e., keep extending till the allocated split time).	Demonstration
			At a small group of intersections, with the user defining one as being critical, while the adjacent intersections require a lower cycle length or progression must be provided for specific phases to minimize the formation of queues on the approaches to the critical intersection, the phase lengths of the critical intersection shall be determined by the system based on the current traffic conditions. The operation of the adjacent intersections shall then be set so that platoons departing the critical intersection are progressed through the non-critical intersections, or platoons arriving at the critical intersection do so at a time when they shall have little or no delay waiting for the appropriate phase.			
2.1.1.0-9.0-1	5	The ASCT shall alter operations, to minimize repeated phase failures.		Yes	When repeated phase failures are detected, ACDSS shall adjust the phase split, increase cycle, or perform queue management if the system has become oversaturated.	Demonstration
2.1.1.0-10	5	The ASCT shall determine the order of phases at a user-specified intersection. (The calculation shall be based on the optimization function.)	4.1.0-1.0-1	Yes	ACDSS shall determine the order of phases at user specified intersections by a feature called TP mapper, which allows phase sequences to be optimized based on the prevalent traffic patterns.	Demonstration
			Maximize the throughput on coordinated routes			
			4.1.0-1.0-2			
			Provide smooth flow along coordinated routes			
			4.1.0-1.0-4			
Manage the lengths of queues						



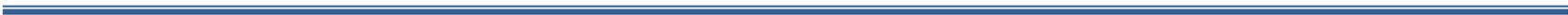
2.1.1.0-11	5	The ASCT shall provide coordination along a route.	4.1.0-8 The system operator needs to designate the coordinated route based on traffic conditions and the selected operational strategy.	Yes	Coordination along a route is specified a series of coordinated phases at each relevant signal.	Demonstration
2.1.1.0-11.0-1	3	The ASCT shall coordinate along a user-defined route.		Yes	ACDSS provides coord along a user-specified route.	Demonstration
2.1.1.0-11.0-2	3	The ASCT shall determine the coordinated route based on traffic conditions.		Yes	Coordinated route can be activated based on traffic conditions.	Demonstration
				Yes		
2.1.1.0-11.0-3	5	The ASCT shall determine the coordinated route based on a user-defined schedule.		Yes	Coordinated route can be activated based on user specified schedule.	Demonstration
				Yes		
2.1.1.0-11.0-4	5	The ASCT shall store a minimum of 20 user-defined coordination routes.		Yes	User defined coordination routes are stored at local controller db as timing plan patterns at each signal.	Demonstration
				Yes		
2.1.1.0-11.0-4.0-1	5	The ASCT shall implement a stored coordinated route by operator command.	Yes	The operator can command a stored coordinate route by activating a relevant pattern along the signals.	Demonstration	
			Yes			
2.1.1.0-11.0-4.0-2	4	The ASCT shall implement a stored coordinated route based on traffic	Yes	ACDSS implements a stored coordinate route by activating a relevant pattern on	Demonstration	
			Yes			



		conditions.			traffic conditions.	
2.1.1.0-11.0-4.0-3	5	The ASCT shall implement a stored coordinated route based on a user-defined schedule.		Yes	ACDSS implements a stored coordinate route by activating a relevant pattern on a user specified schedule.	Demonstration
				Yes		
2.1.1.0-12	5	The ASCT shall not prevent the use of phase timings in the local controller set by agency policy.	4.1.0-9 The system operator needs to set signal timing parameters (such as minimum green, maximum green and extension time) to comply with agency policies.	Yes	ACDSS doesn't prevent the agency specified phase timings in local controller.	Demonstration
<b>2.1.2</b>		<b>2.1.2 Allowable Phases</b>				
2.1.2.0-1	5	The ASCT shall not prevent protected/permissive left turn phase operation.	4.9.0-1.0-14 Protected/permissive phasing and alternate left turn phase sequences.	Yes	ACDSS does not prevent perm/prot left turn phases.	Demonstration
2.1.2.0-2	5	The ASCT shall not prevent the protected left turn phase to lead or lag the opposing through phase based upon user-specified conditions.		Yes	ACDSS selects the best phase sequence (lead/lag combinations) based on a prespecified set of sequence candidates.	Demonstration
2.1.2.0-3	5	The ASCT shall prevent skipping a user-specified phase when the user-specified phase sequence is operating.	4.9.0-1.0-6 The ability to maintain coordination with external movements by preventing phases from being skipped, or by omitting phases, based on time-of-day, external input or when certain phase sequences are in operation.	Yes	ACDSS prevents skipping a use specified phase by placing a phase min recall for that phase.	Demonstration
2.1.2.0-4	5	The ASCT shall prevent		Yes	User specified external	Demonstration



		skipping a user-specified phase based on the state of a user-specified external input.	4.17.0-2 The system operator needs to react to commands issued by TransSuite and future decision support system, such as an ICM system.		input (a special plan) shall override ACDSS adaptive command. This can be accomplished by using TransSuite TCS Manual Override functionality.	
2.1.2.0-5	3	The ASCT shall prevent skipping a user-specified phase according to a time of day schedule.	4.9.0-1.0-6 The ability to maintain coordination with external movements by preventing phases from being skipped, or by omitting phases, based on time-of-day, external input or when certain phase sequences are in operation.	Yes	This is accomplished by placing min recall to that phase on a time of day schedule.	Demonstration
2.1.2.0-6	1	The ASCT shall omit a user-specified phase when the cycle length is below a user-specified value.	4.9.0-1.0-5 Allow one or more phases to be omitted (disabled) under certain traffic conditions or signal states to allow a shorter cycle length to operate, or to provide additional time to other phases in the absence of calls to skipped phase(s).	Yes	This is accomplished by associating cycle length candidates with phase sequences.	Demonstration
2.1.2.0-7	5	The ASCT shall omit a user-specified phase based on measured traffic conditions.		Yes	If there is no call, a (non coordinated) phase shall be skipped.	Demonstration
2.1.2.0-8	1	The ASCT shall omit a user-specified phase based on the state of a user-specified external input.	4.17.0-2 The system operator needs to react to commands issued by TransSuite and future decision support system, such as an ICM system.	Yes	The user can use Manual Override via TransSuite TCS to command a special plan (that omits a phase). The special plan shall override ACDSS adaptive control commands.	Demonstration



2.1.2.0-9	3	The ASCT shall omit a user-specified phase according to a time of day schedule	4.9.0-1.0-5	Yes	This is accomplished by an ACDSS feature called TP mapper and associate the TP mapper with a schedule.	Demonstration	
			Allow one or more phases to be omitted (disabled) under certain traffic conditions or signal states to allow a shorter cycle length to operate, or to provide additional time to other phases.				
2.1.2.0-10	5	The ASCT shall assign unused time from a preceding phase that terminates early to a user-specified phase as follows:	4.9.0-1.0-10	Yes	This is configured using different force-off modes (floating force off or fixed force off) at individual controller level to specify whether the extra green is returned to next coordinated phase, or next phase in the same ring.	Demonstration	
			Allow the operator to specify which phase receives unused time from a preceding phase				* Next phase;
							* Next coordinated phase;
							* User-specified phase.
2.1.2.0-11	5	The ASCT shall assign unused time from a preceding phase that is skipped to a user-specified phase as follows:		Yes	Unused green due to preceding phase skipping shall be returned to user designated phases according to the specified force-off mode (fixed force off or floating force off).	Demonstration	
							* Previous phase;



		* Next phase;				
		* Next coordinated phase;				
		* User-specified phase.				
2.1.2.0-12	4	The ASCT shall not alter the order of phases at a user-specified intersection	<p>4.1.0-7</p> <p>The system operator needs to fix the sequence of phases at any specified location. For example, the operator may need to fix the phase order at a diamond interchange.</p>	Yes	The position can be held by the specified phase sequence subject to the relevant ring-barrier structure.	Demonstration
<b>2.1.3</b>		<b>2.1.3 Oversaturation</b>				
2.1.3.0-1	5	The ASCT shall detect the presence of queues at pre-configured locations, particularly at the I-17 Interchange.	<p>4.1.0-1.0-4</p> <p>Manage the lengths of queues</p> <p>4.1.0-1.0-5</p> <p>Manage the locations of queues within the network</p> <p>4.1.0-4</p> <p>At a small group of intersections, with the user defining one as being critical, while the adjacent intersections require a lower cycle length or progression must be provided for specific phases to minimize the formation of queues on the approaches to the critical intersection, the phase lengths of the critical intersection shall be determined by the system based on the current traffic conditions. The operation of the adjacent intersections shall then be set so that platoons departing the critical intersection are progressed through the non-critical intersections, or platoons arriving at the</p>	Yes	ACDSS relies on advance detectors to identify queues. Shockwave theory is utilized to predict queue dynamics and identify existing queue.	Demonstration



			critical intersection do so at a time when they shall have little or no delay waiting for the appropriate phase.			
2.1.3.0-2	5	When queues are detected at user-specified locations, the ASCT shall execute user-specified timing plan/operational mode.	4.5.0-1	Yes	ACDSS performs queue balancing and queue management when queues are identified at specified locations.	Demonstration
			The system operator needs to detect queues from outside the system and modify the ASCT operation to accommodate the queuing.			
			4.5.0-2			
			The system operator needs to detect queues within the system's boundaries and modify the ASCT operation to accommodate the queuing.			
			4.5.0-3			
			The system operator needs to detect queues propagating outside its boundaries from within the ASCT boundaries, and modify its operation to accommodate the queuing.			
4.5.0-5	The system operator needs to prevent queues forming at the Bell Road / I-17 Interchange.					
2.1.3.0-3	3	When queues are detected at user-specified locations, the ASCT shall execute user-specified adaptive strategy		Yes	Strategy (e.g. diamond control, left turn treatment, gating, queue balance) can be activated on detected queue	Demonstration



2.1.3.0-4	5	When queues are detected at user-specified locations, the ASCT shall omit a user-specified phase at a user-specified signal controller.	4.1.0-1.0-4	Yes	ACDSS shall possibly omit a user-specified phase to provide the needed capacity for other phases, or as part of a systematic oversaturated control strategy. ACDSS can apply diamond interchange control logic for off ramps traffic, special phase sequence for queueing left turns, or systematic queue management to handle queues at specified locations.	Demonstration
			Manage the lengths of queues			
			4.1.0-1.0-5			
			Manage the locations of queues within the network			
			4.1.0-4			
At a small group of intersections, with the user defining one as being critical, while the adjacent intersections require a lower cycle length or progression must be provided for specific phases to minimize the formation of queues on the approaches to the critical intersection, the phase lengths of the critical intersection shall be determined by the system based on the current traffic conditions. The operation of the adjacent intersections shall then be set so that platoons departing the critical intersection are progressed through the non-critical intersections, or platoons arriving at the critical intersection do so at a time when they shall have little or no delay waiting for the appropriate phase.						
4.5.0-5	The system operator needs to prevent queues forming at the Bell Road / I-17 Interchange.					
<b>2.2</b>		<b>2.2 Sequence-based Adaptive Coordination</b>				
2.2.0-2	5	The ASCT shall select cycle length based on	4.1.0-1.0-1	Yes	ACDSS supports selecting cycle length	Demonstration
			Maximize the throughput on coordinated			

		a time of day schedule at user-specified signal controllers.	<p>routes</p> <p>4.1.0-1.0-2</p> <p>Provide smooth flow along coordinated routes</p> <p>4.1.0-1.0-3</p> <p>Distribute phase times in an equitable fashion</p> <p>4.1.0-1.0-4</p> <p>Manage the lengths of queues</p>		based on a time of day schedule. Depending on the schedule, applicable cycle lengths vary.	
2.2.0-3	5	The ASCT shall calculate phase lengths for all phases at each signal controller to suit the current coordination strategy.	<p>4.1.0-1.0-3</p> <p>Distribute phase times in an equitable fashion</p> <p>4.1.0-1.0-5</p> <p>Manage the locations of queues within the network</p> <p>4.1.0-4</p> <p>At a small group of intersections, with the user defining one as being critical, while the adjacent intersections require a lower cycle length or progression must be provided for specific phases to minimize the formation of queues on the approaches to the critical intersection, the phase lengths of the critical intersection shall be determined by the system based on the current traffic conditions. The operation of the adjacent intersections shall then be set so that platoons departing the critical intersection are progressed through the non-critical intersections, or platoons arriving at the critical intersection do so at a time when they shall have little or no delay waiting for</p>	Yes	ACDSS performs cycle, offset and split optimization. For a given cycle, phase splits and offset are optimized to provide the needed bandwidth and progression for the current directional pattern (e.g., EB, WB or Balanced).	Demonstration



			the appropriate phase.			
2.2.0-4	5	The ASCT shall calculate offsets to suit the current coordination strategy for the user-specified reference point for each signal controller along a coordinated route within a group.	4.1.0-1.0-1	Yes	Offset can be optimized for progression along the coordinated arterial. The anchor point (reference point) can be user specified.	Demonstration
			Maximize the throughput on coordinate routes			
			4.1.0-1.0-2			
			Provide smooth flow along coordinated routes			
			4.1.0-1.0-4			
Manage the lengths of queues						
2.2.0-4.0-1	5	The ASCT shall apply offsets for the user-specified reference point of each signal controller along a coordinated route.		Yes	The optimized offset is implemented at each signal controller along the coordinated route.	Demonstration
2.2.0-5	1	The ASCT shall calculate a cycle length for each cycle based on its optimization objectives (as required elsewhere, e.g., progression, queue management, equitable distribution of green).	4.1.0-1.0-1	Yes	For a new cycle, ACDSS shall hold on that cycle for a user specified period, e.g., 10 min. The system is snappier to increase from short to long cycle (e.g, 90 to 105), but shall drop cycle slowly with decreasing demand.	Demonstration
			Maximize the throughput on coordinate routes			
			4.1.0-1.0-2			
			Provide smooth flow along coordinated routes			



2.2.0-5.0-1	5	The ASCT shall limit cycle lengths to user-specified values.	4.1.0-1.0-3	Yes	The user can specify the set of candidate cycle lengths.	Demonstration
			Distribute phase times in an equitable fashion			
			4.1.0-1.0-4			
			Manage the lengths of queues			
2.2.0-5.0-2	3	The ASCT shall limit cycle lengths to a user-specified range.		Yes	The user can specify the range of candidate cycle lengths.	
2.2.0-5.0-3	1	The ASCT shall calculate optimum cycle lengths according to the user-specified coordination strategy.		Yes	Cycle lengths are determined based on the objective and whether queue management is activated or not.	Demonstration
2.2.0-5.0-4	5	The ASCT shall limit changes in cycle length to a user-specified value.		Yes	The user can limit the changes (delta) in cycle length.	Demonstration
2.2.0-5.0-4.0-1	4	The ASCT shall increase the limit for the following 1 cycle based on a change in conditions		No	This is not supported as part of ACDSS logic.	
2.2.0-5.0-4.0-1.0-1	4	The change in conditions shall be defined by 2 successive adaptive increases in cycle length at the maximum rate.		No	This is not supported as part of ACDSS logic.	
2.2.0-5.0-4.0-1.0-2	5	The increase shall be user-defined.		No	This is not supported as part of ACDSS logic.	Demonstration
2.2.0-5.0-5	4	The ASCT shall adjust	4.1.0-5	Yes	Offset s are adjusted	Demonstration

		offsets to minimize the chance of stopping vehicles approaching a signal that have been served by a user-specified phase at an upstream signal.	The system operator needs to minimize the chance that a queue forms at a specified location.		for an intended progression pattern for primary platoons while facilitating secondary platoons.	
<b>2.3</b>		<b>2.3 Non-sequence-based adaptive coordination</b>	<b>NOT USED</b>			
<b>2.4</b>		<b>2.4 Single intersection adaptive operation</b>	<b>NOT USED</b>			
<b>2.5</b>		<b>2.5 Phase-based adaptive coordination</b>	<b>NOT USED</b>			
<b>2.6</b>		<b>2.6 Responsiveness</b>				
2.6.0-1	3	The ASCT shall limit the change in consecutive cycle lengths to be less than a user-specified value.	<i>4.8.0-1</i> The system operator needs to modify the ASCT operation to closely follow changes in traffic conditions.	No	The cycle is bounded by the range and candidate values, though, there is no user specified limit of the delta.	
2.6.0-2	3	The ASCT shall limit the change in phase times between consecutive cycles to be less than a user-specified value. (This does not apply to early gap-out or actuated phase skipping.)		No	The phase duration is bounded by the min and max, there is no user specified limit on the delta.	
2.6.0-3	5	The ASCT shall limit the changes in the direction of primary		Yes	The optimization frequency can be up to every 1 cycle.	Demonstration
			<i>4.8.0-2</i>			



		coordination to a user-specified frequency.	The system operator needs to constrain the selection of cycle lengths to those that provide acceptable operations, such as when resonant progression solutions are desired.			
2.6.0-4	5	When a large change in traffic demand is detected, the ASCT shall respond more quickly than normal operation, subject to user-specified limits.	4.8.0-3	Yes	The fastest response would be next local zero with new cycle length, offset and/or splits.	Demonstration
			The system operator needs to respond quickly to sudden large shifts in traffic conditions.			
2.6.0-5	5	The ASCT shall select cycle length from a list of user-defined cycle lengths at user-specified locations.	4.8.0-2	Yes	The user can specify the list of candidate cycle lengths.	Demonstration
			The system operator needs to constrain the selection of cycle lengths to those that provide acceptable operations, such as when resonant progression solutions are desired.			
<b>3</b>		<b>3 External/Internal Interfaces</b>				
3.0-1		The ASCT shall support external interfaces according to the referenced interface control documents and the following detailed requirements. Interface requirements include:				
	5	· Information layer protocol	4.3.0-1		ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Demonstration
			The system operator needs to adaptively	Yes		



			control signals operated by the City of Phoenix and ADOT.			
	5	· Application layer protocol	4.3.0-2	Yes	ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Demonstration
			The system operator needs to send data to another system that would allow the other system to coordinate with the ASCT system.			
	5	· Lower layer protocol	4.3.0-4		ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Demonstration
			The system operator needs to receive data from another system that shall allow the ASCT system to coordinate its operation with the adjacent system.	Yes		
	5	· Data aggregation	4.11.0-5			Demonstration
			The system operator needs to report performance data in real time to TransSuite and Regional Archived Data System (RADS).	Yes	ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	
	5	· Frequency of storage	4.17.0-2		ACDSS is TransSuite TCS adaptive module. This is implemented at TransSuite level.	Demonstration
	5	· Frequency of reporting	The system operator needs to react to commands issued by TranSuite and future decision support system, such as an ICM system.			
	5	· Duration of storage		Yes		
3.0-1.0-1	5	The ASCT shall send	4.3.0-2	Yes	ACDSS is integrated	Demonstration



		operational data to TranSuite and Regional Archived Data System (RADS).	The system operator needs to send data to another system that would allow the other system to coordinate with the ASCT system.		adaptive control module of TransSuite. All operational data are sent to TransSuite. TransSuite sends controller status and detector data to ACDSS, and ACDSS returns optimized signal timing back to TransSuite. TransSuite then downloads the optimized timing in field controllers via NTCIP.	
			4.11.0-5			
			The system operator needs to report performance data in real time to TranSuite and Regional Archived Data System (RADS).			
3.0-1.0-2	5	The ASCT shall send control data to TranSuite.	4.3.0-2	Yes	ACDSS is TransSuite TCS adaptive module. All control data is sent to TransSuite and implemented by the latter.	Demonstration
			The system operator needs to send data to another system that would allow the other system to coordinate with the ASCT system.			
3.0-1.0-3	5	The ASCT shall send monitoring data to TranSuite.	4.11.0-1	Yes	ACDSS is part of TransSuite. ACDSS archives all monitoring data in dedicated database.	Demonstration
			The agency needs TranSuite to be able to monitor the ASCT system automatically.			
3.0-1.0-4	5	The ASCT shall send coordination data to TranSuite.	4.3.0-2	Yes	ACDSS as an adaptive control module controls signals through TransSuite. All data and control are via TransSuite.	Demonstration
			The system operator needs to send data to another system that would allow the other system to coordinate with the ASCT system.			
3.0-1.0-5	5	The ASCT shall send	4.11.0-5	No	ACDSS logs all the	Demonstration

		performance data to TranSuite and Regional Archived Data System (RADS).	The system operator needs to report performance data in real time to TranSuite and Regional Archived Data System (RADS).		performance data in its own database	
3.0-1.0-6	5	The ASCT shall receive commands from TranSuite or a future decision support system, such as an ICM system.	4.17.0-2 The system operator needs to react to commands issued by TranSuite and future decision support system, such as an ICM system.	Yes	As TransSuite adaptive module, ACDSS receives commands via adaptive control web service interface.	Demonstration
3.0-1.0-7	5	The ASCT shall implement the following commands from the TranSuite external system when commanded:	4.17.0-2	Yes	As TransSuite module, ACDSS support all these.	Demonstration
		· Specified cycle length	The system operator needs to react to commands issued by TranSuite and future decision support system, such as an ICM system.			
		· Specified direction of progression				
		· Specified adaptive strategy				
<b>4</b>		<b>4 Crossing Arterials and Boundaries</b>				
4.0-1	5	The ASCT shall conform its operation to an external system's operation.	4.3.0-4 The system operator needs to receive data from another system that shall allow the ASCT system to coordinate its operation with the adjacent system.	Yes	TransSuite can perform "Manual Override" to issue commands to an adaptive signal overriding ACDSS decisions.	Demonstration
			4.3.0-6 The system operator needs to detect traffic approaching from a neighboring system and coordinate the ASCT operation with the adjacent system. The agency			



			needs the adaptive system to maintain coordination with another adjacent system by sensing arriving traffic.			
			4.17.0-2			
			The system operator needs to react to commands issued by TranSuite and future decision support system, such as an ICM system.			
4.0-1.0-1	5	The ASCT shall alter its operation to minimize interruption of traffic entering the system. (This may be achieved via detection, with no direct connection to the other system)	4.3.0-4	Yes	ACDSS can apply gating/metering strategies to smooth the traffic entering the system.	Demonstration
			The system operator needs to receive data from another system that shall allow the ASCT system to coordinate its operation with the adjacent system.			
			4.3.0-6			
			The system operator needs to detect traffic approaching from a neighboring system and coordinate the ASCT operation with the adjacent system. The agency needs the adaptive system to maintain coordination with another adjacent system by sensing arriving traffic.			
4.0-1.0-2	5	The ASCT shall be based on a fixed cycle length to match an adjacent system at user-specified intersections.	4.3.0-5	Yes	At selected locations, the cycle length can be "locked" to match adjacent systems.	Demonstration
			The system operator needs to constrain the adaptive system to operate a cycle length compatible with the crossing arterial. The agency needs the adaptive system to maintain coordination with another adjacent system by using constraints on cycle length.			
4.0-1.0-3	3	The ASCT shall alter its operation based on data received from another system.	4.3.0-4	Yes	ACDSS can adjust signals based on detection data from another system.	Demonstration
			The system shall accept data from a neighboring system that allows it to stay in coordination with the adjacent system			

			while still operating in adaptive mode.			
4.0-1.0-4	2	The ASCT shall support adaptive coordination on crossing routes.	<p>4.3.0-3</p> <p>The system operator needs to adaptively coordinate signals on two crossing routes simultaneously. A coordinated group shall be able to include more than one coordinated route, such as two crossing arterials. The system shall be able to maintain coordination along both roads. The crossing arterials in this area are 19th Avenue and 35th Avenue.</p>	Yes	This is handled by ACDSS grid network control logic.	Demonstration
<b>5</b>		<b>5 Access and Security</b>				
5.0-1		The ASCT shall be implemented with a security policy that addresses the following selected elements:	<p>4.4.0-1</p> <p>The system operator needs to have a security management and administrative system that allows access and operational privileges to be assigned, monitored and controlled by an administrator, and conform to the agency's access and network infrastructure security policies.</p>			
5.0-1.0-1	5	Local access to the ASCT.	External to the controller cabinet, information flowing in or out shall be encrypted	Yes	This is supported via TransSuite	Demonstration
5.0-1.0-2	5	Remote access to the ASCT.		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-3	5	System monitoring.		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-4	5	System manual override.		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-5	5	Development		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-6	5	Operations		Yes	This is supported via	Demonstration

					TransSuite	
5.0-1.0-7	5	User login		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-8	5	User password		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-9	5	Administration of the system		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-10	5	Signal controller group access		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-11	5	Access to classes of equipment		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-12	5	Access to equipment by jurisdiction		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-13	5	Output activation		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-14	5	System parameters		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-15	5	Report generation		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-16	5	Configuration		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-17	5	Security alerts		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-18	5	Security logging		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-19	5	Security reporting		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-20	5	Database		Yes	This is supported via TransSuite	Demonstration
5.0-1.0-21	5	Signal controller		Yes	This is supported via TransSuite	Demonstration
5.0-2		The ASCT shall provide monitoring and control access at the				



		following locations:				
5.0-2.0-1	5	City of Phoenix TMC located at 200 West Washington Street, Phoenix, AZ 85003	4.10.0-1.0-1 Agency TMC	Yes	ACDSS shall be running from a central server at the TMC. Monitoring and control access are via remote desktop.	Demonstration
5.0-2.0-2	5	User-specified locations	4.10.0-1.0-2 Maintenance facility	Yes	ACDSS shall be running from a central server at the TMC. Monitoring and control access are via remote desktop.	Demonstration
5.0-2.0-3	5	Workstations on agency LAN or WAN located at City of Phoenix traffic signal shop located at 2141 E Jefferson St, Phoenix, AZ 85009	4.10.0-1.0-3 Workstations on agency LAN or WAN	Yes	ACDSS shall be running from a central server at the TMC. Monitoring and control access are via remote desktop.	Demonstration
5.0-2.0-4	5	ADOT TOC located at 2302 West Durango Street, Phoenix, AZ 85009	4.10.0-1.0-4 Other agency's TMC	Yes	ACDSS shall be running from a central server at the TMC. Monitoring and control access are via remote desktop.	Demonstration
5.0-2.0-5	5	Local controller cabinets	4.10.0-1.0-5 Local controller cabinets	Yes	This is via TransSuite TCS	Demonstration
5.0-3	5	The ASCT shall comply	4.4.0-1	Yes	As TransSuite module,	Demonstration

		with the agency's security policy as described in City of Phoenix IT Standards.	<p>The system operator needs to have a security management and administrative system that allows access and operational privileges to be assigned, monitored and controlled by an administrator, and conform to the agency's access and network infrastructure security policies.</p> <p>The adaptive processor/server shall be protected within the agency's firewalls. The IT Department shall provide resources, equipment and system management so that operators shall have appropriate access to the system locally, from within the agency's LAN and from remote locations.</p>		this is transparently handled by TransSuite TCS.	
5.0-4	5	The ASCT shall not prevent access to the local signal controller database, monitoring or reporting functions by any installed signal management system.	<p>4.10.0-2</p> <p>The operator needs to access to the database management, monitoring and reporting features and functions of the signal controllers and any related signal management system from the access points defined for those system components.</p>			Demonstration
<b>6</b>		<b>6 Data Log</b>				
6.0-1		The ASCT shall log the following events:	<p>4.11.0-6</p> <p>The system operator needs to be able to report the exact state of signal timing and input data for a specified period, to allow historical analysis of the system operation.</p>			
6.0-1.0-1	5	Time-stamped vehicle phase calls		Yes	This is managed by TransSuite TCS	Demonstration
6.0-1.0-2	5	Time-stamped pedestrian phase calls		Yes	This is managed by TransSuite TCS	Demonstration
6.0-1.0-3	5	Time-stamped		Yes	This is managed by	Demonstration



		emergency vehicle preemption calls			TransSuite TCS	
6.0-1.0-6	5	Time-stamped start and end of each phase		Yes	ACDSS logs this type of data.	Demonstration
6.0-1.0-7	5	Time-stamped controller interval changes		Yes	ACDSS logs this type of data.	Demonstration
6.0-1.0-8	5	Time-stamped start and end of each transition to a new timing plan		Yes	ACDSS logs this type of data.	Demonstration
6.0-2	5	The ASCT shall export its systems log in the following formats:	4.11.0-4	Yes	System log export in Excel, Text or CSV format supported.	Demonstration
		* MS Excel	The system operator needs to store all operational data and signal timing parameters calculated by the adaptive system, and export selected data to a City of Phoenix TMC server using remote access from TMC.			
		* Text				
		* CSV				
6.0-3	5	The ASCT shall store the event log for a minimum of 31 days.		Yes	Event logs are archived from 1 month to permanent	Demonstration
6.0-4	5	The ASCT shall store results of all signal timing parameter calculations for a minimum of 31 days.	4.11.0-2	Yes	Calculations are archived from 1 month to permanent	Demonstration
			The system operator needs to store and report data used to calculate signal timing and have the data available for subsequent analysis.			
			4.11.0-3			
		The system operator needs to store and report data that can be used to measure traffic performance under adaptive control.				
6.0-5	5	The system shall store the following measured data in the	4.11.0-2	No	This is not fully supported by current version of ACDSS but	Demonstration

		form used as input to calculations for a minimum of 31 days:			the following shall be supported in the next release by	
		* Volume by movement	The system operator needs to store and report data used to calculate signal timing and have the data available for subsequent analysis.		by the end of Q1, 2016.	
		* Occupancy	4.11.0-3			
		* Queue length * Wait time / delay on side streets * % Arrivals on Green / Red * Phase Failure * Green Utilization * Time in Transition * V/C Ratio	The system operator needs to store and report data that can be used to measure traffic performance under adaptive control. 4.11.0-7 Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.		Currently support Volume, Occupancy and Queue Length (estimated)	
6.0-6	1	The ASCT system shall archive all data automatically after a user-specified period not less than 31 days.	4.11.0-4 The system operator needs to store all operational data and signal timing parameters calculated by the adaptive system, and export selected data to a City of Phoenix TMC server using remote access from TMC.	Yes	ACDSS archives all the data minimum 1 month.	Demonstration
6.0-7	5	The ASCT shall provide data storage for a system size of 8 signal controllers. The data to be stored shall include the following:			All these data are archived for a minimum 1 month time.	Demonstration
		* Controller state data				
		* Reports				
		* Log data				
		* Security data				



		* ASCT parameters				
6.0-8	5	The ASCT shall calculate and report relative data quality including:	4.11.0-7	Yes	ACDSS/TransSuite TCS shall generate report on the required items.	Demonstration
		* The extent data is affected by detector faults	Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.			
		* Communication faults between ASCT devices or TMC				
		* Local system faults				
6.0-9	5	The ASCT shall report comparisons of logged data when requested by the user:		Yes	This functionality is provided through TransSuite TCS console.	Demonstration
		* Day to day				
		* Hour to hour				
		* Hour of day to hour of day				
		* Hour of week to hour of week				
		* Day of week to day week				
		* Day of year to day of year				
6.0-10	5	The ASCT shall store data logs in a standard database.	4.11.0-4	Yes	All data are stored in SQL-2003 compatible standard database.	Demonstration
			The system operator needs to store all operational data and signal timing parameters calculated by the adaptive system, and export selected data to a City of Phoenix TMC server using remote access from TMC.			



6.0-11	5	The ASCT shall report stored data in a form suitable to provide explanations of system behavior to troubleshoot the system.	4.11.0-7	Yes	The data are reported by a dashboard and can be exported as separate files.	Demonstration
			Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.			
<b>7</b>		<b>7 Advanced Controller Operation</b>				
7.0-1	5	When specified by the user, the ASCT shall display a vehicle phase more than once for each time the coordinated phase is served.	4.9.0-1.0-1	Yes	This is configured at the controller level to enable phase reservice.	Demonstration
			Service a phase more than once per cycle, such as running a left turn phase before and after its opposing through movement			
7.0-2	5	The ASCT shall provide a minimum of eight phase overlaps.	4.9.0-1.0-2	Yes	This is configured at the controller level as supported by the controller firmware.	Demonstration
			Operate at least eight overlap phases			
7.0-3	5	The ASCT shall accommodate a minimum of eight phases at each signal	4.9.0-1.0-3	Yes	This is configured at the controller level as supported by the controller firmware.	Demonstration
			Operate three rings, eight phases and up to two phases per ring.			
7.0-4	5	The ASCT shall accommodate a minimum of three rings at each signal.		Yes	This is configured at the controller level as supported by the controller firmware.	Demonstration
7.0-5	5	The ASCT shall accommodate a minimum of two phases per ring		Yes	This is configured at the controller level as supported by the controller firmware.	Demonstration
7.0-6	5	The ASCT shall provide a minimum of eight	4.1.0-6	Yes	This is configured at the controller level as	Demonstration
			The system operator needs to modify the			



		different user-defined phase sequences for each signal.	sequence of phases to support the various operational strategies.		supported by the controller firmware.	
			<i>4.9.0-1.0-4</i>			
			Permit different phase sequences under different traffic conditions or by time-of-day			
7.0-6.0-1	5	Each permissible phase sequence shall be user-assignable to any signal timing plan.		Yes	This is configured at the controller level as supported by the controller firmware.	Demonstration
7.0-6.0-2	5	Each permissible phase sequence shall be executable by a time of day schedule.		Yes	Permissible phase sequence can be set to run on a TOD schedule	Demonstration
7.0-6.0-3	5	Each permissible phase sequence shall be executable based on measured traffic conditions		Yes	Permissible phase sequence can be selected based on traffic conditions.	Demonstration
7.0-7	3	The ASCT shall not prevent a phase/overlap output by time-of-day.	<i>4.1.0-6</i>	Yes	Phase /overlap is not prevented by time of day.	Demonstration
			The system operator needs to modify the sequence of phases to support the various operational strategies.			
7.0-8	3	The ASCT shall not prevent a phase/overlap output based on an external input.	<i>4.17.0-2</i>	Yes	ACDSS does not prevent phase/overlap based on an external input.	Demonstration
			The system operator needs to react to commands issued by TranSuite and future decision support system, such as an ICM system.			
7.0-9	4	The ASCT shall not prevent user-specified phases to be designated as coordinated phases.	<i>4.1.0-6</i>	Yes	ACDSS does not prevent user-specified phases to be designated as coordinated phases.	Demonstration
			The system operator needs to modify the sequence of phases to support the various operational strategies.			
			<i>4.9.0-1.0-9</i>			



			Allow any phase to be designated as the coordinated phase			
7.0-10	5	The ASCT shall have the option for a coordinated phase to be released early based on a user-definable point in the phase or cycle. (User selected phase or cycle.)	4.9.0-1.0-12	Yes	Early return to green can be adjusted by selecting fixed force-off or floating force-off.	Demonstration
			Allow the coordinated phase to terminate early under prescribed traffic conditions			
7.0-11	3	The ASCT shall not prevent the controller from displaying flashing yellow arrow left turn.	4.9.0-1.0-15	Yes	FLA is not prevented.	Demonstration
			Use flashing yellow arrow to control permissive left turns.			
7.0-13	5	When adaptive operation is used in conjunction with normal coordination, the ASCT shall not prevent a controller serving a cycle length different from the cycles used at adjacent intersections.	4.9.0-1.0-16	Yes	ACDSS does not prevent a controller to run a cycle different from adjacent intersections, if configured as such.	Demonstration
			Service side streets and pedestrian phases at minor locations more often than at adjacent signals when this can be done without compromising the quality of the coordination. (E.g., double-cycle mid-block pedestrian crossing signals.)			
<b>8</b>		<b>8 Pedestrians</b>				
8.0-2	5	When the pedestrian phase is called, the ASCT shall accommodate pedestrian crossing times during adaptive operations.	4.6.0-2	Yes	Pedestrian WK + FLDW has higher priority over adaptive timing. If WK+FLDW is longer than the current adaptive timing, WK+FLDW shall be	Demonstration
			The system operator needs to accommodate infrequent pedestrian operation while maintaining adaptive operation. (This is appropriate for pedestrian calls that are common but not so frequent that they drive the operational			

			needs.)		honored.	
			4.6.0-3			
			The system operator needs to incorporate frequent pedestrian operation into routine adaptive operation. (This is appropriate when pedestrians are frequent enough that they must be assumed to be present every cycle or nearly every cycle.)			
8.0-3	5	The ASCT shall execute user-specified exclusive pedestrian phases during adaptive operation.	4.6.0-1	Yes	User specified exclusive pedestrian phases can be actuated and serviced during adaptive operations upon ped calls.	Demonstration
			The system operator needs to accommodate infrequent pedestrian operation and then adaptively recover. (This is appropriate for rare pedestrian calls.)			
8.0-5	5	The ASCT shall have the option for a phase to start late, when there is not a pedestrian call for that phase, provided the minimum green time is available.	4.6.0-3	Yes	Pedestrian phase can start late as long as there is sufficient time remaining on the compatible vehicle phase. This is subject to the controller firmware.	Demonstration
			The system operator needs to incorporate frequent pedestrian operation into routine adaptive operation. (This is appropriate when pedestrians are frequent enough that they must be assumed to be present every cycle or nearly every cycle.)			
<b>9</b>		<b>9 Special Functions</b>				
9.0-1	3	The ASCT shall set a specific state for each special function output based on the occupancy on a user-specified detector.	4.9.0-1.0-11	Yes	This is supported via TransSuite	Demonstration
			Allow the controller to respond independently to individual lanes of an approach. This may be implemented in the signal controller using extension/passage timers, which may be assignable to each vehicle detector input channel. This may			



			allow the adaptive operation to be based on data from a specific detector, or by excluding specific detectors.			
9.0-2	3	The ASCT shall set a specific state for each special function output based on the current cycle length.	4.17.0-1 The system operator needs to be able to turn on signs that control traffic or provide driver information when specific traffic conditions occur, when needed to support the adaptive operation, when congestion is detected at critical locations or according to a time-of-day schedule	Yes	This is supported via TransSuite	Demonstration
9.0-3	3	The ASCT shall set a specific state for each special function output based on a time-of-day schedule.		Yes	This is supported via TransSuite	Demonstration
<b>10</b>		<b>10 Detection</b>				
10.0-1	4	The ASCT shall be compatible with the following detector technologies:		Yes	ACDSS support any detector technology as long as volume and occupancy data are provided.	Demonstration
		* Existing Inductive Loops				
		* Existing Video				
		* Furnished Detection				
<b>11</b>		<b>11 EV Pre-emption</b>				
11.0-2	3	The ASCT shall maintain adaptive operation at non-preempted intersections during emergency vehicle preemption.	4.13.0-2 The system operator needs to accommodate emergency vehicle preemption. The City of Phoenix and ADOT use intersection-based preemption. The request is received at the controller directly from the emergency vehicle.	Yes	Non-preempted intersections shall operate normal adaptive operations.	Demonstration
11.0-4	5	The ASCT shall operate		Yes	Special function that	Demonstration



		normally at non-preempted signal controllers when special functions are engaged by a preemption event. (An example of such a special functions is a phase omit, a phase maximum recall or a fire route.)			omits phase or put a max recall shall not impact normal adaptive operation.	
11.0-6	5	The ASCT shall return to normal adaptive operation when preemption of a signal controller is released.		Yes	Adaptive operation shall be resumed when preemption is released.	Demonstration
11.0-7	1	The ASCT shall preempt a user-specified group of signal controllers when a user-specified preemption is requested.		Yes	Preemption always has higher priority than adaptive operations. ACDSS supports preempting signal groups.	Demonstration
11.0.8	5	The ASCT shall not prevent the local signal controller from operating in normally detected limited-service actuated mode during preemption.		Yes	ACDSS doesn't prevent local actuated mode.	Demonstration
<b>12</b>		<b>12 Transit Priority</b>	<b>NOT USED</b>			
<b>13</b>		<b>13 Failure Events and Fallback</b>				
<b>13.1</b>		<b>13.1 Detector Failure</b>				



13.1.0-1	5	The ASCT shall take user-specified action in the absence of valid detector data from a user-specified number of vehicle detectors within a group.	4.14.0-1 The system operator needs to fall back to TOD operation without causing disruption to traffic flow, in the event of equipment, communications and software failure. The system shall recognize a detector failure and take appropriate action to accommodate the missing data. For a local detector failure, the local controller shall place a soft recall or maximum recall (to be user-specified) on the appropriate phase, and issue an alarm. For a detector that influences the adaptive operation (e.g., a system detector), the system shall use historical data from the failed detector, from a period that can reliably be expected to be similar to the current period. If the number of detector failures within a specified group exceeds a user-specified threshold, the system shall cease adaptive operation and go to a fallback operation specified by the user (such as time-of-day operation or free operation). The fallback operation shall be specified by the user based on location and time of day.			
13.1.0-1.0-1	5	The ASCT shall release control to central system control.				
13.1.0-1.0-2	2	The ASCT shall release control to local operations to operate under its own time-of-day schedule.				
13.1.0-2	2	The ASCT shall use the following alternate data sources for operations in the absence of the real-time data from a detector: Stored historical data from the failed detector.				
13.1.0-2.0-3	5	The ASCT shall switch to the alternate source in real time without operator intervention.				
13.1.0-3	5	In the event of a detector failure, the ASCT shall issue an alarm to user-specified recipients. (This	4.12.0-1			
			The system operator needs to immediately notify maintenance and operations staff of alarms and alerts.			
			4.12.0-2			



		requirement may be fulfilled by sending the alarm to a designated list of recipients by a designated means, or by using an external maintenance management system.)	The system operator needs to immediately and automatically pass alarms and alerts to the TranSuite and Regional Archived Data System (RADS).			
13.1.0-4	5	In the event of a failure, the ASCT shall log details of the failure in a permanent log.	4.12.0-3 The system operator needs to maintain a complete log of alarms and failure events.			
13.1.0-5	5	The permanent failure log shall be searchable, archivable, and exportable.				
<b>13.2</b>		<b>13.2 Communications Failure</b>				
13.2-1	5	The ASCT shall execute user-specified actions when communications to one or more signal controllers fails within a group.	4.14.0-1 The system operator needs to fall back to TOD operation without causing disruption to traffic flow, in the event of equipment, communications and software failure.			
13.2-1.0-1	5	In the event of loss of communication to a user-specified signal controller, the ASCT shall release control of all signal controllers within a user-specified group to local control.				
13.2-1.0-2	5	The ASCT shall switch				



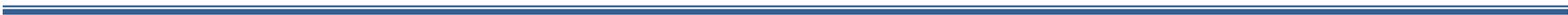
		to the alternate operation in real time without operator intervention.				
13.2-2	5	In the event of communications failure, the ASCT shall issue an alarm to user-specified recipients. (This requirement may be fulfilled by sending the alarm to a designated list of recipients by a designated means, or by using an external maintenance management system.)	<p><i>4.12.0-1</i></p> <p>The system operator needs to immediately notify maintenance and operations staff of alarms and alerts.</p> <p><i>4.12.0-2</i></p> <p>The system operator needs to immediately and automatically pass alarms and alerts to the TranSuite and Regional Archived Data System (RADS).</p>			
13.2-3	5	The ASCT shall issue an alarm within 1 minute of detection of a failure.				
13.2-4	5	In the event of a communications failures, the ASCT shall log details of the failure in a permanent log.	<p><i>4.12.0-3</i></p> <p>The system operator needs to maintain a complete log of alarms and failure events.</p>			
13.2-5	5	The permanent failure log shall be searchable, archivable, and exportable.				
<b>13.3</b>		<b>13.3 Adaptive Processor Failure</b>				

13.3-1	5	The ASCT shall execute user-specified actions when adaptive control fails:	4.14.0-1	Yes		
13.3-1.0-1	5	The ASCT shall release control to central system control.	The system operator needs to fall back to TOD operation without causing disruption to traffic flow, in the event of equipment, communications and software failure.	Yes	ACDSS shall release adaptive. The system shall revert to the default mode, central system control or local TOD	Demonstration
13.3-1.0-2	2	The ASCT shall release control to local operations to operate under its own time-of-day schedule.		Yes	ACDSS shall revert to local TOD, if such is set as the default fall back.	Demonstration
13.3-2	5	In the event of adaptive processor failure, the ASCT shall issue an alarm to user-specified recipients. (This requirement may be fulfilled by sending the alarm to a designated list of recipients by a designated means, or by using an external maintenance management system.)	4.12.0-1	Yes	Alarms by text message or by email.	Demonstration
			The system operator needs to immediately notify maintenance and operations staff of alarms and alerts.			
			4.12.0-2			
			The system operator needs to immediately and automatically pass alarms and alerts to the TranSuite and Regional Archived Data System (RADS).			
13.3-3	5	The permanent failure log shall be searchable, archivable, and exportable.	4.12.0-3	Yes	The logged failure is searchable, achievable, and exportable.	Demonstration
			The system operator needs to maintain a complete log of alarms and failure events.			
13.3-4	5	During adaptive	4.14.0-1	Yes	ACDSS does not	Demonstration

		processor failure, the ASCT shall provide all local detector inputs to the local controller.	The system operator needs to fall back to TOD operation without causing disruption to traffic flow, in the event of equipment, communications and software failure.		intercept local detector inputs to local controller.	
<b>14</b>		<b>14 Software</b>				
14.0-1	5	The vendor's adaptive software shall be fully operational within the following platform: (edit as appropriate)	4.15.0-2	Yes	ACDSS is a Windows based software running on a Windows Server. TransSuite TCS is Windows/Linux based software.	Demonstration
		* Windows-PC	The system operator needs to use equipment and software acceptable under current agency IT policies and procedures.			
		* Linux				
14.0-2	5	The system shall interface with standard loop detectors, Traficon video detection and furnished detection.	4.15.0-1.0-2 Detector type	Yes	ACDSS interface the detectors via TransSuite TCS.	
14.0-3	5	The system shall interface with Econolite ASC/2S-2100, Econolite ASC/2-2000RM, and ASC/3 controllers.	4.15.0-1.0-1 Controller type	Yes	These controllers are supported.	Demonstration
<b>15</b>		<b>15 Training</b>				
15.0-1		The vendor shall provide the following training.	4.16.0-1 The agency needs all staff involved in operation and maintenance to receive appropriate training.	Yes	This is part of our standard training package.	
15.0-1.0-1	5	The vendor shall provide training on the operations of the adaptive system.			This is part of our standard training package.	



15.0-1.0-2	5	The vendor shall provide training on troubleshooting the system.		This is part of our standard training package.	
15.0-1.0-3	5	The vendor shall provide training on preventive maintenance and repair of equipment.		This is part of our standard training package.	
15.0-1.0-4	5	The vendor shall provide training on system configuration.		This is part of our standard training package.	
15.0-1.0-5	5	The vendor shall provide training on administration of the system.		This is part of our standard training package.	
15.0-1.0-6	5	The vendor shall provide training on system calibration.		This is part of our standard training package.	
15.0-1.0-7	5	The vendor's training delivery shall include: printed course materials and references, electronic copies of presentations and references.		This is part of our standard training package.	
15.0-1.0-8	5	The vendor's training shall be delivered at the TMC and Signal Shop.		The training shall be provided at the designated location.	
15.0-1.0-9	5	The vendor shall provide a minimum of 4 hours training to a		The training shall be provided for the designated staff of the	



		minimum of 25 staff.			City.	
15.0-1.0-10	5	The vendor shall provide a minimum of 5 training sessions over 3 months.			This is part of our standard training package.	
<b>16</b>		<b>16 Maintenance, Support and Warranty</b>				
16.0-1	5	The Maintenance Vendor shall provide maintenance according to a separate maintenance contract. That contract should identify repairs necessary to preserve requirements fulfillment, responsiveness in effecting those repairs, and all requirements on the maintenance provider while performing the repairs.	4.16.0-2 The agency needs the system to fulfill all requirements for the life of the system. The agency therefore needs the system to be maintained to repair faults that are not defects in materials and workmanship.	Yes	This is part of our standard maintenance and support agreement. Full terms and conditions of the maintenance and support contract shall be negotiated when appropriate.	
16.0-2	5	The Vendor shall provide routine updates to the software and software environment necessary to preserve the fulfillment of requirements for the life of the system. Preservation of	4.16.0-4 The agency needs the system to fulfill all requirements for the life of the system. The agency therefore needs support to keep software and software environment updated as necessary to prevent requirements no longer being fulfilled.	Yes	This is part of our standard maintenance and support agreement. Full terms and conditions of the maintenance and support contract shall be negotiated when appropriate.	



		requirements fulfillment especially includes all IT management requirements as previously identified.				
16.0-3	5	The Vendor shall warrant the system to be free of defects in materials and workmanship for a period of 5 years. Warranty is defined as correcting defects in materials and workmanship (subject to other language included in the purchase documents). Defect is defined as any circumstance in which the material does not perform according to its specification.	<p><i>4.16.0-3</i></p> <p>The agency needs the system to fulfill all requirements for the life of the system. The agency therefore needs the system to remain free of defects in materials and workmanship that result in requirements no longer being fulfilled.</p>	Yes	Warranty shall be provided as specified.	
<b>17</b>		<b>17 Schedule</b>				
17.0-1	3	The ASCT shall set the state of external input/output states according to a time-of-day schedule at user-specified locations.	<p><i>4.17.0-1</i></p> <p>The system operator needs to be able to turn on signs that control traffic or provide driver information when specific traffic conditions occur, when needed to support the adaptive operation, when congestion is detected at critical locations or according</p>	Yes	This is accomplished via TransSuite TCS	Demonstration
17.0-2	3	The ASCT output		Yes	This is accomplished	Demonstration

		states shall be settable according to a time-of-day schedule	to a time-of-day schedule		via TransSuite TCS	
17.0-3	3	The ASCT operational parameters shall be settable according to a Time of Day schedule		Yes	This is accomplished via TransSuite TCS	Demonstration
<b>18</b>		<b>18 Performance Measurement, Monitoring and Reporting</b>				
18.0-1	5	The ASCT shall report measures of current traffic conditions on which it bases signal state alterations.	4.11.0-2 The system operator needs to store and report data used to calculate signal timing and have the data available for subsequent analysis.	Yes	ACDSS logs all data and measures of traffic conditions in the database.	Demonstration
18.0-2	5	The ASCT shall report all intermediate calculated values that are affected by calibration parameters.		Yes	All intermediate calculated values are logged.	Demonstration
18.0-3	5	The ASCT shall maintain a log of all signal state alterations directed by the ASCT.	4.11.0-7 Have the ability to generate historic and real-time reports that effectively support operation, maintenance and reporting of system performance and traffic conditions.	Yes	All signal state change (detailed controller status data including cycle, offset, and individual splits, cycle start and end time). Whether the signal is in transition, and transition cycles are also logged.	Demonstration
18.0-3.0-1	5	The ASCT log shall		No	This is not supported	Demonstration



		include all events directed by the external inputs.			right now.	
18.0-3.0-2	5	The ASCT log shall include all external output state changes.		No	This is not supported right now.	Demonstration
18.0-3.0-3	5	The ASCT log shall include all actual parameter values that are subject to user-specified values.		Yes	All the configurable inputs are logged in the DB	Demonstration
18.0-3.0-4	5	The ASCT shall maintain the records in this ASCT log for 31 days.		Yes	The log can be kept from minimum 1 month to permanent	Demonstration
18.0-3.0-5	5	The ASCT shall archive the ASCT log after 31 days in the following manner: .CSV, MS Excel, Text		Yes	The log can be kept from minimum 1 month to permanent	Demonstration



## Exhibit C

### Software License and Maintenance Agreements

#### C.1 ACDSS License Agreement

The following document represents KLD's End User License Agreement for ACDSS. This license agreement will be executed with Maricopa County for the ACDSS deployments in Scottsdale and Phoenix. Existing Scottsdale and Phoenix TransSuite license will not be affected.

#### ACDSS Software End User License Agreement

##### I. Definitions

**KLD** means KLD Engineering, P.C. a firm incorporated in the State of New York that provides professional services in the practice of engineering, including transportation and transportation-related software engineering.

**ACDSS, Software, or ACDSS Software** means the binary, executable version of the adaptive signal control software package as described in the purchase order and related documentation.

**Agency** means Maricopa County, the State of Arizona, City of Phoenix, or City of Scottsdale \_\_\_\_\_

##### II. License

KLD grants to Agency a non-exclusive, non-transferable license for use of the ACDSS software in Agency. Title to all intellectual property rights including patent, trademark, copyright and trade secret rights and title to all ownership rights and all copies of and all media bearing the licensed Software, support materials and control concept shall remain in KLD.

The license is a permanent license, at the one-time cost specified and for the specific use specified in Section VII. This fee also covers one year of maintenance that includes free upgrades of the ACDSS software.

The Agency may elect to pay an annual software maintenance fee after the initial one year maintenance period cited, at the cost specified in Section VII. If the Agency does not elect to have continual maintenance coverage, it may - at its own risk and responsibility - continue to use the product as initially delivered and/or as upgraded during any continual maintenance period thereafter (unless it breaches the conditions below, in this Section II).

KLD's commitment and obligation is to maintain and service the most recent revision/release/version number of the software licensed. That revision/release/version will be the result of the activities cited in Section IV ("Warranty"). The Agency may choose to install the latest revision/release/version or not, but it is only the most recent revision/release/version that is supported.

Agency shall be entitled to:

- a. Use the licensed Software, only in binary, executable form on licensed computers.
- b. Use the support documentation but only as required to support the use of the licensed Software.
- c. Make as many backup copies of the licensed Software in binary, executable form as necessary for its operating policies and practices. All backup copies must include the copyright notice in the original form as it appears on the licensed Software.

Agency may not:

- a. Sub-license, share, sell, rent, lease or otherwise transfer Agency's right to use the Software; or
- b. Copy, modify, translate, decompile, disassemble, tamper with, or reverse engineer any part of the Software; or
- c. Use the Software to develop any other Software and derivative products; or

- d. Alter, remove or obscure copyright or Intellectual Property statements applied to the Software.
- e.

The licensed Software and support material included with this Agreement are confidential information that is the property of KLD. The licensed Software, control concepts or any of the support materials shall not be made available to any other party or organization without the written consent of KLD.

KLD can terminate this agreement if Agency breaches a provision of this License and have not remedied that breach within 30 calendar days after receipt of a notice from KLD requiring Agency to rectify such breach.

On termination of the License, Agency must immediately:

- a. Stop using the Software;
- b. Ensure all copies of the Software are deleted or permanently removed from any form of storage; and
- c. Return to KLD all other confidential information of KLD in material form.

### **III. Confidentiality**

#### **Confidential Information**

In the performance of this Agreement or in contemplation thereof, the parties and their respective employees and agents may have access to private or confidential information owned or controlled by the other party and such information may contain proprietary details and disclosures. All information and data identified in writing as proprietary or confidential by either party ("Confidential Information") and so acquired by the other party or its employees or agents under this Agreement or in contemplation thereof shall be and shall remain the disclosing party's exclusive property. The recipient shall use all reasonable efforts (which in any event shall not be less than the efforts the recipient takes to ensure the confidentiality of its own proprietary and other confidential information) to keep, and have its employees and agents keep, any and all "Confidential Information" confidential, and shall not copy, publish or disclose it to others, nor authorize its employees, agents or anyone else to copy or disclose it to others without the disclosing party's written approval; nor shall the recipient make use of the "Confidential Information" except for the purposes of executing its obligations hereunder, and (except as provided for herein) shall return the Confidential Information and data to the first party at its request. Agency's duty to maintain confidentiality as described hereunder shall be subject to the laws of the State of New York.

#### **Excluded information**

The foregoing conditions will not apply to information or data which is, or which becomes generally known to the public by publication or by any means other than a breach of duty on the part of the recipient hereunder, is information previously known to the recipient, is information independently developed by or for the recipient or is information generally released by the owning party without restriction.

#### **Right to Injunctive Relief**

Because of the unique nature of the Confidential Information, the parties agree that each party may suffer irreparable harm in the event that the other party fails to comply with any of its obligations under this Confidentiality Article, and that monetary damages may be inadequate to compensate either party for such breach. Accordingly, the parties agree that either party will, in addition to any other remedies available to it at law or in equity, be entitled to seek injunctive relief to enforce the terms of this Article.

### **IV. Warranty**

KLD warrants to Agency that KLD shall supply to Agency, during the license period and any continuous period of extended maintenance thereafter, in a timely manner, any software revisions that are developed for the ACDSS software, without fee. Such revisions are either to correct "bugs", provide additional features, or integrate the most up-to-date Research and Development work by KLD, and are at the sole discretion of KLD. KLD will make a good faith effort to remedy "bugs" identified by the Agency within the license period and any continuous period of extended maintenance thereafter, should it concur that the problem identified is due to a "bug" and not using the software beyond the capability for which it was designed and delivered.

If KLD transfers its principal assets to another entity by sale or other means, the terms of this agreement will continue. If KLD ceases operations without arrangements to transfers its assets including the source code of ACDSS, that source code will be made available to the Agency for its own use only. If KLD discontinues support of the product at any time in the future, the source code will be made available to the Agency for its own use only.

**V. Schedule of Costs**

The Agency shall have the right to use this license on any number of intersections that are under the jurisdiction of the Agency, as represented to KLD in its definition of use.

The ACDSS permanent license requires a one-time license fee as described in Exhibit A of this Contract. This fee also covers the first year of software maintenance. Software maintenance and support is included for years two through five as described in Exhibit A.

Should the Agency wish to have software enhancements done by KLD, they will be offered at the standard rate table (Attachment B below) used for public sector clients, or can be quoted on a firm fixed price basis. This can be done as a separate authorization or as an option in the Agency's purchase order, at the Agency's discretion.

Should the Agency wish to have system design and traffic engineering professional services done by KLD, either directly or as a subconsultant to another consultant, they will be offered at the standard rate table used for public sector clients. If the preference is for KLD to be a subconsultant to another consultant however, KLD must retain the right to choose whether to participate in the particular teaming arrangement of interest.

**C.2 Software Maintenance Agreement**

The following Software Maintenance Agreement will be executed with Maricopa County for Project Areas 3 and 4, Scottsdale and Phoenix. Existing TransSuite Maintenance Agreements between the Cities of Scottsdale and Phoenix and TransCore will not be affected.



**1 AGREEMENT COVERAGE**

Period of Coverage:

**2 SOFTWARE COVERAGE**

Services will be provided under this agreement for the following software applications:

- ◆ Adaptive Control Decision Support System

All software listed above and covered under this agreement is provided under and subject to the Software License Agreement between TransCore and Maricopa County.

**3 GENERAL TERMS AND CONDITIONS**

The purpose of this Software Maintenance Agreement is to provide support and applicable updates for the software components listed in Section 2, along with the option for additional work as discussed in Section 6.

- 3.1** The scope-of-services presented in this Software Maintenance Agreement (herein referred to as the "Agreement") are to be provided by TransCore ITS, LLC. (TransCore) to Maricopa County, the State of Arizona, City of Phoenix, or City of Scottsdale hereinafter referred to as the "Customer."

- 3.2** Neither TransCore nor the Customer will assign this Agreement or any right hereunder to any person, firm, or entity without the written consent of the other party. In addition, such consent will not be unreasonably withheld.
- 3.3** Neither party shall be responsible for delays or failures in performance resulting from acts beyond its control, such as labor strikes, fire, acts of war, terrorist attacks (or other casualties), communication line failures, electrical/power failures, or irregularities, and the like. The Customer shall be responsible for ensuring that all necessary communications lines are restored to proper operation before requesting on-site assistance under the provision of this contract unless it is for the purpose of troubleshooting system problems as noted in Section 4, Paragraph 3.
- 3.4** This Agreement will be interpreted and construed in accordance with the laws of the State of Arizona, without regard to its conflicts of law principles.
- 3.5** The Customer agrees not to engage in any recruiting efforts of TransCore's personnel without receiving written consent from the individual employee's management.
- 3.6** Any terms of this Agreement which are held to be invalid will be deleted, but the remainder of these terms will not be affected.
- 3.7** If either party becomes insolvent, is unable to pay its debt when due, files for bankruptcy, is the subject of involuntary bankruptcy, has a receiver appointed, or has its assets assigned, the other party may cancel any unfulfilled obligations.
- 3.8** Neither party's failure to exercise any of its rights under this Agreement will constitute or be deemed a waiver or forfeiture of those rights.
- 3.9** Any changes, additions, and enhancements in the form of new or partial programs or documentation as may be provided under this Agreement shall remain the proprietary property of TransCore. The License Agreement specified above will include under its proprietary restrictions any such additional programming and documentation provided under this Agreement.

#### **4 CONTRACT LENGTH OF SERVICES**

- 4.1 Agreement Duration** – The time period within this Agreement for the rendering of Software Support Services by TransCore to the Customer shall be as stated in Article 1 above.

#### **INTENTIONALLY OMITTED**

- 4.2 Agreement Hours of Operation and Response Times** – TransCore's services hereunder are provided on an *ad hoc* time and materials basis at the Customer's request. TransCore personnel will be available for telephone consultations/inquiries and/or on-site visits as the situation demands and staff availability permit. The primary hours for services will be during our regular business hours Monday thru Friday, 8:00 AM thru 6:00 PM Eastern Time.

Services outside these normal operating hours, including nights, weekends, and holidays, will be provided as staff availability permits. The Customer will be required to contact appropriate TransCore personnel in these cases. TransCore staff contacts, and after hours contact numbers, are listed in Attachment A.

TransCore personnel will respond to Customer requests for Software Support Services within a reasonable time period. During regular business hours, TransCore will begin to provide services to the Customer within twenty-four (24) hours of the request. During emergency situations, during regular business hours, TransCore will begin to provide services to the Customer within four (4) hours of official notification when possible. Outside normal business hours, TransCore will make every effort to provide services to the Customer within eight (8) hours of official notification when possible and dependent upon the availability of a responsible TransCore employee.

**5 AGREEMENT COST AND PAYMENT**

- 5.1** The total amount/cost of this Agreement shall be as stated in Exhibit “A” of Contract 15058-RFP, plus any amounts which may become due because of Additional services contracted by the Customer to TransCore under the terms of the Contract and this Agreement.
- 5.2** All Contract Support and Software Support Services to be provided by TransCore, whether planned or an emergency, shall be covered under the Contract and this Agreement at the cost listed above. Services not covered within the Contract and this Agreement are subject to TransCore’s standard time and material rates.
- 5.3** Payment of the annual Agreement fee (as outlined in #1 above) shall entitle the Customer to specified application software maintenance support services by TransCore based on the terms and conditions set forth within the Contract and this Agreement.
- 5.4** If the Customer fails to pay any additional support fees (services not covered under the Contract and/or this Agreement but requested by the Customer at TransCore’s standard time and material rates), or fails to perform under the Contract or this Agreement with TransCore after 10 days written notice, TransCore reserves the right to withhold services pending full payment of fees or compliance with these terms by the Customer. If TransCore fails to respond to the Customer within 10 days of verbal correspondence, the Customer has the option to terminate this agreement.
- 5.5** TransCore will submit itemized cost invoices to the Customer for prior approval of Additional services rendered (services not covered under the Contract and/or this Agreement, but requested by the Customer at TransCore’s standard time and material rates). All charges for Additional services are payable by the Customer as a net amount due in thirty (30) days from the date of the invoice. All payments made by the Customer after forty-five (45) days from date of invoice shall be subject to a 1.5% per month penalty fee until the date paid.
- 5.6** Time and Materials Rates are as per Attachment B.
- 5.7** There shall be added to maintenance fees and other charges under this agreement amounts equal to any tariff, duties and/or sales or use tax, or any tax in lieu thereof (including any interest or penalties) imposed by the government or governmental agency with respect to services rendered by TransCore under the Contract and/or this Agreement and which TransCore now or in the future may be required to collect or remit. If the Customer has tax exemption capabilities, they are free to exercise these options, as always.
- 5.8** Corrections for difficulties or defects traceable to Customer errors or system changes will be billed at TransCore standard time and material rates.

**6 AGREEMENT SCOPE-OF-SERVICES**

- 6.1** Coverage – The software covered under this Agreement is that software outlined in Section 1 of this Agreement. Any corrections or alterations to or new versions of the Software that TransCore may deliver to the Customer under this Agreement shall be limited to one (1) copy of the source code and documentation (if new documentation is appropriate).
- 6.2** Services to be Performed – TransCore will support the Customer in the maintenance and operation of their TransCore software as outlined in Section 1. This support may span a broad range of services including, but not limited to, technical consulting, troubleshooting and diagnosis of problems, software defect correction, periodic or preventive maintenance, software version upgrades, training, system expansion, and/or system enhancement.
- 6.3** Software Installation Scheduling – TransCore will install any and all software modifications and/or programs for portions thereof on the Customer’ systems only at times mutually agreeable between both parties.
- 6.4** Documentation – TransCore will maintain a log of the Customer’ user requests/errors/problems.

- 6.5** Cost Accounting and Invoicing (*For Time and Materials Work ONLY*)– TransCore will track time and material costs and generate monthly Contract invoices through our job cost accounting system. This monthly Contract invoice will reflect the current time and materials cost for the invoice period and the total time and materials cost over the duration of the Contract to date.

## **7 WARRANTY**

TransCore does not warrant that the operation of its software products will be uninterrupted or error-free. TransCore will place the highest emphasis on resolving problems within a mutually agreed upon time period.

THE EXPRESS WARRANTIES, IF ANY, CONTAINED IN THIS CONTRACT ARE THE SOLE AND EXCLUSIVE WARRANTIES PROVIDED BY CONTRACTOR. TRANSCORE SPECIFICALLY DISCLAIMS ANY OTHER WARRANTIES, EXPRESS OR IMPLIED INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AS WELL AS ANY WARRANTIES ALLEGED TO HAVE ARISEN FROM CUSTOM, USAGE, OR PAST DEALINGS BETWEEN THE PARTIES.

## **8 CUSTOMER RESPONSIBILITIES**

- 8.1** The Customer shall have an assigned individual to serve as liaison between the Customer and TransCore. The Customer acknowledges its obligation to provide personnel having sufficient skills and experience to operate and manage the equipment and/or programs being provided to obtain the desired results.
- 8.2** The Customer shall be exclusively responsible for the supervision, management, and control of its use of the TransCore software including, but not limited to the following:
- assuring proper configuration, program installation, audit controls, and operating methods;
  - establishing adequate backup plans based on alternate procedures in the event of computer system malfunction;
  - implementing sufficient procedures and checkpoints to satisfy its requirements for security and accuracy of input and output as well as restart and recovery in the event of malfunction;
  - informed use of the output insofar as technical expertise or professional judgment is required; and
  - maintenance and distribution of system passwords.
- 8.3** The Customer is responsible for the security of its proprietary and confidential information and for maintaining a procedure external to the software products to reconstruct lost or altered Customer files, data, or programs.
- 8.4** Before execution of on-site support service by TransCore, the Customer shall make reasonable efforts to have a representative of the Customer available at the time these services are provided. TransCore will accept written approval, if a representative is not available, so as to have on-site access to the system for support purposes. TransCore will be held harmless for all circumstances arising from this access that would normally be the domain of the Customer or its designated representative including but not limited to shortages, loss, damages or destruction of Customer property. TransCore upon discovery of such facts shall report said items to the Customer before beginning maintenance of system items.
- 8.5** The Customer shall notify TransCore if software products are being used in an environment or location, which the Customer reasonable believes, poses a potential health and/or safety hazard to TransCore employees or subcontractors.
- 8.6** The Customer shall maintain the hardware and software products in its system at the prescribed revision levels while TransCore's Software Support Services are in-effect at TransCore's discretion.
- 8.7** The Customer shall provide TransCore access to and use of all information and facilities determined necessary by TransCore to support the software.

- 8.8** The Customer acknowledges that all TransCore software and/or changes, improvements, revisions or updates made to TransCore software are the sole and exclusive property of TransCore and may be provided by TransCore to others.
- 8.9** The Customer agrees to provide TransCore with dumps, as requested, and with sufficient support and test time on the Customer' computer system to duplicate the problem, certify that the problem is indeed with TransCore's Software, and to certify that the problem has indeed been fixed or a suitable work-around devised.
- 8.10** The Customer agrees to install and maintain, for the duration of the Contract, internet access and a Customer VPN account at the host computer.

## **9 DISPUTES**

All Parties agree to first enter into negotiations to resolve any controversy, claim or dispute ("dispute") arising under or relating to this Agreement. The Parties agree to negotiate in good faith to reach a mutually agreeable resolution of such dispute within a reasonable period of time.

## **10 NOTICES**

Any notice or communication to TransCore shall be deemed served if it is delivered, in writing, personally or by registered or certified mail to:

TransCore ITS, LLC

Contractual:  
Ricardo Perez  
Contract Manager  
TransCore  
150 4<sup>th</sup> Ave. North, Suite 1200  
Nashville, TN 37219

Technical:  
William L. Skillas, PE  
Vice President  
TransCore  
192 Technology Parkway, Suite 500  
Norcross, GA 30092

Any notice or communication to the CUSTOMER shall be deemed served if it is delivered, in writing, personally or by registered or certified mail to:

April Wire  
Maricopa County Department of Transportation  
2901 W. Durango  
Phoenix, Arizona 85009

## **14 LIMITATION ON DISSEMINATION OF TRANSCORE COMMERCIAL WORK PRODUCT**

TransCore and Customer expressly exclude any and all third parties from the benefits of this Agreement. In the event that Customer furnishes any TransCore work product to a person who is not a party to this Agreement, Customer agrees to defend, indemnify, and hold harmless TransCore from and against all claims, damages, losses, costs and expenses (including reasonable attorney's fees) of actions brought by third parties, and arising out of or relating to such third party's use or distribution of, or reliance upon, the TransCore's work product.

Attachment A

TransCore Authorized Representatives

Wuping Xin

Office: 631-617-5650 x 227

Cell: 631-617-5649

Email: wxin@kldcompanies.com

Bill Skillas

Office: 770-246-6242

Cell: 678-910-8602

Email: william.skillas@transcore.com

**Attachment B****Time and Materials Rates**

<b>Labor Category</b>	<b>2016 Hourly Rate</b>	<b>2017 Hourly Rate</b>	<b>2018 Hourly Rate</b>	<b>2019 Hourly Rate</b>	<b>2020 Hourly Rate</b>	<b>2021 Hourly Rate</b>
Project Manager	\$ 220.31	\$ 226.92	\$ 233.73	\$ 240.74	\$ 247.96	\$ 255.40
System Architect	\$ 220.31	\$ 226.92	\$ 233.73	\$ 240.74	\$ 247.96	\$ 255.40
Senior Systems Engineer	\$ 186.81	\$ 192.41	\$ 198.19	\$ 204.13	\$ 210.26	\$ 216.56
Engineer I	\$ 132.40	\$ 136.37	\$ 140.46	\$ 144.68	\$ 149.02	\$ 153.49
Engineer II	\$ 154.14	\$ 158.76	\$ 163.53	\$ 168.43	\$ 173.49	\$ 178.69
Engineer III	\$ 265.66	\$ 273.62	\$ 281.83	\$ 290.29	\$ 299.00	\$ 307.97

## Exhibit D

### **OFFICE OF PROCUREMENT SERVICES CONTRACTOR TRAVEL AND PER DIEM POLICY**

- 1.0 All contract-related travel plans and arrangements shall be prior-approved by the County Contract Administrator.
- 2.0 Lodging, per diem and incidental expenses incurred in performance of Maricopa County/Special District (County) contracts shall be reimbursed based on current U.S. General Services Administration (GSA) domestic per diem rates for Phoenix, Arizona. Contractors must access the following internet site to determine rates (no exceptions): [www.gsa.gov](http://www.gsa.gov)
  - 2.1 Additional incidental expenses (i.e., telephone, fax, internet and copying charges) shall not be reimbursed. They should be included in the contractor's hourly rate as an overhead charge.
  - 2.2 The County will not (under no circumstances) reimburse for Contractor guest lodging, per diem or incidentals.
- 3.0 Commercial air travel shall be reimbursed as follows:
  - 3.1 Coach airfare will be reimbursed by the County. Business class airfare may be allowed only when preapproved in writing by the County Contract Administrator as a result of the business need of the County when there is no lower fare available.
  - 3.2 The lowest direct flight airfare rate from the Contractors assigned duty post (pre-defined at the time of contract signing) will be reimbursed. Under no circumstances will the County reimburse for airfares related to transportation to or from an alternate site.
  - 3.3 The County will not (under no circumstances) reimburse for Contractor guest commercial air travel.
- 4.0 Rental vehicles may only be used if such use would result in an overall reduction in the total cost of the trip, not for the personal convenience of the traveler. Multiple vehicles for the same set of travelers for the same travel period will not be permitted without prior written approval by the County Contract Administrator.
  - 4.1 Purchase of comprehensive and collision liability insurance shall be at the expense of the contractor. The County will not reimburse contractor if the contractor chooses to purchase these coverage.
  - 4.2 Rental vehicles are restricted to sub-compact, compact or mid-size sedans unless a larger vehicle is necessary for cost efficiency due to the number of travelers. (NOTE: contractors shall obtain pre-approval in writing from the County Contract Administrator prior to rental of a larger vehicle.)
  - 4.3 County will reimburse for parking expenses if free, public parking is not available within a reasonable distance of the place of County business. All opportunities must be exhausted prior to securing parking that incurs costs for the County. Opportunities to be reviewed are the DASH; shuttles, etc. that can transport the contractor to and from County buildings with minimal costs.

**SERIAL 15058-RFP**

- 4.4 County will reimburse for the lowest rate, long-term uncovered (e.g. covered or enclosed parking will not be reimbursed) airport parking only if it is less expensive than shuttle service to and from the airport.
- 4.5 The County will not (under no circumstances) reimburse the Contractor for guest vehicle rental(s) or other any transportation costs.
- 5.0 Contractor is responsible for all costs not directly related to the travel except those that have been pre-approved by the County Contract Administrator. These costs include (but not limited to) the following: in-room movies, valet service, valet parking, laundry service, costs associated with storing luggage at a hotel, fuel costs associated with non-County activities, tips that exceed the per diem allowance, health club fees, and entertainment costs. Claims for unauthorized travel expenses will not be honored and are not reimbursable.
- 6.0 Travel and per diem expenses shall be capped at 15% of project price unless otherwise specified in individual contracts.
- 7.0 Contractor shall provide, (upon request) with their invoice(s), copies of receipts supporting travel and per diem expenses, and if applicable with a copy of the written consent issued by the Contract Administrator. No travel and per diem expenses shall be paid by County without copies of the written consent as described in this policy and copies of all receipts.

**Exhibit E**

**Special Federal Terms, Conditions and Documents**



**Maricopa County Small Business Enterprise Program  
Participation Reporting Form**

*This form is to be submitted with each pay application or invoice. Any pay application or invoice without this form attached is subject to rejection as not being a completed pay application or invoice pursuant to the terms of the contract.*

\_\_\_\_\_  
Name of Prime Consultant Contractor

\_\_\_\_\_  
Contract No.

\_\_\_\_\_  
Contact Person

\_\_\_\_\_  
Project No.

\_\_\_\_\_  
Street Address

\_\_\_\_\_  
Amount of this Pay Application/ Invoice

\_\_\_\_\_  
City, State ZIP

Complete below with information on the SBE firms utilized as sub consultants/ subcontractors for this pay application/ invoice. If work was self-performed and your firm, as the prime, is an SBE firm pursuant to ARS. § 41-1001, et seq then you may list your firm as the SBE firm.

SBE Firm Name	SBE Firm Address	Type Of Work Performed	\$ Paid to SBE App./ Invoice
			\$
			\$
			\$
			\$
			\$
			\$

A mark in this box certifies that no SBE firms were utilized as the prime, subconsultant or subcontractor with respect to this pay application/ invoice.

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

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

\_\_\_\_\_  
Printed Name & Telephone Number

**\*\*FOR USE ON FEDERAL AID PROJECTS WITHOUT GOALS\*\***

**(EPRISENGL, 03/15/11)**

**DISADVANTAGED BUSINESS ENTERPRISES:**

**1.0 Policy:**

The Arizona Department of Transportation (hereinafter the Department) has established a Disadvantaged Business Enterprise (DBE) program in accordance with the regulations of the U.S. Department of Transportation (USDOT ), 49 CFR Part 26. The Department has received Federal financial assistance from the U.S. Department of Transportation and as a condition of receiving this assistance, the Department has signed an assurance that it will comply with 49 CFR Part 26.

It is the policy of the Department to ensure that DBEs, as defined in Part 26, have an equal opportunity to receive and participate in USDOT-assisted contracts. It is also the policy of the Department:

1. To ensure nondiscrimination in the award and administration of USDOT-assisted contracts;
2. To create a level playing field on which DBEs can compete fairly for USDOT-assisted contracts
3. To ensure that the DBE program is narrowly tailored in accordance with applicable law;
4. To ensure that only firms that fully meet 49 CFR Part 26 eligibility standards are counted as DBEs;
5. To help remove barriers to the participation of DBEs in USDOT-assisted contracts; and
6. To assist in the development of firms that can compete successfully in the market place outside the DBE program.

Local Public Agencies (LPA) and or sub-recipients of Federal financial assistance will administer and manage the contracts from advertising, consultant selection, negotiation, contract execution, processing payment reports and contract modifications, audits, DBE compliance (e.g., reporting and monitoring) through contract closeout.

**2.0 Assurances of Non-Discrimination:**

The contractor, sub-recipient, or subcontractor shall not discriminate on the basis of race, color, sex or national origin in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of 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 state deems appropriate. The contractor, sub-recipient, or subcontractor shall ensure that all subcontract agreements contain this non-discrimination assurance.

**3.0 Definitions:**

- A. **Disadvantaged Business Enterprise (DBE):** a for-profit small business concern which meets both of the following requirements:
  1. Is at least 51 percent owned by one or more socially and economically disadvantaged individuals or, in the case of any publicly owned business, at least 51 percent of the stock is owned by one or more such individuals; and,
  2. Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.
- B. **Socially and Economically Disadvantaged Individuals:** any individual who is a citizen (or lawfully admitted permanent resident) of the United States and who is:

- 1 Any individual who is found to be a socially and economically disadvantaged individual on a case-by-case basis.
  - 2 Any individual in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:
    - i. "Black Americans," which includes persons having origins in any of the Black racial groups of Africa;
    - ii. "Hispanic Americans," which includes persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
    - iii. "Native Americans," which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;
    - iv. "Asian-Pacific Americans," which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau), the Commonwealth of the Northern Marianas Islands, Macao, Fiji, Tonga, Kiribati, Tuvalu, Nauru, Federated States of Micronesia, or Hong Kong;
    - v. "Subcontinent Asian Americans," which includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
    - vi. "Women;"
    - vii. Any additional groups whose members are designated as socially and economically disadvantaged by the Small Business Administration (SBA), at such time as the SBA designation becomes effective.
- C. **Joint Venture:** an association of a DBE firm and one or more other firms to carry out a single, for-profit business enterprise, for which parties combine their property, capital, efforts, skills and knowledge, and in which the DBE is responsible for a distinct, clearly defined portion of the work of the contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture are commensurate with its ownership interest.
- D. **Non-DBE:** any firm that is not a DBE.
- E. **RACE-CONSCIOUS:** a measure or program is one that is focused specifically on assisting only DBEs, including women-owned DBEs.
- F. **RACE-NEUTRAL:** a measure or program is one that is, or can be, used to assist all small businesses. For the purposes of this part, race-neutral includes gender-neutrality.

#### **4.0 Working with DBEs:**

The Department works with DBEs and assists them in their efforts to participate in the highway construction program. All bidders should contact the Business Engagement and Compliance Office at the address shown below for assistance in their efforts to use DBEs in the construction program of the Department:

Arizona Department of Transportation  
Business Engagement and Compliance Office  
1135 N. 22nd Avenue (second floor), Mail Drop 154A  
Phoenix, AZ. 85009  
Phone: (602) 712-7761  
FAX: (602) 712-8429

**5.0 Applicability:**

The Department has established an overall annual goal for DBE participation on Federal-aid contracts. The Department intends for the goal to be met with a combination of race conscious efforts and race neutral efforts. Race conscious participation occurs where the contractor uses a percentage of DBEs, as defined herein, to meet the contract-specified goal. Race neutral efforts are those that are, or can be, used to assist all small businesses or increase opportunities for all small businesses. The regulation, 49 CFR 26, defines race neutral as when a DBE wins a prime contract, is awarded a subcontract on a project without DBE goals, and is awarded a subcontract from a prime contractor that did not consider the firm's DBE status.

The provisions are applicable to all bidders including DBE bidders.

**6.0 Certification:**

Certification as a DBE shall be predicated on:

1. The completion and execution of an application for certification as a "Disadvantaged Business Enterprise".
2. The submission of documents pertaining to the firm(s) as stated in the application(s), including but not limited to a statement of social disadvantage and a personal financial statement.
3. The submission of any additional information which the Department may require to determine the firm's eligibility to participate in the DBE program.
4. The information obtained during the on-site visits to the offices of the firm and to active job-sites.

Applications for certification may be filed with the Department at any time. Both hardcopy submission and online submission is available.

For hardcopy submissions, applications for certification are available at the Business Engagement and Compliance Office, 1135 N. 22nd Avenue (second floor), mail drop 154A, Phoenix, Arizona 85009, phone (602) 712-7761. Hardcopy applications may also be obtained through the internet at [www.azdbe.org](http://www.azdbe.org). Hardcopy applications must be filed through the Business Engagement and Compliance Office at the above address.

For online submissions, the online application process may be accessed through the internet at [www.azdbe.org](http://www.azdbe.org).

DBE firms and firms seeking DBE certification shall cooperate fully with requests for information relevant to the certification process. Failure or refusal to provide such information is a ground for denial or removal of certification.

Arizona is a member of the AZ Unified Certification Program (AZUCP). Only DBE firms that are certified by the AZUCP are eligible for credit on ADOT projects. A list of DBE firms certified by AZUCP is available on the internet at [www.azdbe.org](http://www.azdbe.org). The list will indicate contact information and specialty for each DBE firm, and may be sorted in a variety of ways.

However, ADOT does not guarantee the accuracy and/or completeness of this information, nor does ADOT represent that any licenses or registrations are appropriate for the work to be done.

The Department's certification is not a representation of qualifications and/or abilities. The contractor bears all risks that the firm may not be able to perform its work for any reason.

**7.0 General:**

Each contractor shall establish a program that will ensure nondiscrimination in the award and administration of contracts and subcontracts.

Each contractor shall also designate a full time employee who shall be responsible for the administration of the contractor's DBE program.

Agreements between the bidder and a DBE in which the DBE promises not to provide subcontracting quotations to other bidders are prohibited.

**8.0 DBE Subcontractor Payment Reporting:**

The Department is required to collect data on DBE and non-DBE participation to report to Department Of Transportation on Federal-aid projects. Maricopa County Transport will notify the contractor that such record keeping is required by the Department for tracking DBE participation.

The contractor shall submit a report on a monthly basis indicating the amounts earned by and paid to all DBEs and non-DBEs working on the project. In addition, the contractor shall require that all DBE and non-DBE subcontractors verify receipt of payment.

The contractor shall provide all such required information for the current month by the 5th of the following month. The required information shall be submitted electronically through the Department's web-based payment tracking system (<https://arizonalpa.dbesystem.com>).

**9.0 Goals:**

The Department has not established contract goals for DBE participation in this contract. Contractors are still encouraged to employ reasonable means to obtain DBE participation. Contractors must retain records in accordance with these DBE specifications. The contractor is notified that this record keeping is important to the Department so that it can track DBE participation where only race neutral efforts are employed.

**10.0 Crediting DBE Participation:**

**10.01 General Requirements:**

Only the value of the work actually performed by the DBE can be credited toward DBE participation. Credit is given only after the DBE has been paid for the work performed.

The contractor bears the responsibility to determine whether the DBE possesses the proper contractor's license(s) to perform the work.

The Department's certification is not a representation of qualifications and/or abilities. The contractor bears all risks that the DBE may not be able to perform its work for any reason.

A DBE may participate as a prime contractor, subcontractor, joint venture partner with either a prime contractor or a subcontractor, or as a vendor of materials or supplies. A DBE joint venture partner shall be responsible for a clearly defined portion of the work to be performed, in addition to meeting the requirements for ownership and control.

The dollar amount of work to be accomplished by DBEs, including partial amount of a lump sum or other similar item, shall be on the basis of subcontract, purchase order, hourly rate, rate per ton, etc., as agreed to between parties.

With the exception of bond premiums, all work must be attributed to specific bid items. Where work applies to several items, the DBE contracting arrangement must specify unit price and amount attributable to each bid item. DBE credit for any individual item of work performed by the DBE shall be the lesser of the amount to be paid to the DBE or the prime contractor's bid price. If

the amount bid by the DBE on any item exceeds the prime contractor's bid amount, the prime contractor may not obtain credit by attributing the excess to other items.

Where more than one DBE is engaged to perform parts of an item (for example, supply and installation), the total amount payable to the DBEs will not be considered in excess of the prime contractor's bid amount for that item.

Bond premiums may be stated separately, so long as the arrangement between the prime contractor and the DBE provides for separate payment not to exceed the price charged by the bonding company.

DBE credit may be obtained only for specific work done for the project, supply of equipment specifically for physical work on the project, or supply of materials to be incorporated in the work. DBE credit will not be allowed for costs, such as overhead items, capital expenditures (for example, purchase of equipment), and office items.

If a DBE performs part of an item (for example, installation of materials purchased by a Non-DBE), the DBE credit shall not exceed the lesser of (1) the DBE's contract or (2) the prime contractor's bid for the item, less a reasonable deduction for the portion performed by the Non-DBE.

When a DBE performs as a partner in a joint venture, only that portion of the total dollar value of the contract which is clearly and distinctly performed by the DBE's own forces can be credited.

The contractor may credit second-tier subcontracts issued to DBEs by non-DBE subcontractors. Any second-tier subcontract to a DBE must meet the requirements of a first-tier DBE subcontract.

All DBE and non-DBE subcontracting activity must be reported by the contractor. This includes lower-tier subcontracting regardless of whether or not the DBE is under contract with another DBE.

A prime contractor may credit the entire amount of that portion of a construction contract that is performed by the DBE's own forces. The cost of supplies and materials obtained by the DBE for the work of the contract can be included so long as that cost is reasonable. Leased equipment may also be included. No credit is permitted for supplies purchased or equipment leased from the prime contractor or its affiliate(s).

When a DBE subcontracts a part of the work of its contract to another firm, the value of the subcontract may be credited towards DBE participation only if the DBE's subcontractor is itself a DBE and performs the work with its own forces. Work that a DBE subcontracts to a non-DBE firm does not count towards DBE participation.

A prime contractor may credit the entire amount of fees or commissions charged by a DBE firm for providing a bona fide service, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a USDOT-**assisted** contract, provided the fees are reasonable and not excessive as compared with fees customarily allowed for similar services.

10.02 **Police Officers:**

DBE credit will not be permitted for procuring DPS officers. For projects on which officers from other agencies are supplied, DBE credit will be given only for the broker fees charged, and will not include amounts paid to the officers. The broker fees must be reasonable.

**10.03 Commercially Useful Function:**

As a prime contractor, a DBE shall perform a significant portion of the contract work with its own work force in accordance with normal industry practices and Subsection 108.01 - Subletting of Contract of the Standard Specifications.

A prime contractor can credit expenditures to a DBE subcontractor only if the DBE performs a commercially useful function on the contract. A DBE performs a commercially useful function when it is responsible for execution of the work of a contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE must also be responsible, with respect to materials and supplies on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, the Department will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work, and other relevant factors.

A DBE will not be considered to perform a commercially useful function if its role is limited to that of an extra participant in a transaction contract, or project through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is such an extra participant, the Department will examine similar transactions, particularly those in which DBEs do not participate.

If a DBE does not perform or exercise responsibility for at least 30 percent of the total cost of its contract with its own work force, or if the DBE subcontracts a greater portion of the work of a contract than would be expected on the basis of normal industry practice for the type of work involved, the Department will presume that the DBE is not performing a commercially useful function.

When a DBE is presumed not to be performing a commercially useful function as provided above, the DBE may present evidence to rebut this presumption. Decisions on commercially useful function matters are subject to review by DOT, but are not administratively appealable to U.S. DOT.

**10.04 Trucking:**

The Department will use the following factors in determining whether a DBE trucking company is performing a commercially useful function. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting DBE goals.

The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract on every day that credit is to be given for trucking.

The contractor will receive credit for the total value of transportation services provided by the DBE using trucks it owns, insures and operates, and using drivers it employs.

The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services.

The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit for the total value of the transportation services provided by non-DBE lessees not to exceed the value of transportation services provided by DBE-owned trucks on the contract. Additional participation by non-DBE lessees results in credit only for the fee or commission paid to the DBE as a result of the lease agreement.

Example: DBE Firm X uses two of its own trucks on contract. It leases two trucks from DBE Firm Y and six trucks from non-DBE firm Z. DBE credit would only be awarded for the total value of transportation services provided by Firm X and Firm Y, and may also be awarded for the total value of transportation services provided by four of the six trucks provided by Firm Z. In all, full credit would be allowed for the participation of eight trucks. With respect to the other two trucks provided by Firm Z, DBE credit could be awarded only for the fees or commissions pertaining to those trucks Firm X receives as a result of the lease with Firm Z.

**10.05 Materials and Supplies:**

The Department will credit expenditures with DBEs for material and supplies as follows. If the materials or supplies are obtained from a DBE manufacturer, 100 percent of the cost of the materials or supplies is credited. A manufacturer is defined as a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract, and of the general character described by the specifications.

If the materials or supplies are purchased from a DBE regular dealer, 60 percent of the cost of the materials or supplies is credited. A DBE regular dealer is defined as a firm that owns, operates, or maintains a store or warehouse or other establishment in which the materials, supplies, articles, or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A firm may be a DBE regular dealer in such bulk items as petroleum products, steel, cement, stone or asphalt without owning, operating, or maintaining a place of business, as provided above, if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement, and not on an ad-hoc or contract-by-contract basis. Packers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not regular dealers within the meaning of this paragraph and the paragraph above.

With respect to materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer, the Department will credit the entire amount of the fees or commissions charged by the DBE for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site, toward DBE goals, provided the fees are determined to be reasonable and not excessive as compared with fees customarily allowed for similar services. The cost of the materials and supplies themselves may not be counted toward the DBE goal.

DBE credit for supplying paving grade asphalt and other asphalt products will only be permitted for standard industry hauling costs, and only if the DBE is owner or lessee of the equipment and trucks. Leases for trucks must be long term (extending for a fixed time period and not related to time for contract performance) and must include all attendant responsibilities such as insurance, titling, hazardous waste requirements, and payment of drivers.

**11.0 Joint Checks:**

**11.01 Requirements:**

A DBE subcontractor and a material supplier (or equipment supplier) may request permission for the use of joint checks for payments from the prime contractor to the DBE subcontractor and the supplier. Joint checks may be issued only if all the conditions in this subsection are met.

1. The DBE subcontractor must be independent from the prime contractor and the supplier, and must perform a commercially useful function. The DBE subcontractor must be responsible

for negotiating the price of the material, determining quality and quantity, ordering the materials, installing (where applicable), and paying for the material. The DBE subcontractor may not be utilized as an extra participant in a transaction, contract, or project in order to obtain the appearance of DBE participation.

2. The use of joint checks will be allowed only if the prime contractor, DBE subcontractor, and material supplier establish that the use of joint checks in similar transactions is a commonly recognized business practice in the industry, particularly with respect to similar transactions in which DBE's do not participate.
3. A material or supply contract may not bear an excessive ratio relative to the DBE subcontractor's normal capacity.
4. There may not be any exclusive arrangement between one prime and one DBE in the use of joint checks that may bring into question whether the DBE is independent of the prime contractor.
5. Any arrangement for joint checks must be in writing, and for a specific term (for example, one year, or a specified number of months) that does not exceed a reasonable time to establish a suitable credit line with the supplier.
6. The prime contractor may act solely as the payer of the joint check, and may not have responsibility for establishing the terms of the agreement between the DBE subcontractor and the supplier.
7. The DBE must be responsible for receiving the check from the prime contractor and delivering the check to the supplier.
8. The prime contractor cannot require the DBE subcontractor to use a specific supplier, and the prime contractor may not participate in the negotiation of unit prices between the DBE subcontractor and the supplier.

**11.02 Procedure and Compliance:**

1. Maricopa County Dept. Transportation Procurement Office must approve the agreement for the use of joint checks in writing.
2. After obtaining authorization for the use of joint checks, the prime contractor, the DBE, and the supplier must retain documentation to allow for efficient monitoring of the agreement.
3. Copies of canceled checks must be submitted period in which the joint check was issued, whether or not joint checks were used. with the payment information for the Certificates of payment must indicate
4. The prime contractor, DBE, and supplier each have an independent duty to report to the Maricopa County Dept. Transportation Procurement Office in the case of any change from the approved joint check arrangement.
5. Any failure to comply will be considered by the Maricopa County Dept. Transportation Procurement Office to be a material breach of this contract and will subject the prime contractor, DBE, and supplier to contract remedies and, in the case of serious violations, a potential for termination of the contract, reduction or loss of prequalification, debarment, or other remedies which may prevent future participation by the offending party.

EXAMPLE INVOICE

Company Name  
Address  
Phone Number

DATE:

INVOICE NUMBER:  
TIME PERIOD:

TO: Maricopa County Department of Transportation  
2901 West Durango Street  
Phoenix, Arizona 85009-6357

MCDOT PROJECT MANAGER:  
PROJECT NAME:  
WORK ORDER NUMBER:  
CONTRACT NUMBER:

MILESTONE	CONTRACT AMOUNT	MILESTONE VALUE PERCENT	COMPLETED MILESTONE COST	REMAINING CONTRACT AMOUNT
(identify either tasks or phases)				
Milestone 1	\$0	20%	\$0.00	\$0.00
Milestone 2	\$0	20%	\$0.00	\$0.00
Milestone 3	\$0	15%	\$0.00	\$0.00
Milestone 4	\$0	15%	\$0.00	\$0.00
Milestone 5	\$0	30%	\$0.00	\$0.00
TOTAL:		100%	\$0.00	
<b>CONTRACT AMOUNT COMPLETED</b>			\$0.00	
<b>PREVIOUSLY BILLED</b>			\$0.00	
<b>TOTAL DUE</b>			\$0.00	
<b>TOTAL INVOICE</b>			\$0.00	

Submitted by: \_\_\_\_\_  
Consultant

Payment Request Verification: \_\_\_\_\_  
MCDOT Project Manager

Approval to Pay: \_\_\_\_\_  
MCDOT Division Head

IF THIS IS A FULL AND FINAL PAYMENT REQUEST BE CERTAIN TO INCLUDE THE REQUIRED CERTIFICATE OF

**REQUIRED CONTRACT PROVISIONS  
FEDERAL-AID CONSTRUCTION CONTRACT**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

**ATTACHMENTS**

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (Included In Appalachian contracts only)

**I. GENERAL**

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

**II. NONDISCRIMINATION**

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

**Note:** The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

**1. Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: 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, pre-apprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. **Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

### III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

### IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

#### 1. Minimum wages

a. 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 such laborers or mechanics, subject to the provisions

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

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, 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:

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

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

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

(2) 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, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) 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 Wage and Hour Administrator for determination. The Wage and Hour 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.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, 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.

c. 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.

d. 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.

## 2. Withholding

The contracting agency 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 the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, 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.

## 3. Payrolls and basic records

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

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

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

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

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

**7. Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

**8. Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar

with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

**9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

**10. Assurance Required by 49 CFR 26.13(b):**

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. 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 contracting agency deems appropriate.

**11. Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

### III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

### IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

#### 1. Minimum wages

a. 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 such laborers or mechanics, subject to the provisions

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

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, 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:

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

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

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

(2) 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, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) 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 Wage and Hour Administrator for determination. The Wage and Hour 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.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, 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.

c. 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.

d. 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.

## 2. Withholding

The contracting agency 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 the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, 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.

## 3. Payrolls and basic records

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

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

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

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

(3) 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 3.b.(2) of this section.

(4) 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.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, 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 FHWA may, after written notice to the contractor, the contracting agency or the State DOT, 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.

#### 4. Apprentices and trainees

##### a. Apprentices (programs of the USDOL).

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, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, 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 Office of Apprenticeship Training, Employer and Labor Services 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 Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, 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.

##### b. Trainees (programs of the USDOL).

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.

c. 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.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

**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.

**6. Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 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.

**7. Contract termination: debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**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.

**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 its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

**10. Certification of eligibility.**

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

b. 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).

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

**V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT**

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

**1. Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any 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.

**2. Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, 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 (1.) of this section.

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

**4. Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors 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 (1.) through (4.) of this section.

**VI. SUBLETTING OR ASSIGNING THE CONTRACT**

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

- (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
- (2) the prime contractor remains responsible for the quality of the work of the leased employees;
- (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
- (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is

evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

**VII. SAFETY: ACCIDENT PREVENTION**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

**VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

**IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

**X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION**

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

**1. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

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

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

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**2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:**

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

**2. Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. 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 clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

\*\*\*\*\*

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

\*\*\*\*\*

**XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal 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.

b. 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 Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. 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.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION  
Certificate of Performance and Payment of ALL Claims

PROJECT NAME: \_\_\_\_\_

\_\_\_\_\_ hereby certifies to the Maricopa County Department of Transportation  
(Name of Signer)  
(MCDOT) that all lawful claims for labor, rental of equipment, material used, and any other  
claims by \_\_\_\_\_ or its subconsultants in connection with the project described in  
**MCDOT Contract No** \_\_\_\_\_, have been paid.

\_\_\_\_\_ understands that with receipt of payment for any previously invoiced amounts,  
plus any retained monies, that this is a settlement of all claims of every nature and kind against MCDOT arising  
out of the performance of **MCDOT'S Contract No** \_\_\_\_\_, relating to the material,  
equipment and work covered in and required by the contract.

The undersigned hereby certifies that to his/her knowledge, no contractual disputes exist in regard to this contract  
and that he/she has no knowledge of any pending or potential claims in regard to this contract.

Upon submission of this document and a separate invoice for any retained funds to MCDOT, invoice  
processing will be completed within sixty (60) calendar days.

State of Arizona            )  
  §  
County of Maricopa        )

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

*Signature*

Subscribed and Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

Notary Public

My Commission Expires: \_\_\_\_\_

## Title VI Assurances

### Maricopa County Department of Transportation Title VI Assurances

The Maricopa County Department of Transportation (herein referred to as the "Recipient"), HEREBY AGREES THAT, as a condition to receiving any Federal financial assistance from the U.S. Department of Transportation (DOT), through Federal Highway Administration and Arizona Department of Transportation, is subject to and will comply with the following:

#### Statutory/Regulatory Authorities

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252}, (prohibits discrimination on the basis of race, color, national origin);
- 49 C.F.R. Part 21 (entitled Non-discrimination In Federally-Assisted Programs of the Department of Transportation-Effectuation of Title VI of the Civil Rights Act of 1964};
- 28 C.F.R. section 50.3 (U.S. Department of Justice Guidelines for Enforcement of Title VI of the Civil Rights Act of 1964};
- 23 C.F.R. Part 200 Subchapter C-Civil Rights (Title VI program implementation and related statues)

The preceding statutory and regulatory cites hereinafter are referred to as the "Acts" and "Regulations," respectively.

#### General Assurances

In accordance with the Acts, the Regulations, and other pertinent directives, circulars, policy, memoranda and/or guidance, the Recipient hereby gives assurances that it will promptly take any measures necessary to ensure that:

"No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity," for which the Recipient receives Federal financial assistance from DOT, including the Federal Highway Administration.

The Civil Rights Restoration Act of 1987 clarified the original intent of Congress, with respect to Title VI and other Non-discrimination requirements (The Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973}, by restoring the broad, institutional-wide scope and coverage of these non-discrimination statutes and requirements to include all programs and activities of the Recipient, so long as any portion of the program is Federally assisted.

#### Specific Assurances

More specifically, and without limiting the above general Assurance, the Recipient agrees with and gives the following Assurances with respect to its Federal Aid Highway Program.

1. The Recipient agrees that each "activity," "facility," or "program," as defined in §§ 21.23 (b) and 21.23 (e) of 49 C.F.R. § 21 will be (with regard to an "activity") facilitated, or will be (with regard to a "facility") operated, or will be (with regard to a "program") conducted in compliance with all requirements imposed by, or pursuant to the Acts and the Regulations.
2. The Recipient will insert the following notification in all solicitations for bids, Requests For Proposals for work, or material subject to the Acts and the Regulations made in connection with all Federal Aid Highway Program and, in adapted form, in all proposals for negotiated agreements regardless of funding source:

"The Maricopa County Department of Transportation, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252.42 U.S.C. §§ 2000d- 4} and the Regulations, hereby notifies all advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award."

3. The Recipient will insert the clauses of Appendix A and E of this Assurance in every contract or agreement subject to the Acts and the Regulations.
4. The Recipient will insert the clauses of Appendix B of this Assurance, as a covenant running with the land, in any deed from the United States effecting or recording a transfer of real property, structures, use, or improvements thereon or interest therein to a Recipient.
5. That where the Recipient receives Federal financial assistance to construct a facility or part of a facility, the Assurance will extend to the entire facility and facilities operated in connection therewith.
6. That where the Recipient receives Federal financial assistance in the form, or for the acquisition of real property or an interest in real property, the Assurance will extend to rights to space on, over, or under such property.
7. That the Recipient will include the clauses set forth in Appendix C and Appendix D of this Assurance, as a covenant running with the land, in any future deeds, leases, licenses, permits, or similar instruments entered into by the Recipient with other parties:
  - a. for the subsequent transfer of real property acquired or improved under the applicable activity, project, or program; and
  - b. for the construction or use of, or access to, space on, over, or under real property acquired or improved under the applicable activity, project or program.
8. That this Assurance obligates the Recipient for the period during which Federal financial assistance is extended to the program, except where the Federal financial assistance is to provide, or is in the form of, personal property, or real property, or interest therein, or structures or improvements thereon, in which case the Assurance obligates the Recipient, or any transference for the longer of the following periods:
  - a. the period during which the property is used for a purpose for which the Federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits; or
  - b. the period during which the Recipient retains ownership or possession of the property.
9. The Recipient will provide for such methods of administration for the program as are found by the Secretary of Transportation or the official whom he/she delegates specific authority to give reasonable guarantee that it, other recipients, sub-recipients, sub-grantees, contractors, subcontractors, consultants, transferees, successors in interest, and other participants of Federal financial assistance under such program will comply with all requirements imposed or pursuant to the Acts, the Regulations, and this Assurance.
10. The Recipient agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the Acts, the Regulations, and this Assurance.

**SERIAL 15058-RFP**

By signing this ASSURANCE, Maricopa County Department of Transportation also agrees to comply (and require any sub-recipients, sub-grantees, contractors, successors, transferees, and/or assignees to comply) with all applicable provisions governing Federal Highway Administration or Arizona Department of Transportation access to records, accounts, documents, information, facilities, and staff. You also recognize that you must comply with any program or compliance reviews, and/or complaint investigations conducted by the Federal Highway Administration or Arizona Department of Transportation. You must keep records, reports, and submit the material for review upon request to Federal Highway Administration, Arizona Department of Transportation, or its designee in timely, complete, and accurate way. Additionally, you must comply with all other reporting, data collection, and evaluation requirements, as prescribed by law or detailed in program guidance.

Maricopa County Department of Transportation gives this ASSURANCE in consideration of and for obtaining any Federal grants, loans, contracts, agreements, property, and/or discounts, or other Federal-aid and Federal financial assistance extended after the date hereof to the recipients by the U.S. Department of Transportation under the Federal Highway Administration and Arizona Department of Transportation. This ASSURANCE is binding on Arizona, other recipients, subrecipients, sub-grantees, contractors, subcontractors and their subcontractors, transferees, successors in interest, and any other participants in the Federal Aid Highway Program the person(s) signing below is authorized to sign this ASSURANCE on behalf of the Recipient.

## APPENDIX A

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

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally- assisted programs of the U.S. Department of Transportation, Federal Highway Administration or the Arizona Department of Transportation, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Nondiscrimination:** The contractor, with regard to the work performance by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
3. **Solicitations for Subcontractors, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and Regulations relative to Non- discrimination on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient, the Federal Highway Administration or Arizona Department of Transportation to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient, the Federal Highway Administration, or Arizona Department of Transportation, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration or Arizona Department of Transportation, may determine to be appropriate, including, but not limited to:
  - a. withholding payments to the contractor under the contract until the contractor complies; and/or
  - b. cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with request to any subcontract or procurement as the Recipient, the Federal Highway Administration, or Arizona Department of Transportation may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

**APPENDIX E**

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

**Pertinent Non-Discrimination Authorities:**

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, which ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1687 et seq).

**TRANSCORE ITS, LLC, 15300 N. 90<sup>TH</sup> STREET, STE 750, SCOTSDALE, AZ 852860**

PRICING SHEET: NIGP CODE 91842

Terms:	NET 30
Vendor Number:	VC0000009395
Certificates of Insurance	Required
Contract Period:	To cover the period ending <b>August 31, 2021.</b>