SERIAL 15058 RFP BELL RD ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT) DEPLOYMENT
(Contract - Kimley-Horn and Associates, Inc.)

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

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 7th day of September, 2016 by and between Maricopa County ("County"), a political subdivision of the State of Arizona, and Kimley Horn, a North Carolina corporation ("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 7th 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 will 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 will 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, officers, directors, officials, and employees from and against all claims, damages, losses, and expenses (including, but not limited to 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 Contractor's performance of this Contract.

Contractor's duty to defend, indemnify, and hold harmless the County, its agents, representatives, , officers, directors, officials, and employees shall arise in connection with any claim, 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 of the Contractor, 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.

The amount and type of insurance coverage requirements set forth herein will in no way be construed as limiting the scope of the indemnity in this paragraph.

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 Professional Liability, 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 Professional Liability, 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 **Professional Liability.**

Contractor shall maintain Professional Liability insurance which will provide coverage for any and all negligent 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.

6.2.12 **Cyber –**

Policy Limit:

6.2.12.1 The policy shall be issued with minimum limits of $100,000.
6.2.12.2 The policy shall include coverage for all directors, officers, agents and employees of the Contractor.
6.2.12.3 The policy shall **include coverage for third party fidelity.**
6.2.12.4 The policy shall **include coverage for theft.**
6.2.12.5 The policy shall **contain no requirement for arrest and conviction.**
6.2.12.6 The policy shall cover loss outside the premises of the **Named Insured.**
6.2.12.7 The policy shall endorse **(Blanket Endorsements are not acceptable)** the Department as **Loss Payee** as our interest may appear.

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 fifteen (15) days 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 OF SERVICES:

6.3.1 The Contractor warrants to exercise the professional standard of care so that all services provided hereunder will 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.

6.3.2 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.

6.4 INSPECTION OF SERVICES:

6.4.1 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.

6.4.2 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 will not unduly delay the work.

6.4.3 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:

6.4.3.1 Require the Contractor to take necessary action to ensure that future performance conforms to Contract requirements; and

6.4.3.2 Reduce the Contract price to reflect the reduced value of the services performed.

6.4.4 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:

6.4.4.1 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

6.4.4.2 Terminate the Contract for default.

6.5 REQUIREMENTS CONTRACT:

6.5.1 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 will be made. It only indicates that if purchases are made for the materials or services contained in the Contract, they will be purchased from the Contractor awarded that item if the Contractor can meet all the delivery requirements of the County. Orders will only be placed when the County identifies a need and proper authorization and documentation have been approved.

6.5.2 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 will 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.

6.5.3 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.

6.6 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.

6.7 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—

6.7.1 Cancel the stop-work order; or

6.7.2 Terminate the work covered by the order as provided in the Default, or the Termination for Convenience of the County, clause of this contract.

6.7.3 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.

6.8 UNCONDITIONAL TERMINATION FOR CONVENIENCE:

Maricopa County may terminate the resultant Contract for convenience by providing sixty (60) calendar days advance notice to the Contractor.

6.9 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:

6.9.1 Deliver the supplies or to perform the services within the time specified in this contract or any extension;

6.9.2 Make progress, so as to endanger performance of this contract; or

6.9.3 Perform any of the other provisions of this contract.

6.9.4 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.

6.10 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.

6.11 CONTRACTOR LICENSE REQUIREMENT:

6.11.1 The Contractor 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 Contractor 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.

6.11.2 Contractors furnishing finished products, materials or articles of merchandise that will require installation or attachment as part of the Contract, shall possess any licenses required. A Contractor is not relieved of its obligation to posses the required licenses by subcontracting of the labor portion of the Contract. Contractors are advised to contact the Arizona Registrar of Contractors, Chief of Licensing, at (602) 542-1525 to ascertain licensing requirements for a particular contract. Contractors shall identify which license(s), if any, the Registrar of Contractors requires for performance of the Contract.

6.12 SUBCONTRACTING:

6.12.1 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.

6.12.2 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.

6.13 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.

6.14 ADDITIONS/DELETIONS OF SERVICE:

6.14.1 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 will 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 will be negotiated between the Contractor and the County.

6.14.2 The County reserves the right of final approval on proposed staff for all Task Orders. Also, upon request by the County, the Contractor will 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.

6.15 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.

6.16 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.

6.17 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.

6.18 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.

6.19 CERTIFICATION REGARDING DEBARMENT AND SUSPENSION

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

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

6.19.1.2 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 statues or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

6.19.1.3 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

6.19.1.4 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.

6.19.2 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.

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

6.20.1 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.

6.20.2 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 will 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.

6.21 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:

6.21.1 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,

6.21.2 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.

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

6.22.1 The Parties agree that this Contract and employees working on this Contract will 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;

6.22.2 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.

6.22.3 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).

6.23 FEDERAL CLAUSES

6.23.1 **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 will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

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.

6.23.2 **Buy America**

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

6.23.3 **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.

6.23.4 **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.

6.23.5 **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.

6.23.6 **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.

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

6.24.1 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.

6.24.2 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.

6.24.3 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.

6.25 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.

6.26 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.

6.27 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.

6.28 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.

6.29 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.

6.30 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.

6.31 GOVERNING LAW:

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

6.32 ORDER OF PRECEDENCE:

In the event of a conflict in the provisions of this Contract and Contractor's license agreement, if applicable, the terms of this Contract shall prevail.

6.33 INCORPORATION OF DOCUMENTS:

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

6.33.1 Exhibit A, Pricing;

6.33.2 Exhibit B, Scope of Work;

6.33.3 Exhibit C, Standard Software Maintenance Agreement(or other contractor agreement requiring County signature); and

6.33.4 Exhibit D, Office of Procurement Services Contractor Travel and Per Diem Policy

6.33.5 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:

Kimley-Horn
ATTN: Pierre Pretorius, Principal
7740 N. 16th St, Suite 300
Phoenix, AZ 85020

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

CONTRACTOR

AUTHORIZED SIGNATURE

PIERRÉ PRETORIUS SR. VP.

PRINTED NAME AND TITLE

7740 N 16th ST., #300, PHOENIX AZ 85020

ADDRESS

7/27/2016

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:	Kimley-Horn and Associates, Inc.
COUNTY VENDOR NUMBER :	W000010222 9
ADDRESS:	7740 N. 16th Street, Ste. 300
	Phoenix, Arizona 85020
P.O. ADDRESS:	N/A
TELEPHONE NUMBER:	(602) 944-5500
FACSIMILE NUMBER:	(602) 944-7423
WEB SITE:	www.kimley-horn.com
CONTACT (REPRESENTATIVE):	Douglas Gettman, Ph.D.
REPRESENTATIVE'S E-MAIL ADDRESS:	doug.gettman@kimley-horn.com

	YES	NO	REBATE
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:	[ ]	[X]	%

(Payment shall be made within 48 hours of utilizing the Purchasing Card)

[X] NET 30 DAYS

1.0 PRICING:

		Year 1	Year 2	Year 3	Year 4	Year 5
Implementation/Professional Services	NTE	$467,500	$	$	$	$
Licensing	NTE	0	$	$	$	$
Maintenance and Support	NTE	$60,000	included	included	included	included
Proprietary Hardware	NTE	$	$	$	$	$
NOT TO EXCEED (NTE) TOTAL	$527,500					

2.0 ADDITIONAL PRICING:

Respondents are to list all additional/optional pricing modules, hardware, or other offerings in this Excel sheet.

These costs are included in the Year 1 price:

Omitting phases and selecting alternate sequence below a user-selected cycle time	$35,000 (included)
Accelerating cycle change rate based on user-specified conditions	$35,000 (included)
TOD Tuning and learning module	$125,000 (included)
Queue length estimation, displays	$25,000 (included)
Replacing detector data with historical values of detection or splits	$22,500 (included)

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 within 20 days of receipt of Verification Plan. All deficiencies identified shall be addressed by the contracted system provider within 20 days of receipt of MCDOT comments.

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 a 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.

Task by Task Progress Payments

The parties acknowledge that payment for the Tasks hereunder be payable only upon the County's acceptance of each Task, acceptance of which shall not be unreasonably withheld, delayed or conditioned. The Schedule of Task Completion, as defined below, is inclusive of the terms and conditions within the Master Agreement. Tasks will be billed by percent complete of each task on a monthly basis.

Task 1 - Intersection Detection Identificatio

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. System provider in conjunction with City of Surprise technical staff 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 provider's 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. Task 1 shall not be considered complete until final plans are approved and accepted by MCDOT.

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.

Task Value - 15% of Total Project Cost $79,125

Task 2 – Initial 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.

Task Value - 25% of Total Project Cost $131,875

Task 3 – Installation of features (bundle 1)
The system provider shall deliver, install, configure and set up all software enhancements 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.

1. Accelerating cycle change rate
2. Replacing failed detectors with historical data/splits

Task Value - 15% of Total Project Cost $79,125

Task 4 – Installation of features (bundle 2)
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.

1. TOD tuning and learning module
2. Queues estimates and displays
3. Alternate sequence below a certain cycle time

Task Value - 15% of Total Project Cost $79,125

Task 5 - 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.

Task Value – 18.6% of Total Project Cost $98,250

Task 6 – Maintenance and Support
The system provider will provide system maintenance and support for Years 2-5 as per the terms in Exhibit C. This will be billed in total at the beginning of Year 2.

Task Value – 11.4% of Total Project Cost $60,000

Exhibit B

Scope of Work

How Does Kadence Work?

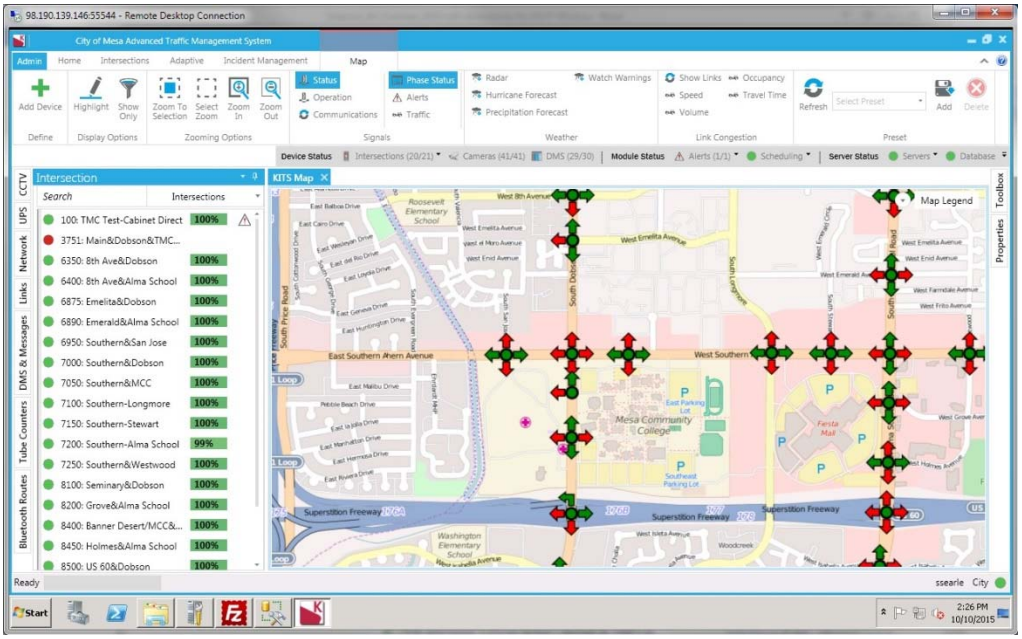
Kadence comprises five principal algorithms for tuning signal splits, offsets, cycle time, phase sequence, and TOD schedule. In the Kadence approach, second-by-second phase timing and detector data is polled from the controller. New signal timing Parameters are downloaded to field controllers every three to four cycles. The field controller then begins operating in an actuated-coordinated state with these new settings.

Kadence has no field equipment in each cabinet, and the software system resides completely at central.

Stop bar detection is used for cycle, splits, and phase sequence tuning. Advance detection is only needed for offset tuning and for measuring stopped and flowing vehicle queues. Advance detection can be used upstream of the controller connected to the downstream controller, or as exit detection connected to the upstream controller (including a controller that is not intended to be adaptively controlled). Kadence is detection-technology agnostic. In all cases, better performance will be achieved with lane-by- lane detection but this is not required.

Kadence detects the presence of queues by measuring the average occupancy on a queue detector. When the level of occupancy is consistently high (a user-configurable threshold of occupancy) for several minutes (a user-configurable threshold of time), IF… THEN logic conditions can be configured to put Kadence into a variety of congestion management modes by selecting a new response coordination pattern with associated configuration parameters for Kadence to begin metering, increase cycle time, or change the coordination flow pattern.

All pedestrian functions are handled by the local controller. Kadence can be configured to allow split tuning to violate the pedestrian clearance times, which results in a transition event if a pedestrian push button is activated, or can be configured to only allow splits that are larger than the pedestrian clearance time. Advance walk, delay walk, and all other pedestrian settings are handled by the field controller.



Internet maps and real-time signal status

Based on past experience with adaptive systems

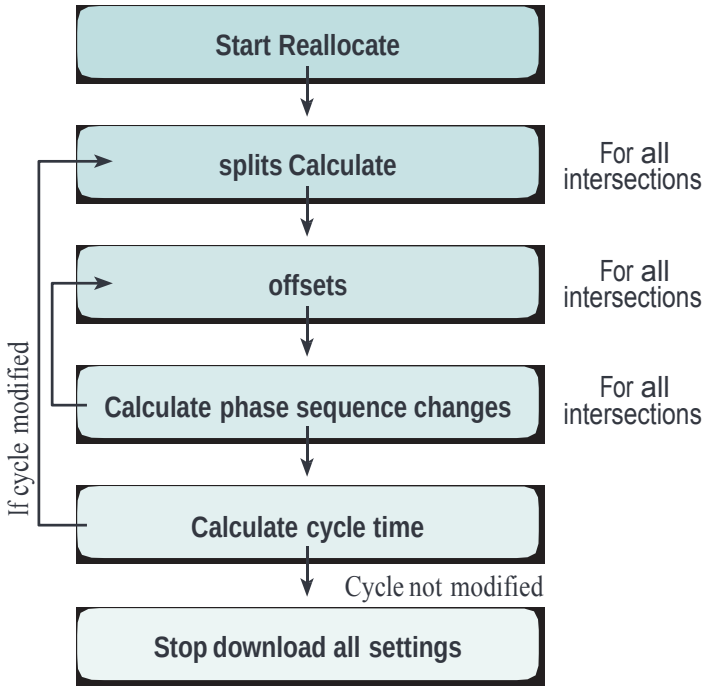
that override the controller's timings every second (Real-Time Hierarchical Optimized Distributed Effective System (RHODES), Optimized Policies for Adaptive Control [OPAC], Split Cycle Offset Optimisation Technique [SCOOT], Sydney Coordinated Adaptive Traffic System [SCATS], and InSync), this methodology of downloading new timings is more reliable, safer, and less error prone. In addition, the approach of ACSLITE is proven to require minimal capital investment, infrastructure, detectors, configuration, and calibration. The system operation has been validated in over 20 deployments nationwide to produce improvements to travel time and system delay over actuated-coordinated operation with TOD plans.

Long-term benefits not typically captured in a short before-and-after study are also accrued over time as the traffic patterns shift due to construction, incidents, land use changes, and so on.

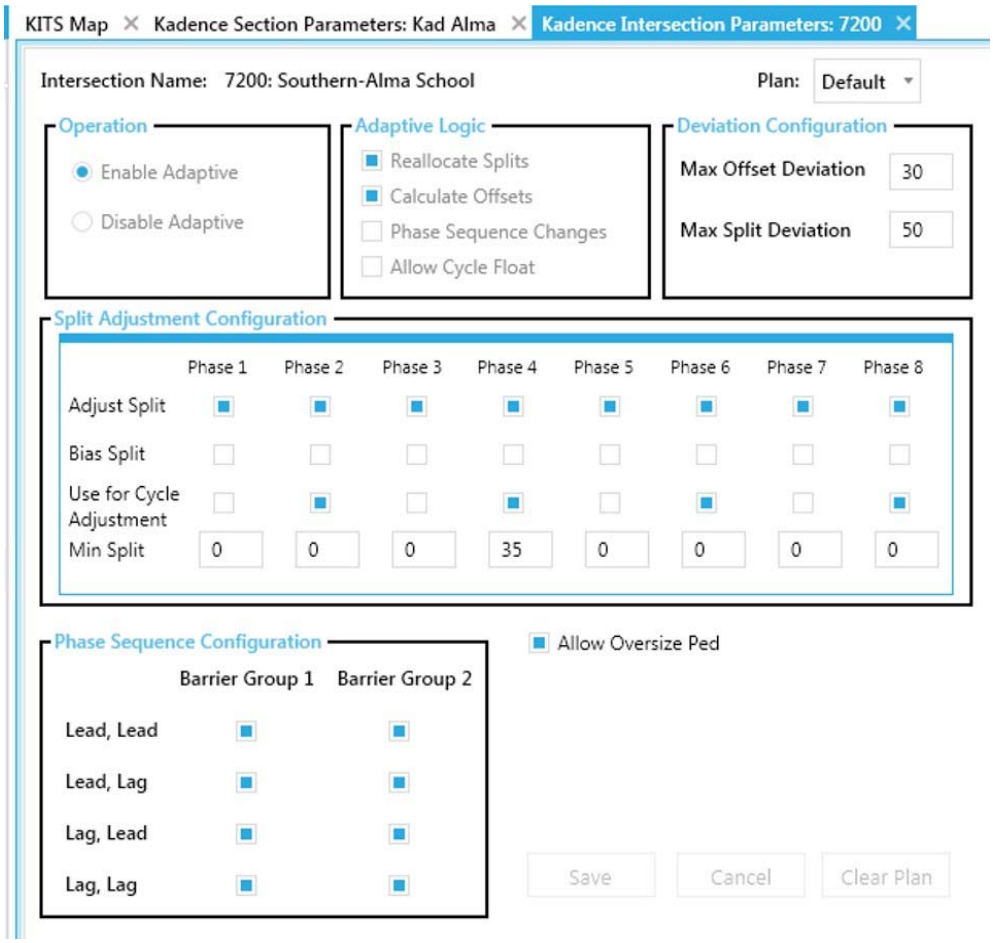
In addition to the implementation of three optimization algorithms (cycle tuning, cycle selection, and phase sequence selection), several other key enhancements have been implemented in Kadence. The system requires three cycles of good observations of phase timing and detector data before making decisions but now checks every 30 seconds to identify if that requirement is satisfied. This vastly improves the responsiveness of the system versus the fixed-horizon scheme (five minutes, 10 minutes) implemented in the baseline ACSLITE system. The offset tuning algorithm has also been enhanced to search offsets in a range instead of only considering fixed changes (+5, 0, -5). By selecting larger search bounds (say, +/-20s), Kadence can quickly find the correct offset solution when the current solution is particularly poor. Kadence has a variety of configurable parameters to tailor the operation to the expectations of any agency. Certain adjustments can be disallowed and some phases can be excluded from optimization by pattern.

Configurable parameters include:

- Exclude any phase from split tuning by pattern
- Exclude or allow any lead-lag sequence by pattern
- Exclude or allow cycle tuning by pattern
- Exclude or allow offset tuning by pattern
- Configure maximum deviation of splits from pattern values
- Configure maximum deviation of offsets from pattern values
- Configure minimum and maximum cycle time
- Set phase minimum and maximum bounds by pattern, by phase
- Exclude or allow cycle selection
- Select any phases for biasing, by pattern
- Configure operation by TOD and Pattern



Kadence algorithm computation process



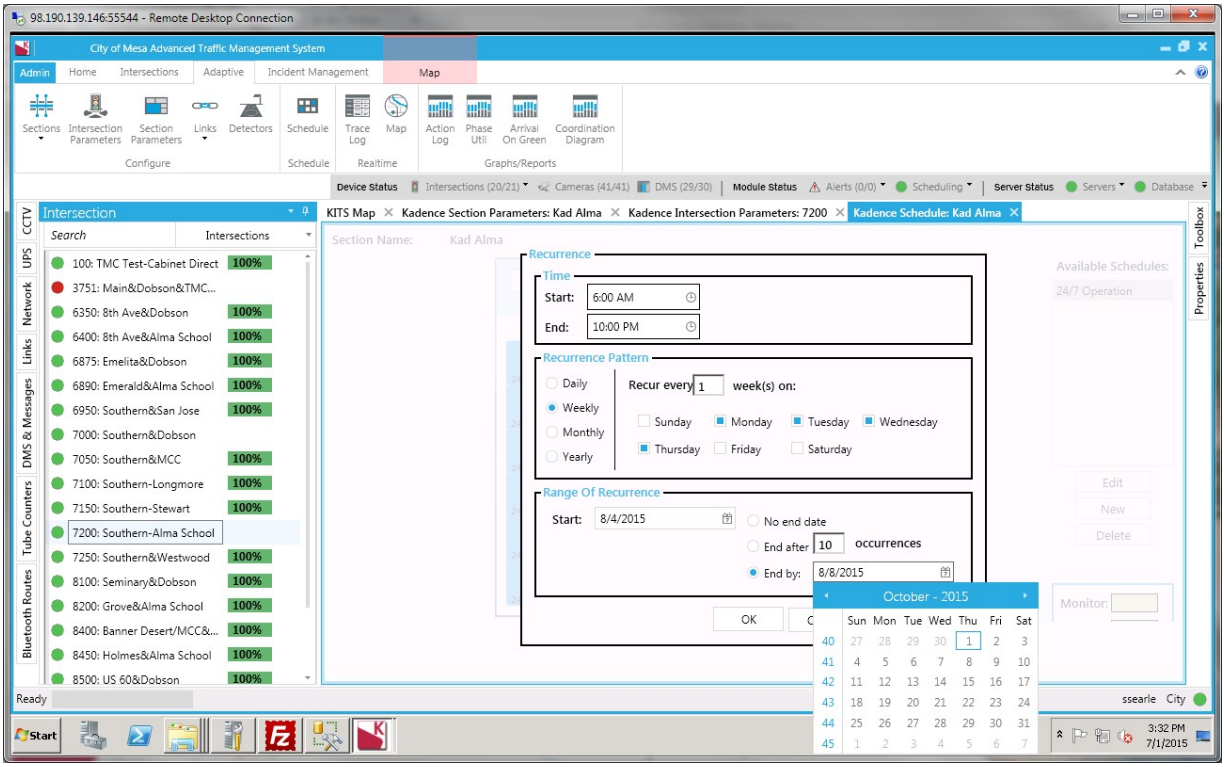
Configurable intersection parameters

All Kadence algorithms and services operate at a central Traffic Management Center (TMC). There are no field hardware components to install or maintain. If a Kadence algorithm fails, controllers will return to their normal TOD operation. In addition, Kadence can be turned ON or OFF from central and scheduled to run on a TOD, day-of-week schedule. When Kadence is OFF, the controller will return to its regular non-adaptive operation as programmed in the controller (time based coordination [TBC] coordination or free, as configured). Kadence does not send hold or force-off commands to controllers, or suppress phase calls, so there is no risk of a controller getting stuck in a certain phase. All controller features operate normally including pedestrians, transit priority, and preemption. Kadence can run alongside an existing central system on an IP network using NTCIP or AB3418 protocols, depending on what is supported by the field device. Kadence **is** already integrated fully with the **ASC/3.**

How Does Kadence Meet Your Operational Objectives?

Kadence can meet a variety of agency objectives, including:

- Maximize throughput on a coordinated route
- Provide smooth flow on a coordinated route
- Provide access equity for all phases at an intersection
- Manage the length of queues
- Optimize operation to minimize phase failures
- Combine these objectives



Scheduling Kadence ON/OFF times

Maximize the Throughput on a Coordinated Route

Kadence maximizes throughput on a coordinated route by using a combination of offset tuning, split tuning, cycle tuning, and phase sequence selection. Kadence tunes offsets to provide smooth flow, which increases the throughput on the route by reducing stops. By tuning (increasing) the coordinated phase splits, more time can be provided to that route when the level of traffic on the side streets and other competing phases is reduced. In the split tuning algorithm, coordinated phase utilization measures can be biased so that more time for that movement is protected which provides more opportunities for progression along the route. If the coordinated phases are over a specified threshold for phase utilization, the cycle time can also be increased to provide additional throughput on the critical route. In addition, Kadence can modify the phase sequence to a lead-lag combination for left turns to increase the amount of time that the critical through route receives if there is very low opposing left-turn volume.

For example, a change from lead-lead to lag-lead would be predicated if:

- Phase 5 has a heavier utilization than phase 1
- Phases 2 and 5 have heavier total utilization than phases 1 and 6
- Offsets are then adjusted after the sequence change is evaluated and a similar comparison is done for the other barrier group (phases 3, 4, 7, and 8)

Cycle Selection

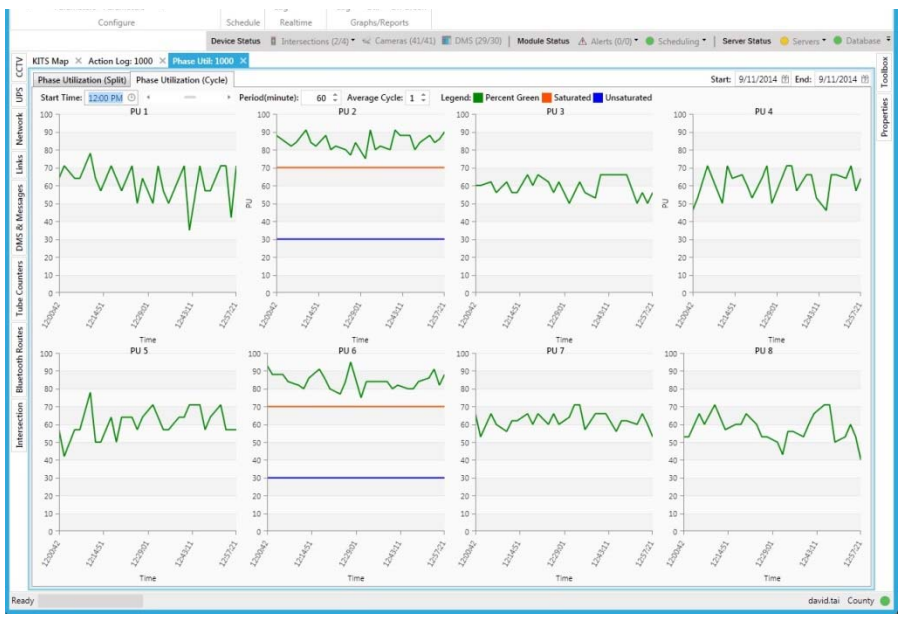
Throughput is also improved on coordinated routes by determining a decision to either implement the cycle time that is next in the TOD schedule earlier or later than was originally planned. This can be used in conjunction with the cycle tuning method (discussed below) or alone. This allows the system to adapt to changes to the beginning or end of peak periods. The same evaluation approach for the incremental cycle tuning algorithm described previously is used but rather than changing the cycle just a few seconds, the system enables the new cycle time immediately and recalculates splits and offsets appropriately.

The algorithm begins considering implementing the next pattern in the TOD schedule early if it less than a configurable number of minutes before the next pattern change time. For example, this threshold time might be set to 30 minutes prior to the schedule change so if the pattern is scheduled to be adjusted at 10:00 am, the algorithm will begin considering implementing the next pattern at 9:30 am. If the thresholds for phase utilization are not exceeded to implement a lower or higher cycle, the current cycle is retained. If the phase utilization thresholds are not exceeded after the scheduled time to change to the next cycle, the system can keep the current pattern in operation. After a configurable amount of time, however, the system will transition to the next pattern in the TOD.

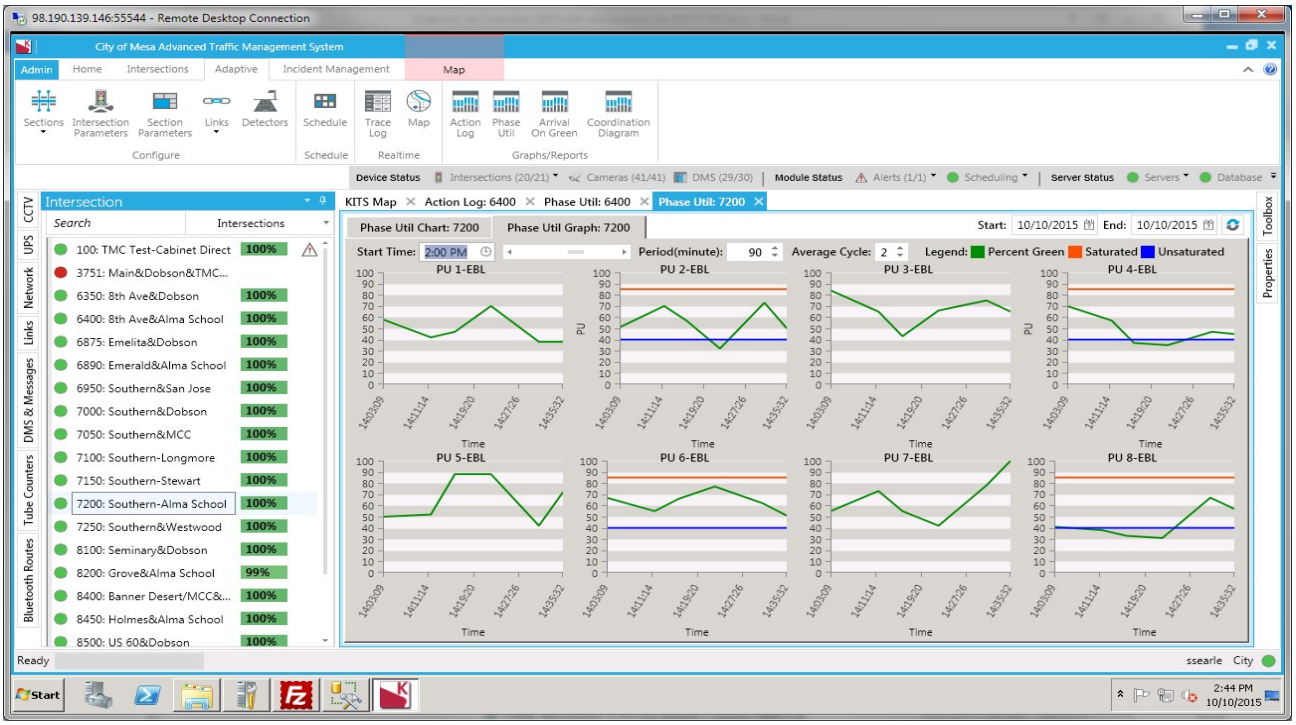
Phase sequence tuning method

(logic applies for barrier group 34 | 78)
PU = "phase utilization"
PU15 means average PU1 + average PU5 for minimum of last three cycles
"dominates" means PU15 > PU 26 + threshold value

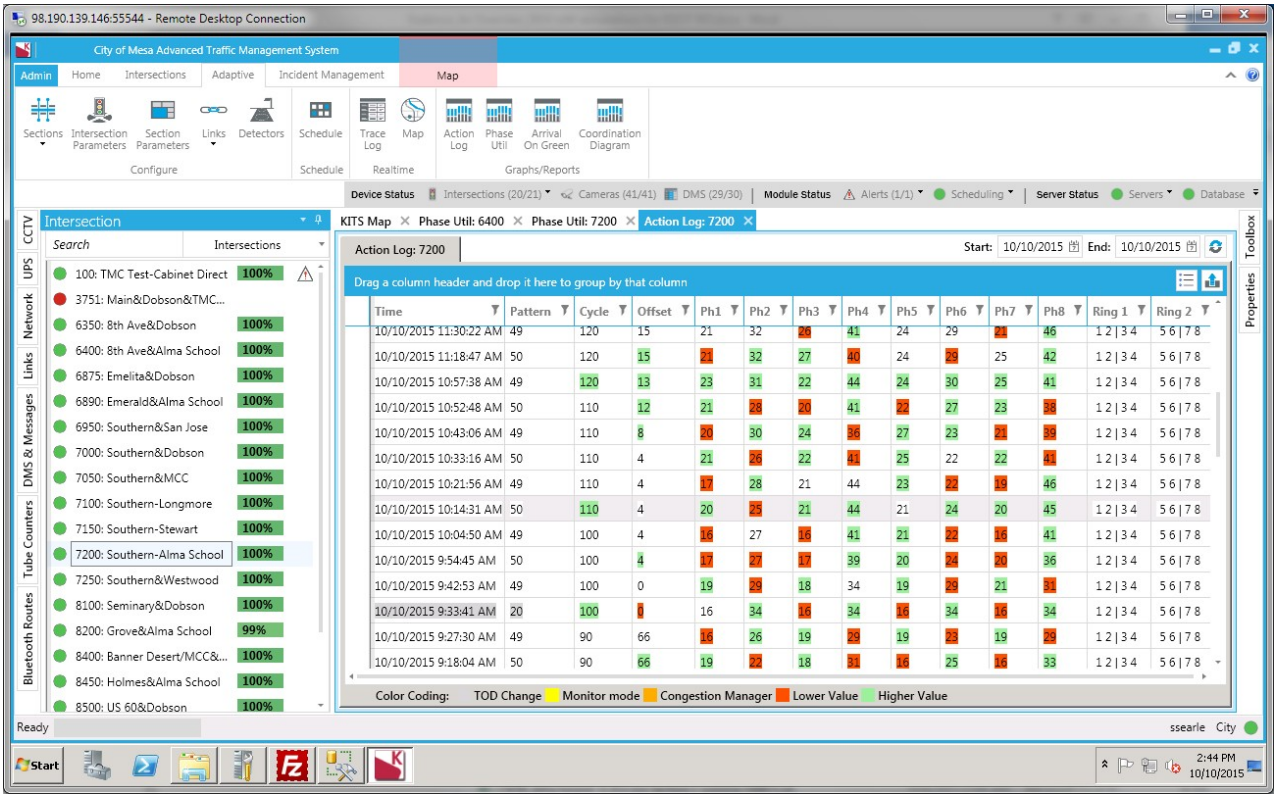
Current sequence \ potential next sequence	Lead-lead (12|56)	Lead-lag (12|65)	Lag-lead (21|56)	Lag-lag (21|65)
Lead-lead (12|56)	N/A	PU5 < light PU (16) dominates PU (25)	PU1 < light PU(25) dominates PU(16)	PU1 < light PU5 < light PU(26) dominates PU(15)
Lead-lag (12|65)	PU5 > heavy PU(15) dominates PU(26)	N/A	PU1 < light PU5 > heavy PU(25) dominates PU(16)	PU1 < light PU(26) dominates PU(15)
Lag-lead (21|56)	PU1 > heavy PU(15) dominates PU(26)	PU1 > heavy PU5 < light PU(16) dominates PU(25)	N/A	PU5 < light PU(26) dominates PU(15)
Lag-lag (21|65)	PU1 > heavy PU5 > heavy PU(15) dominates PU(26)	PU1 > heavy PU(16) dominates PU(25)	PU5 > heavy PU(25) dominates PU(16)	N/A



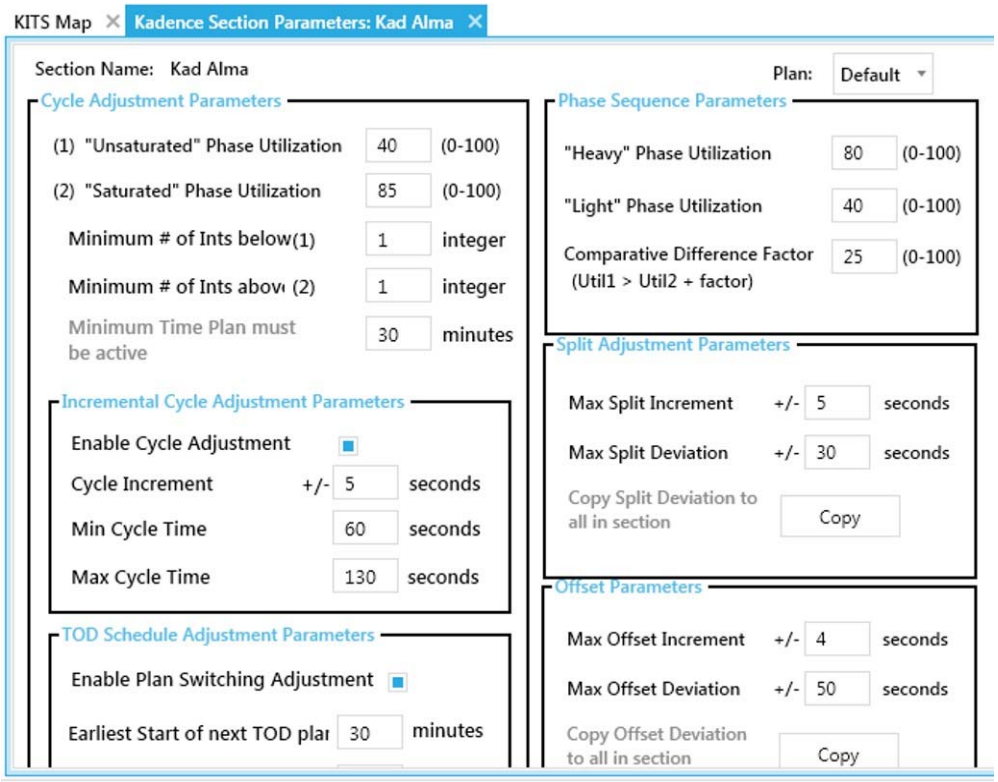
Phase utilization graphs show when critical phases are oversaturated



Flexible graphing displays for phase utilization



Action log of all adjustments including color coding



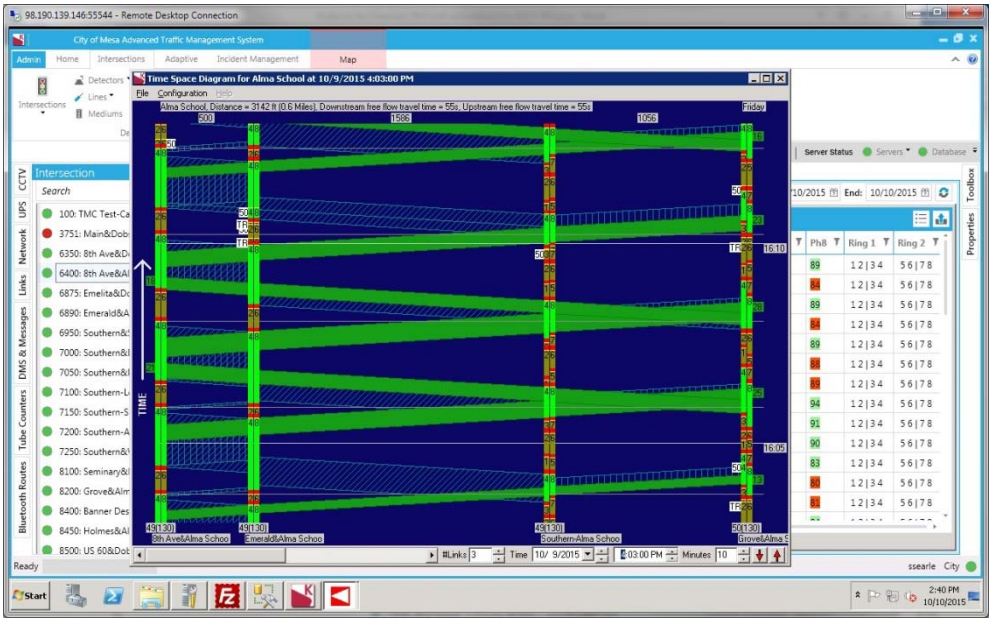
Kadence section configuration parameters

Provide Smooth Flow Along Coordinated Routes

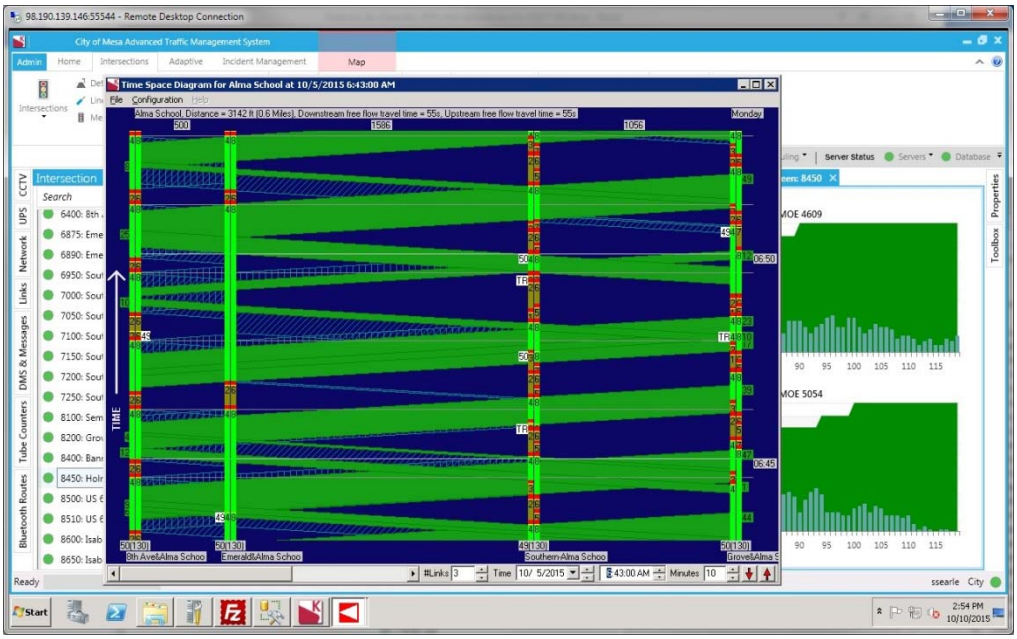
Tuning offsets improves progression performance along primary routes for phases that are coordinated. Offset tuning algorithms are particularly straightforward. The proven and robust methodology used in ACSLITE is used in Kadence with several key enhancements.

The concept of the data-driven offset adjustment algorithm is to maximize the number of vehicles arriving during the green phase. Periodically, small, incremental adjustments are made to the offset to maximize the total proportion of cyclic flow arriving to a green light. This concept is then expanded to consider and mitigate the effects of such modifications to the offset value for multiple approaches (including the consideration of cross-coordination on all four approaches) and the effects of changes at a given intersection on adjacent intersections.

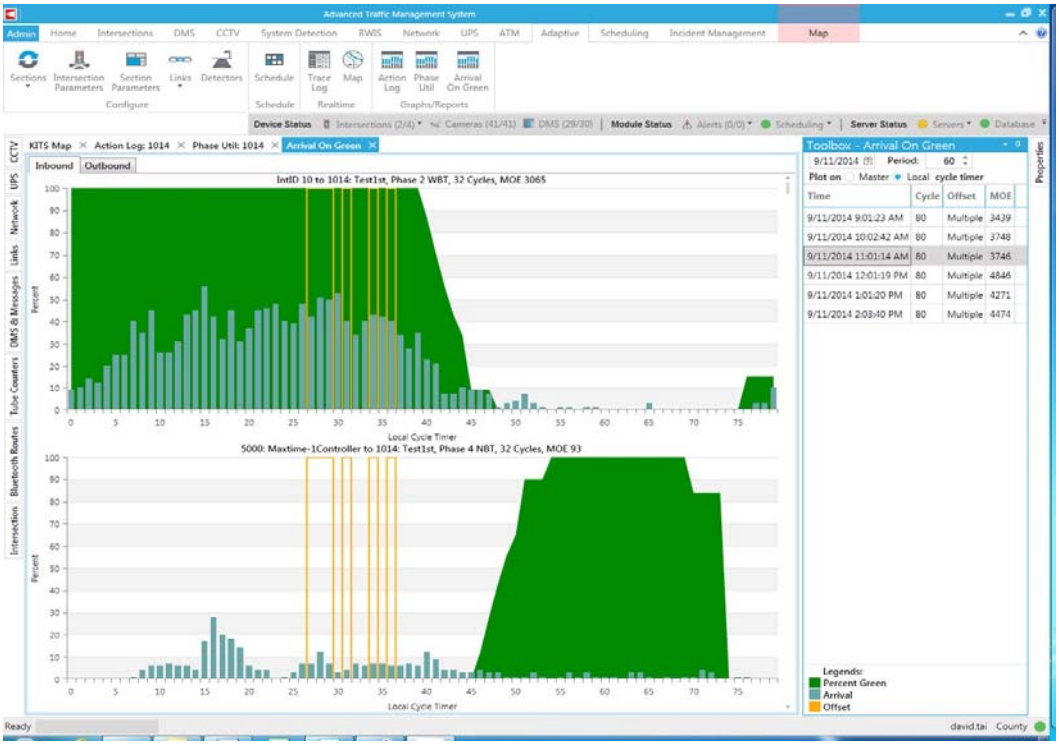
A user-configurable maximum deviation from the original setting (either an increase or decrease to the offset value) is defined for each offset to restrict the algorithm (if desired) from drifting too far away from the original solution. The user can also specify that this value is unbounded, which allows the system to search for any offset. For example, if the initial offset is 20s and the maximum deviation is set to 10s, the algorithm will be restricted to implement offsets with the range of 10s to 30s. Each controller considers a range of offset settings: no change, adjust up to seconds earlier, or adjust up to seconds later. The adjustment maximum step size is a user-configurable value. If the value is set at 10, for example, Kadence will search offsets in each step in the range of (+10, +9, +8, +7, …., 0, -1, -2, -3,….., -10). If the difference in the % arrivals on green between the evaluated offsets is not greater than small amount of improvement, say, 5%, the controller will remain at the current offset. This reduces transition events that do not result in significant improvement to performance.



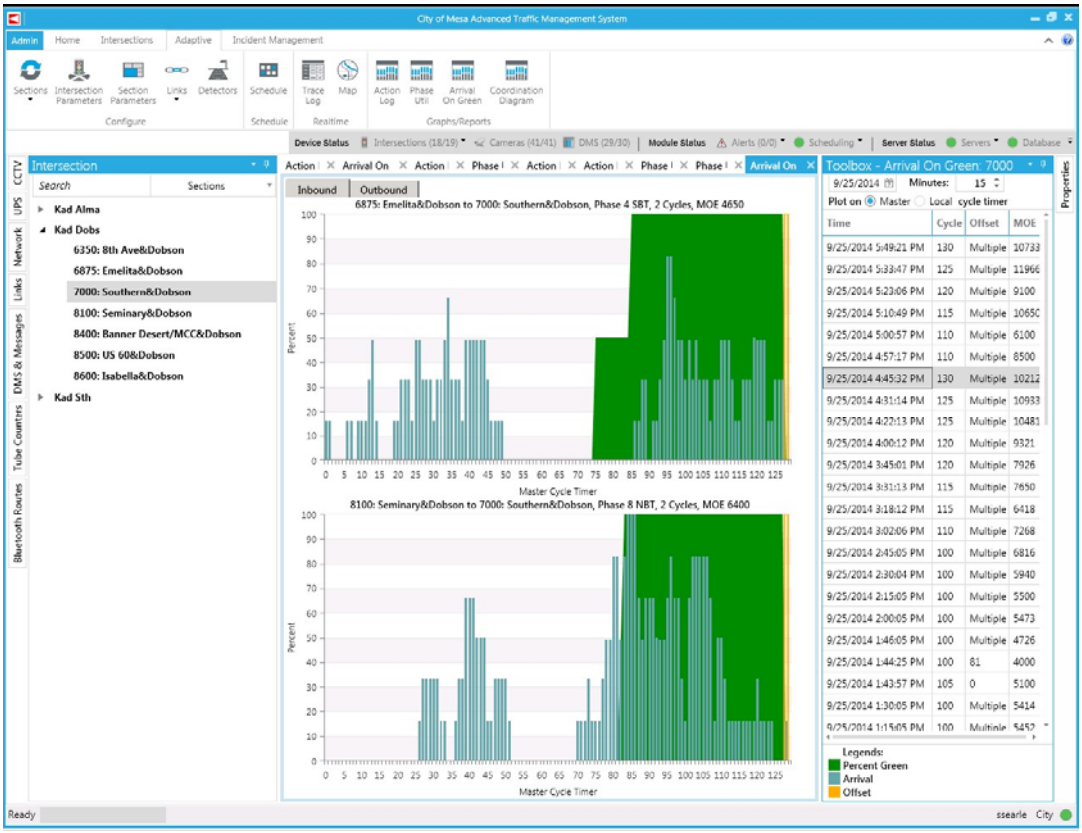
Real-time historical time-space display showing Kadence green bands



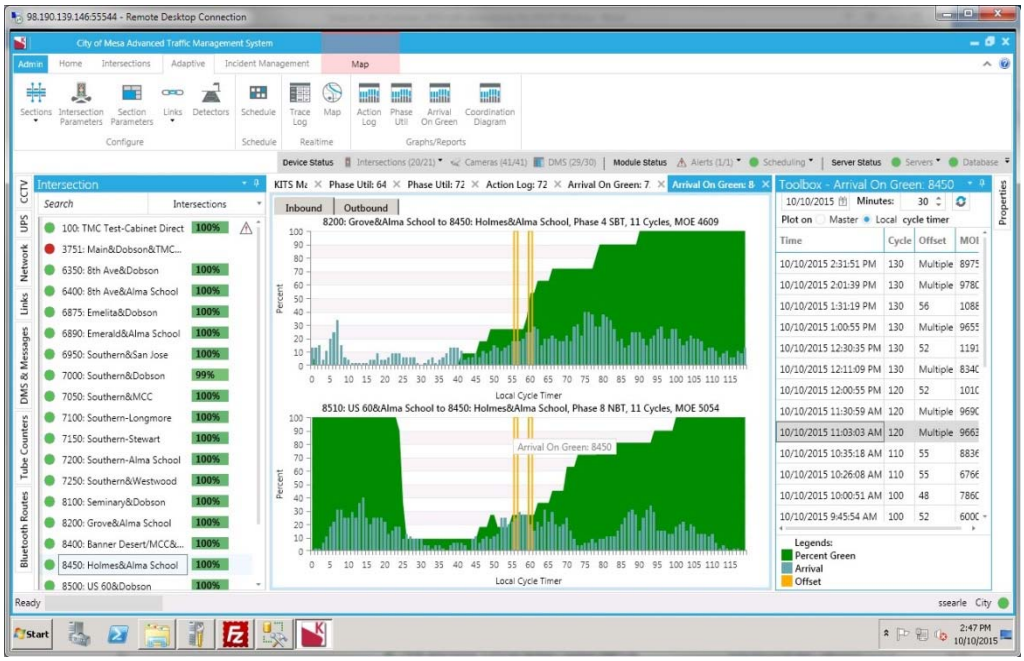
Two-way progression at certain times of day



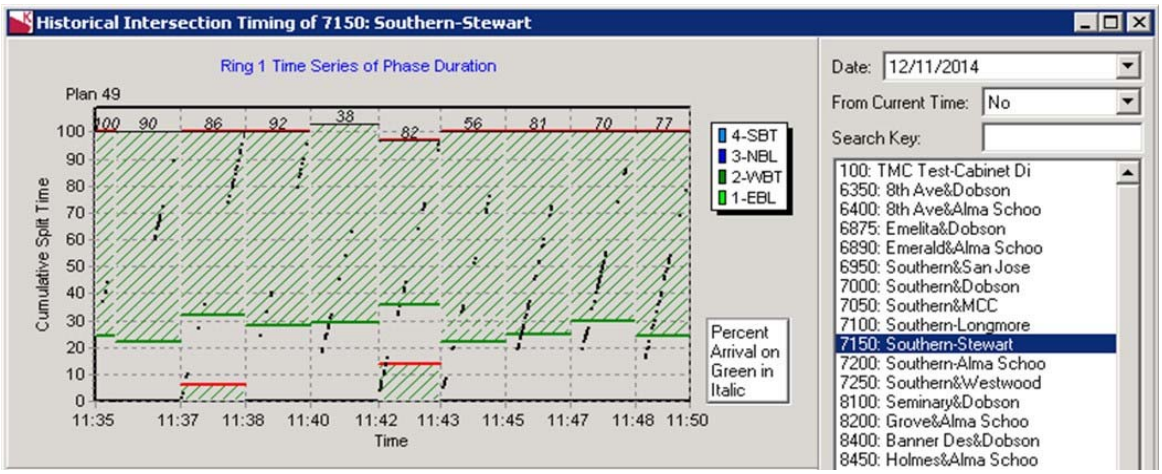
Arrivals on green display for multiple offset values (in yellow)

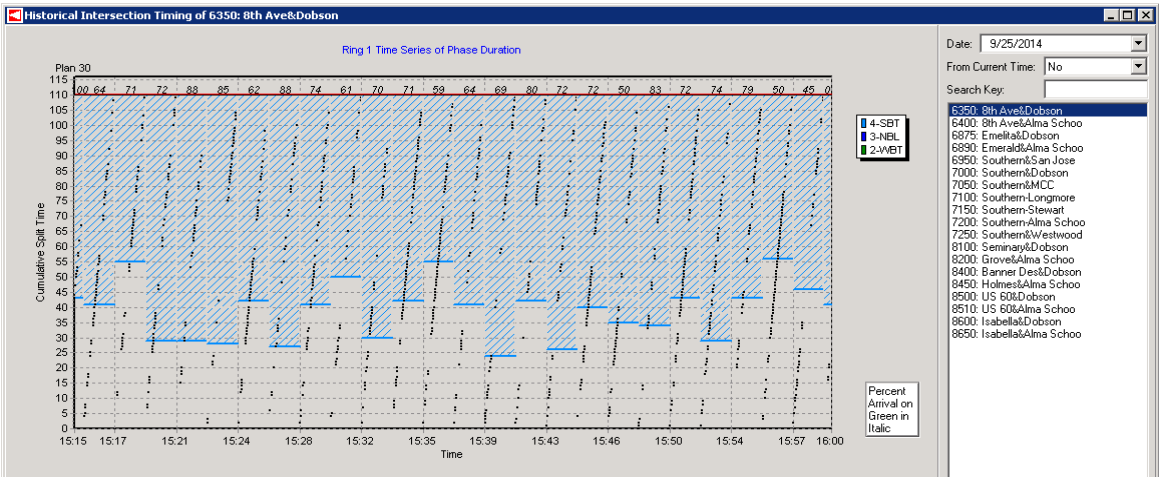


Arrivals on green display



Flexible aggregation of percent arrivals on green by TOD and DOW



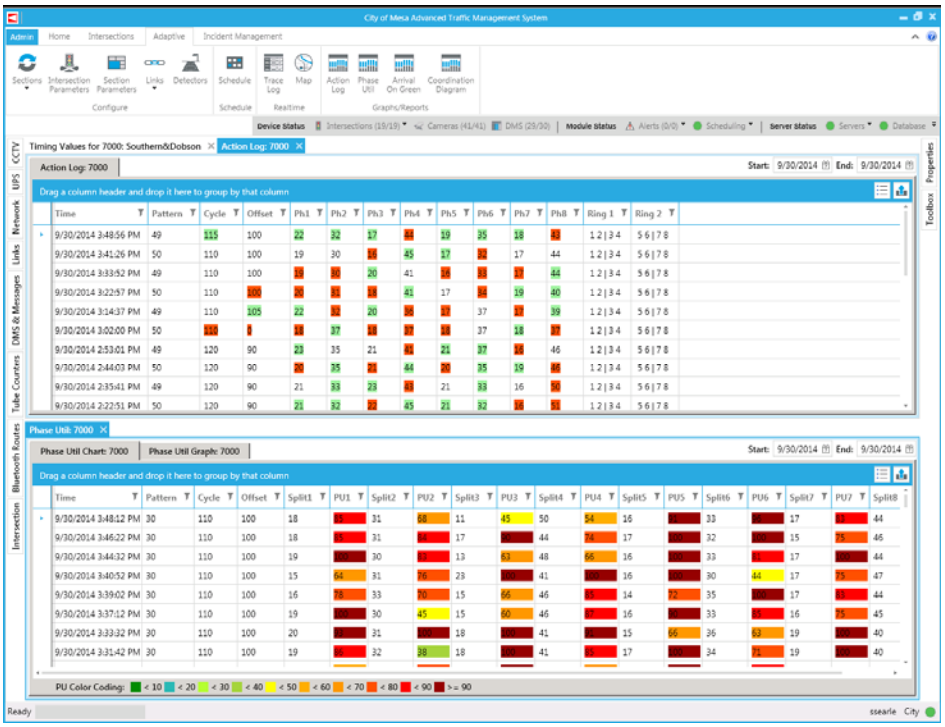


Purdue coordination diagrams showing percent arrivals on green for each cycle

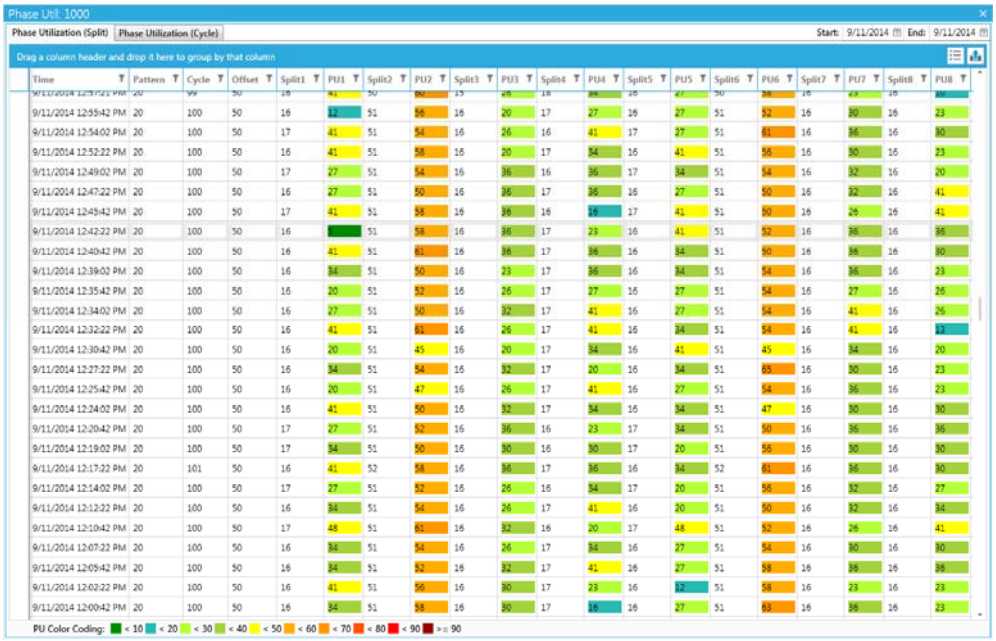
Distribute Phase Times in an Equitable Fashion

Splits are tuned by collecting volume and occupancy data from detectors at the stop bar of the intersection in the same way that was implemented in the ACSLITE project, which is similar to the methods used by SCATS and SCOOT. The algorithm attempts to equalize the degree of saturation on all the phases at the intersection.

This algorithm also allows coordinated phases (or any phase, but this biasing is typically applied to coordinated phases) to have biased splits, so that progression is protected when the saturation level of the coordinated phase is lower than that of side-streets. Without such biasing, split adjustment methods that equalize the degree of saturation on all phases tend to focus more on providing adequate level of service (LOS) on side streets while degrading progression along a critical route.



Color-coded phase utilization display and configurable docking



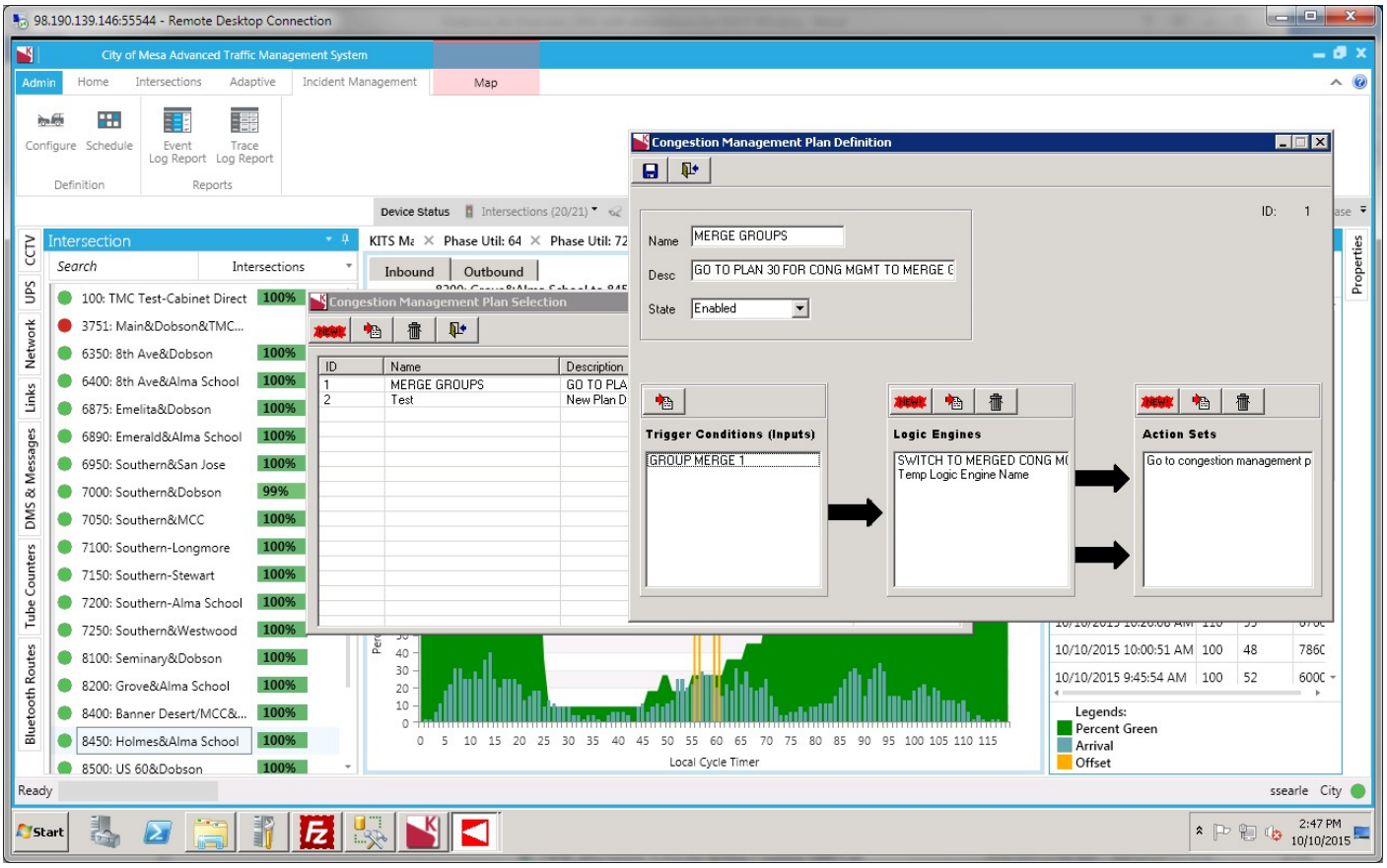
Color-coded phase utilization display with served splits

Any phase can also be determined to be left out from the split tuning process. This is commonly applied to phases on minor side-streets that very occasionally experience bursty traffic flows that do not last more than a few minutes. In the absence of regular arrivals, the splits will be adjusted to the minimum possible value. Since the absence of traffic on the side-street will naturally result in additional time to the main street when the phase is skipped, the side-street phase may be set by the traffic engineer to a reasonable value that provides adequate LOS during the burst and kept fixed. Kadence will adjust

the minimum and maximum constraints into account, and allows the user to either adhere to pedestrian crossing times or not. If the pedestrian crossing times are allowed to be larger than the split, then when a pedestrian pushes the button requesting service, the intersection will likely go into transition. In areas with low pedestrian volume, this is typically acceptable operation. If pedestrian volumes are quite high, it is more typical that the crossing constraints would be considered as minimum phase durations.

Manage the Length of Queues

Current algorithms in Kadence do not explicitly measure queue lengths, but queue detectors can be used to change Kadence operating parameters by putting the system into congestion management patterns when queue detector data exceeds a user-configured threshold. Queue lengths are balanced or managed by modifying splits, offsets, cycle time, and phase sequence. Future work will include integration of the methodology we developed in NCHRP 03-90 that tunes splits on a route based on measurement of the degree of oversaturation. This process uses the TOSI (temporal oversaturation level) and SOSI (spatial oversaturation level) measures to determine the amount of green time to add and subtract, respectively, from a phase. Simply speaking, there are two ways to deal with oversaturation: one is to increase the downstream output rate and the other is to constrain the upstream input rate. These two basic actions result in three mitigation strategies for an oversaturated phase.

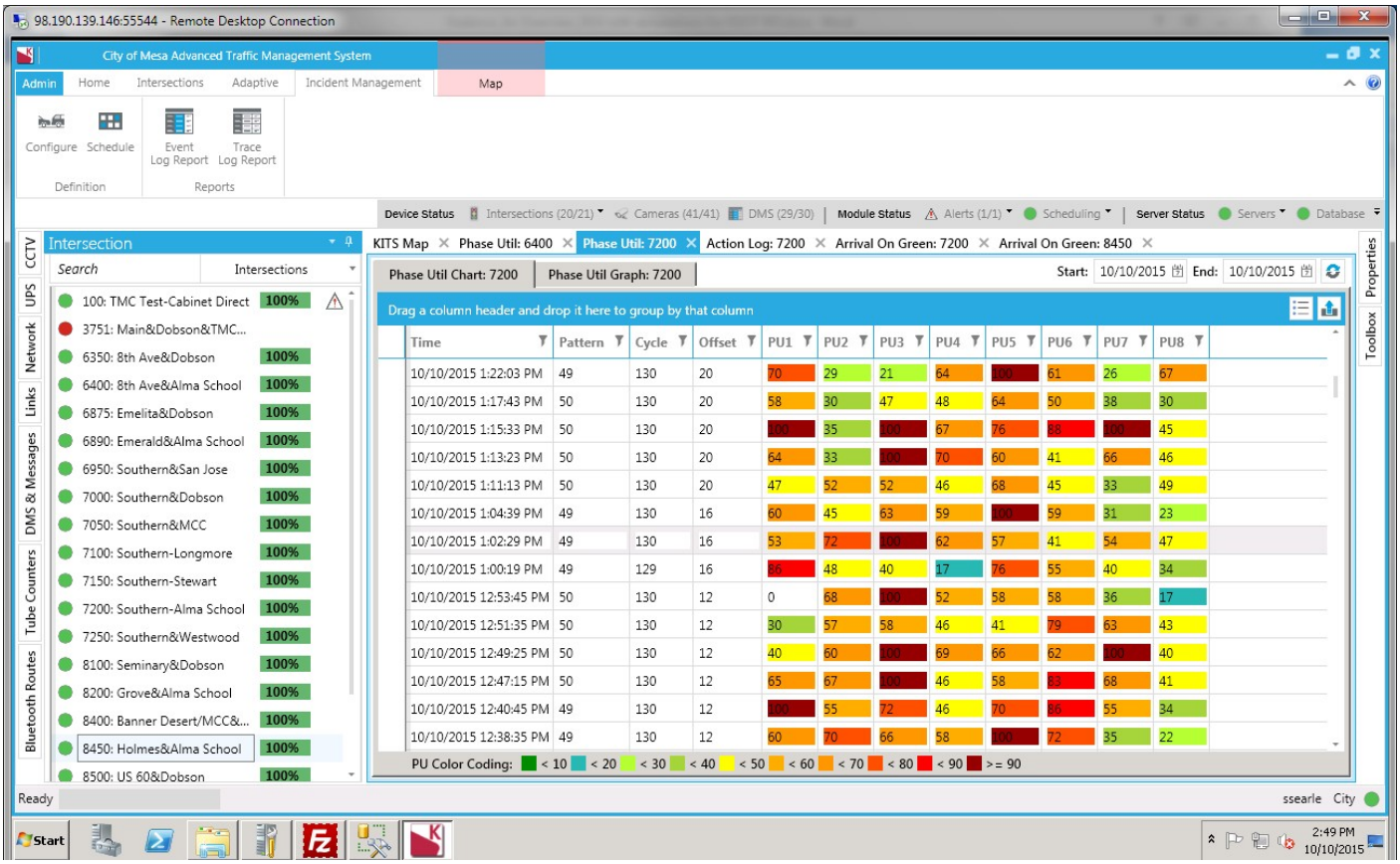


Congestion management logic configuration interface

At an Isolated Intersection, Optimize Operation with a Minimum of Phase Failure

Cycle time is adjusted on a section- or arterial-wide basis to provide adequate capacity to operate all of the signals under capacity and reduce the occurrence of phase failure. Kadence uses a heuristic rule to adjust the cycle time up or down a given step size.

In a straightforward fashion, if the cycle time is increased by four seconds, then every phase on the controller gets a proportion of the additional time. For example, if there are four phases per ring, one additional second is provided for each phase split. The split adjustment algorithm will refine the splits at a later step if this allocation results in uneven phase utilization. The step size is user-defined. Minimum and maximum cycle limitations are imposed including limitations by minimum green, pedestrian clearance times, and user-defined minimum and maximum cycles. As a reliability measure, there must be at least three cycles of vehicle- occupancy data for critical phase utilization monitoring detectors in the system to execute the cycle tuning algorithm.



Tuning to balance the phase utilization levels

This methodology will tend towards longer cycles during peak periods as traffic demand builds, which is generally accepted as an appropriate strategy. Recent research (NCHRP 03-90) we conducted is indicating that when the conditions are extremely oversaturated, shorter cycles will provide more efficient throughput. These improvements or algorithms have not yet been integrated into the system but are planned for future work. This will improve the capability of Kadence to provide sound decisions during incident response conditions, such as heavy diversion of flows from a freeway to a parallel arterial or frontage road system.

Checked in the cycle tuning algorithm are determined by the user. When the average phase utilization on these critical phases is above the user-defined threshold (say, 80% phase utilization) to increase the cycle, a given (the user-defined step size) number of seconds are added to the cycle time. Similarly, the system cycle time is decreased by a fixed number of seconds when the average of the phase utilization on the critical phases is less than a lower threshold (say, 50% phase utilization).

A Combination of Two or More of These Strategies

Kadence balances and optimizes combinations of operational objectives by running multiple algorithms together. Each algorithm can be enabled or disabled by pattern, so cycle tuning or other algorithms can be deliberately disabled by the traffic engineer by time of day. Five principal algorithms are included in Kadence for tuning splits, offsets, cycle time, and phase sequence. Based on the configurability of the system by TOD pattern, each of these objectives can be addressed at different times. The original ACSLITE system was designed for coordinated arterial corridors to provide smooth flow and address access equity. The additional features and algorithms added to Kadence in the last three years make the system applicable to a much wider range of situations including grids and interchanges. Additional features planned in the roadmap will extend Kadence's applicability to oversaturated conditions and diversionary routes and groups.

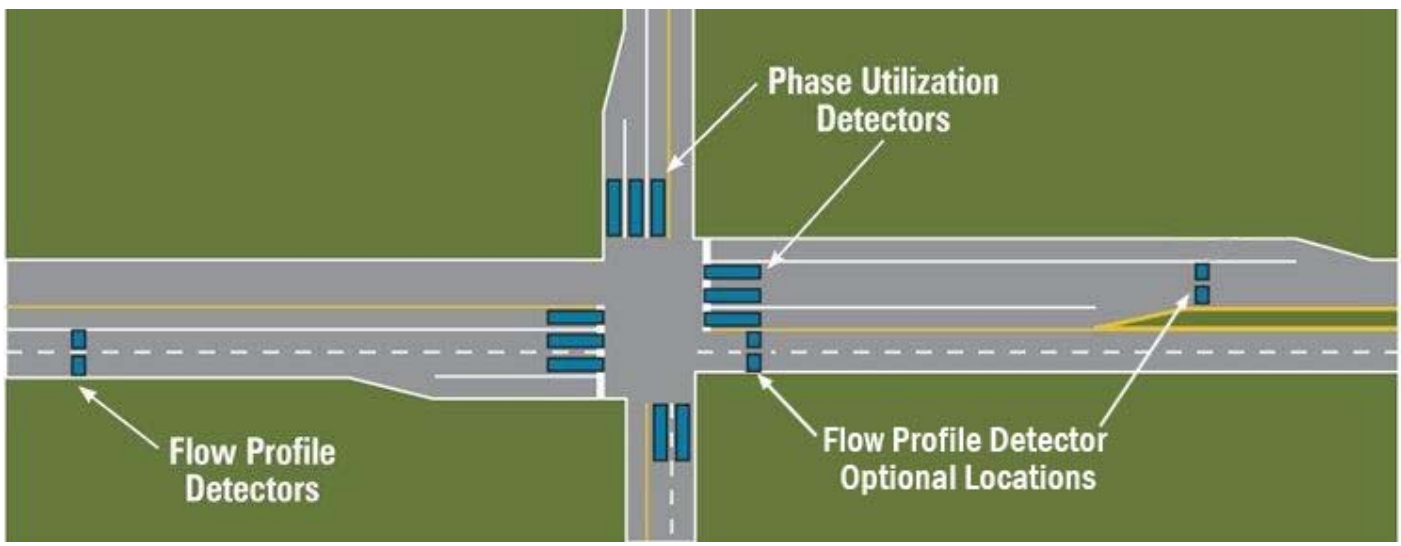
Field Configuration Requirements (Kadence)

Good detection is the key ingredient to effective traffic control (adaptive or otherwise). Kadence uses detectors at the stop bar for tuning splits, cycle, and sequence. Kadence uses detection at mid-block, dilemma-zone, or exit zones to tune offsets and estimate queue lengths for adaptive operation during oversaturated conditions. Phases that do not have detection cannot be tuned, but other phases at the intersection can still be tuned with appropriate configuration. It does not matter what kind of detector is used (loops, radar, video, etc.). Stop bar detectors can be any length, and there is no specific length requirement. If new stop bar loops or zones are being added, shorter zones are better. Upstream zones should be as short as possible. Standard 6x6 loops or zones work well. There is no specific placement distance of advance loops or zones. Farther away from the intersection will produce better performance (except if using video that is monitoring both stop bar and advance zones where there is a balance between detection accuracy and fidelity). It is not necessary that every intersection has a full suite of lane-by-lane detection for every phase. Intersections with very minor side-street volumes can typically be configured for offset tuning only if stop-bar detection for the coordinated phases is not present.

Lane-by-lane detection will improve performance significantly, but the system will operate with multiple lanes tied together into one detection channel, if necessary. Separating detection by lane is typically an inexpensive investment that will yield significant performance improvements. It is better to separate all of the channels (or none of the channels) at an intersection rather than doing some but not others, but Kadence will use the maximum utilization of all detectors configured for the phase for tuning. If video cameras are used, like with traditional actuated operation, mounting should be done to minimize occlusion of one or more lanes by vehicles. Advance and stop bar zones can be done with one camera if mounted properly (i.e., high enough). If detector channels are limited, right turn lanes with right-turn-on-red (RTOR) allowed can typically be removed from configuration if the movement has low risk of becoming popular at certain times of day in the future.

Field configuration data needed for understanding what will be needed for setup and operation of Kadence:

- Location and length of all detectors and operational status of loops, cameras, or cards/racks
- Detectors set for presence and not pulse operation
- Detector number assignments for each lane and which phase each detector calls (for interchanges, identify which phases are controlled by the same detectors)
- Phase to movement assignments (e.g., 2 = WBT)
- Default sequence and all allowable sequences
- Identification of which phases are on min or max recall and desirability or necessity to remain on this mode
- Identification of which detectors are currently tied together and whether or not they can be separated in the cabinet, pull box
- Available space for additional detection cards or racks for additional inputs
- IP communications parameters
- Distance between intersections (stop-bar to stop-bar)
- Offset reference mode



Kadence detector layout

Operational Performance Expectations

The marketplace for ASCT is now quite mature, with offerings by essentially every central system provider and a few systems that are provided by third parties. Comparisons among ASCT technologies are challenging, since the performance results reported in before-and-after studies are relative to a specific "before" condition. In many applications where ASCT systems have shown relatively low incremental improvements, the before condition is typically quite adequate for the traffic situation or the metrics do not match the goals of the agency. In applications where vast improvements have been demonstrated over a relatively short time frame, the "before" condition is typically quite poor or inadequate for the traffic situation. In this case, the improvements shown by the ASCT have two components: (1) implementation of sound traffic engineering principles such as coordinated operation, syncing of controller clocks, and effective operational parameters, and (2) tuning of the baseline operational parameters over time to adjust to the inherent fluctuations in traffic flow.

In particular, arterials or systems where existing controllers are not coordinated (all signals in a corridor run free) or do not have interconnection or central system monitoring for syncing of controller clocks (offsets are not implemented effectively) experience immediate improvements to arterial travel time. In most evaluation studies that are typically very short-term (one week of before-and-after data is common), 80% of the improvements due to ASCT deployment are attributable to these basic traffic engineering principles and the remaining incremental benefits are due to the adaptive operation that adjusts to the fluctuations.

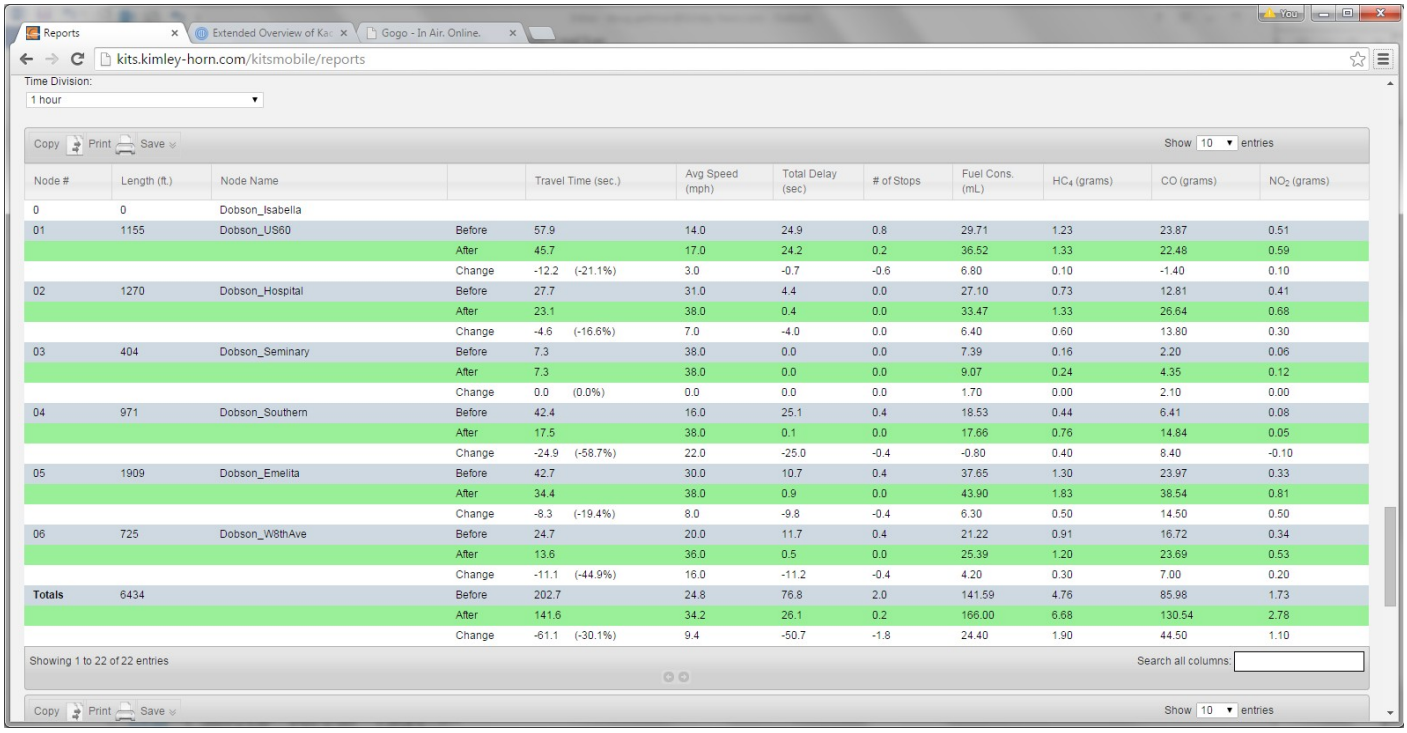
Algorithms in Kadence have all been proven to provide improvements to operation in real-world deployments and verifications during SBIR-DTRT57-10-C-10044. This is the USDOT project where we took the ACSLITE core software algorithms and added the cycle tuning, sequence tuning, and other algorithm enhancements that resulted in Kadence. The best performance is typically achieved when all of the algorithms are enabled together based on the specific objectives and combined objectives of the agency. Over 10 evaluation studies of offset and split performance (ACSLITE) have shown significant reductions in arterial travel time and phase delays, including:

- 20% reduction in travel time in Columbus, OH
- 33% reduction in travel time in Houston, TX
- 40% reduction in travel time in Bradenton, FL
- 90% reduction in left turn delay in Houston, TX
- 25% reduction in travel time in Annapolis, MD

Results for Kadence algorithm performance from SBIR-DTRT57-10-C-10044 are summarized here:

- Offset tuning alone: 20-30% reduction in travel time on linear arterial with one poorly set initial offset
- Offset tuning alone: 20-50% reduction in travel time on linear arterial with all offsets set poorly initially
- Split tuning alone: 33%-75% reduction in left turn delay when one left turn split is set initially incorrectly
- Split tuning alone: 33-90% reduction in left turn delays when all left turn splits are set initially incorrectly
- Split and sequence adjustments together: 50-70% reduction in left turn delays when left turn splits are set initially incorrectly
- Split, sequence, and offset adjustments together: 50-70% reduction in left turn delays when left turn splits are set initially incorrectly

- Sequence and split adjustments together: 20-40% reduction in queue lengths when splits and sequence are set initially incorrectly
- All algorithms together: 20-80% reductions in average delay per vehicle and similar improvements to the incremental tests above for travel time and queue length improvements when initial settings are inappropriate
- All algorithms together: 15% reduction in average delay per vehicle during oversaturated conditions on an arterial
- All algorithms together: 15% reduction in total delay during oversaturated conditions on an arterial
- All algorithms together: 10% reduction in total stops during oversaturated conditions on an arterial

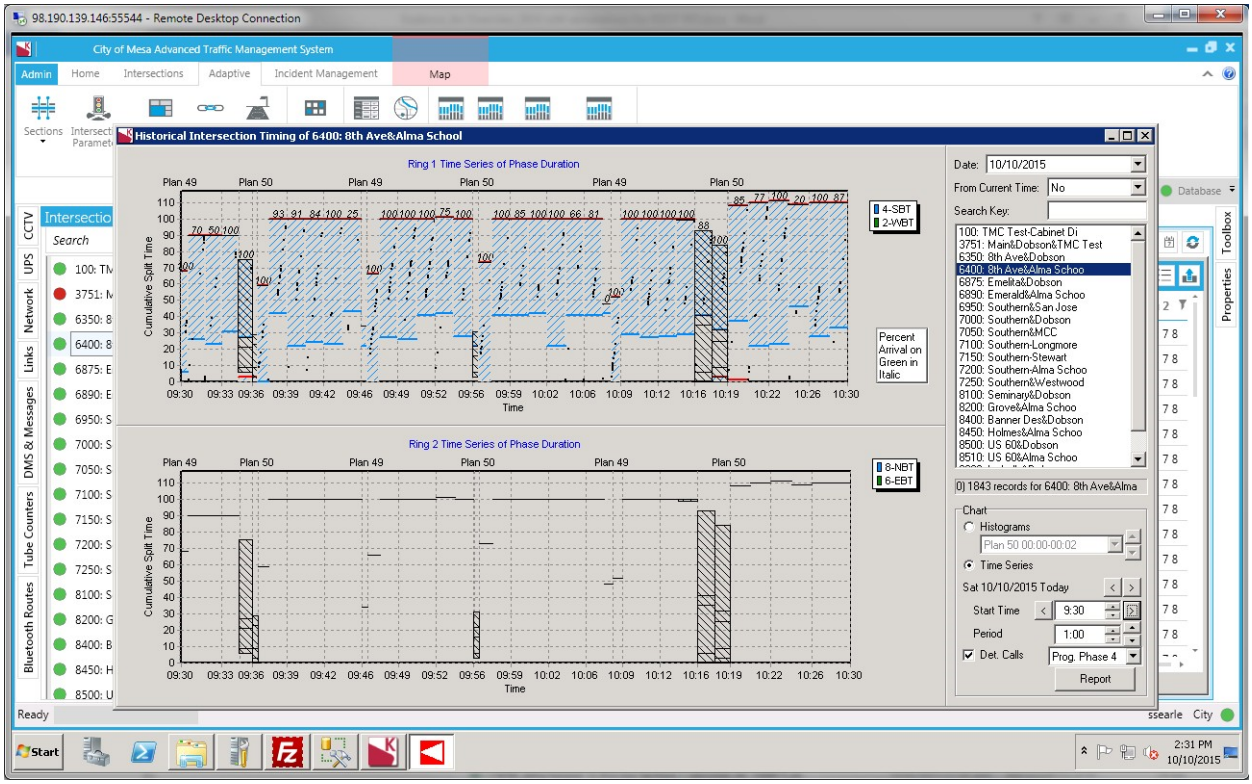


Node #	Length (ft.)	Node Name		Travel Time (sec.)	Avg Speed (mph)	Total Delay (sec)	# of Stops	Fuel Cons. (mL)	HC_4 (grams)	CO (grams)	NO_2 (grams)
0	0	Dobson_Isabella									
01	1155	Dobson_US60	Before	57.9	14.0	24.9	0.8	29.71	1.23	23.87	0.51
			After	45.7	17.0	24.2	0.2	36.52	1.33	22.48	0.59
			Change	-12.2 (-21.1%)	3.0	-0.7	-0.6	6.80	0.10	-1.40	0.10
02	1270	Dobson_Hospital	Before	27.7	31.0	4.4	0.0	27.10	0.73	12.81	0.41
			After	23.1	38.0	0.4	0.0	33.47	1.33	26.64	0.68
			Change	-4.6 (-16.6%)	7.0	-4.0	0.0	6.40	0.60	13.80	0.30
03	404	Dobson_Seminary	Before	7.3	38.0	0.0	0.0	7.39	0.16	2.20	0.06
			After	7.3	38.0	0.0	0.0	9.07	0.24	4.35	0.12
			Change	0.0 (0.0%)	0.0	0.0	0.0	1.70	0.00	2.10	0.00
04	971	Dobson_Southern	Before	42.4	16.0	25.1	0.4	18.53	0.44	6.41	0.08
			After	17.5	38.0	0.1	0.0	17.66	0.76	14.84	0.05
			Change	-24.9 (-58.7%)	22.0	-25.0	-0.4	-0.80	0.40	8.40	-0.10
05	1909	Dobson_Emelita	Before	42.7	30.0	10.7	0.4	37.65	1.30	23.97	0.33
			After	34.4	38.0	0.9	0.0	43.90	1.83	38.54	0.81
			Change	-8.3 (-19.4%)	8.0	-9.8	-0.4	6.30	0.50	14.50	0.50
06	725	Dobson_W8thAve	Before	24.7	20.0	11.7	0.4	21.22	0.91	16.72	0.34
			After	13.6	36.0	0.5	0.0	25.39	1.20	23.69	0.53
			Change	-11.1 (-44.9%)	16.0	-11.2	-0.4	4.20	0.30	7.00	0.20
Totals	6434		Before	202.7	24.8	76.8	2.0	141.59	4.76	85.98	1.73
			After	141.6	34.2	26.1	0.2	166.00	6.68	130.54	2.78
			Change	-61.1 (-30.1%)	9.4	-50.7	-1.8	24.40	1.90	44.50	1.10

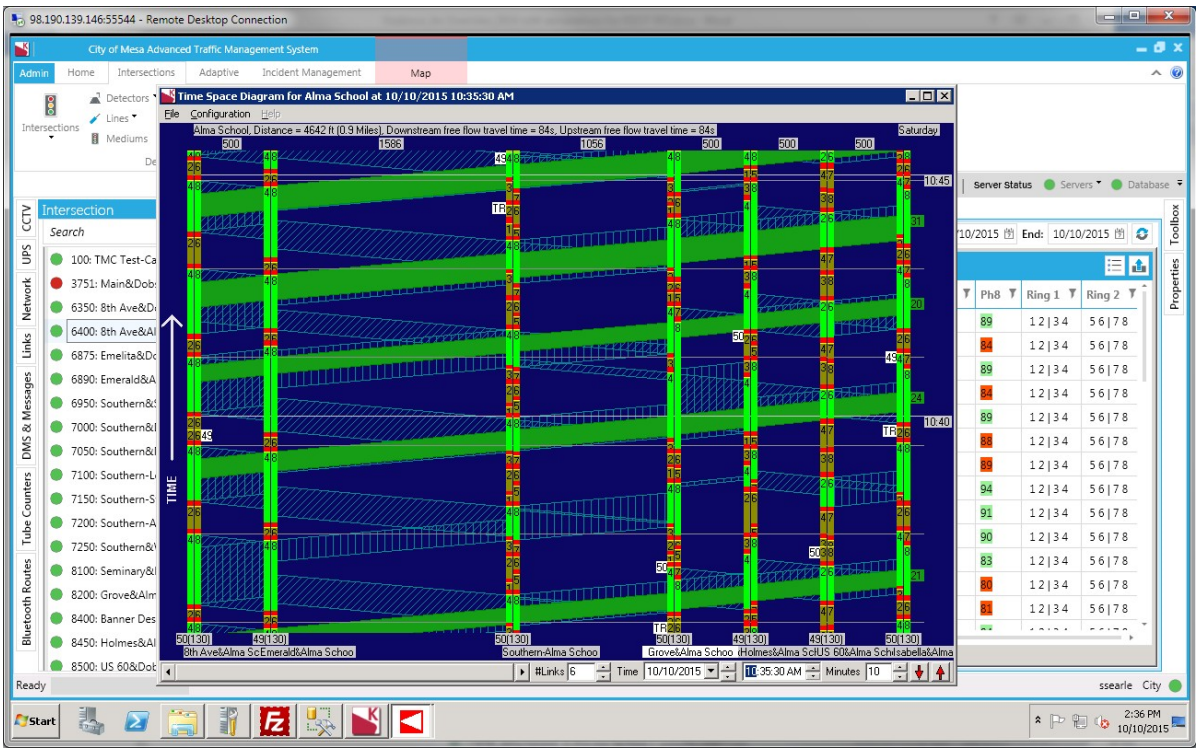
Example comparison of Kadence (green) versus TOD (gray) on Dobson Road in Mesa, AZ

In summary, Kadence algorithms have been validated to provide improvements to traffic operations. When the baseline conditions are poor, all adaptive systems can show significant improvements with a combination of "raising the floor" by implementing synchronized clocks and basic coordination, and "pushing on the ceiling" by adapting to the fluctuations in traffic demand. Our philosophy of operation is that sound traffic engineering principles based on actuated-coordinated features of all modern controllers are the cornerstone of the deployment of any adaptive system. All adaptive systems need good initial parameters and configuration to operate effectively, and match their configuration parameters to the objectives of the agency at certain times of day. Kadence is fully configurable to change the adaptive objectives by time period focusing on throughput and arterial coordination at AM and PM peaks and on equitable distribution of green in off-peak times or on combinations of objectives.

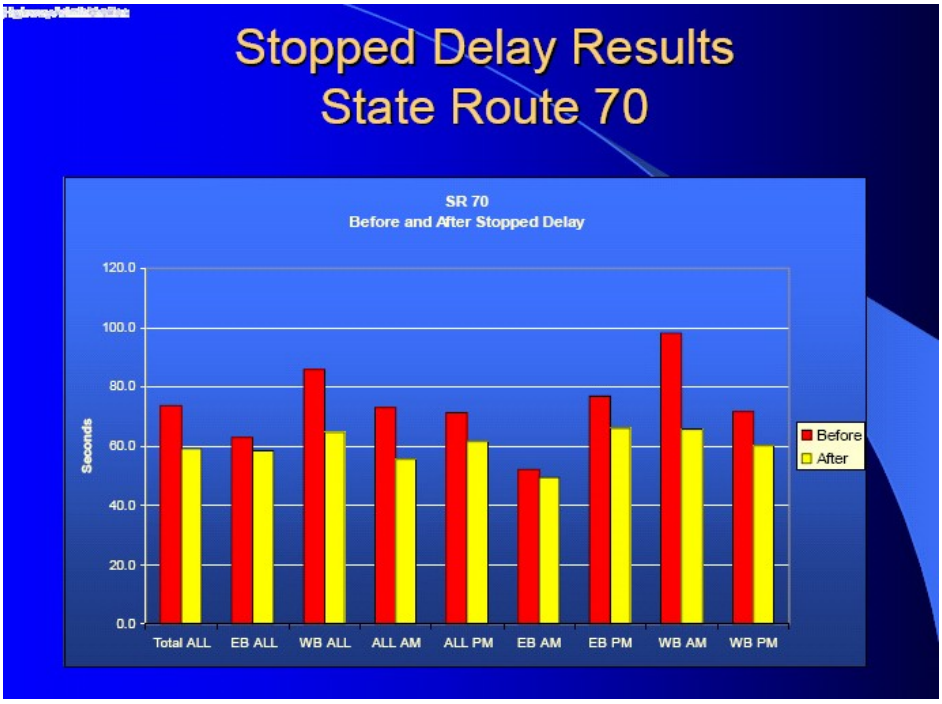
The true promise of Kadence and similar ASCTs is the long-term benefits that accrue over time as the system continues to adapt operation as traffic patterns change.



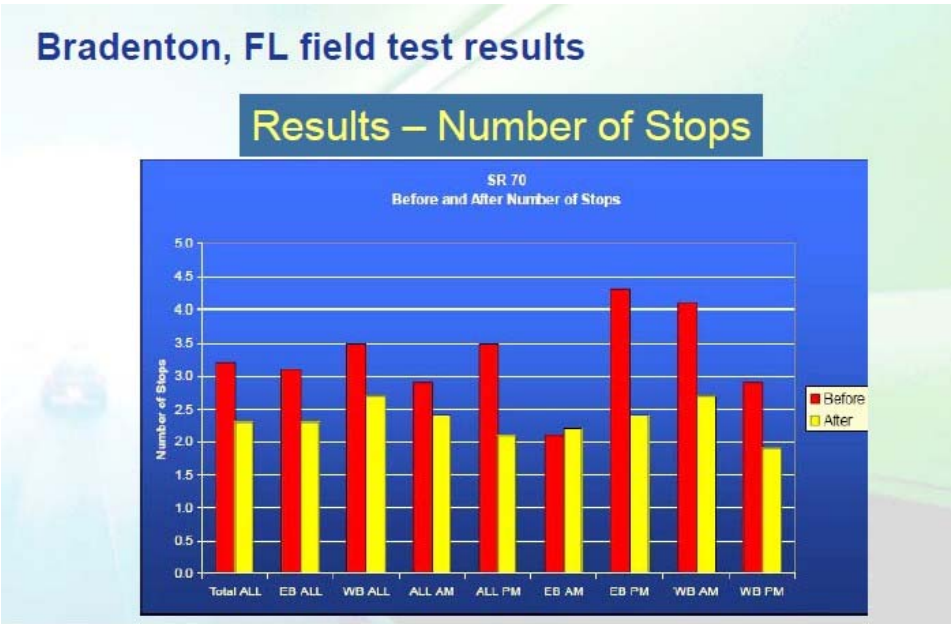
Example display of arrivals on green in Mesa, AZ showing majority of percent arrivals above 90%



Real-time time-space diagram showing green bands along Alma School Road in Mesa, AZ



Example performance improvements of Kadence in Florida



Example performance improvements of Kadence in Houston, TX

Schematic Diagram — Kadence

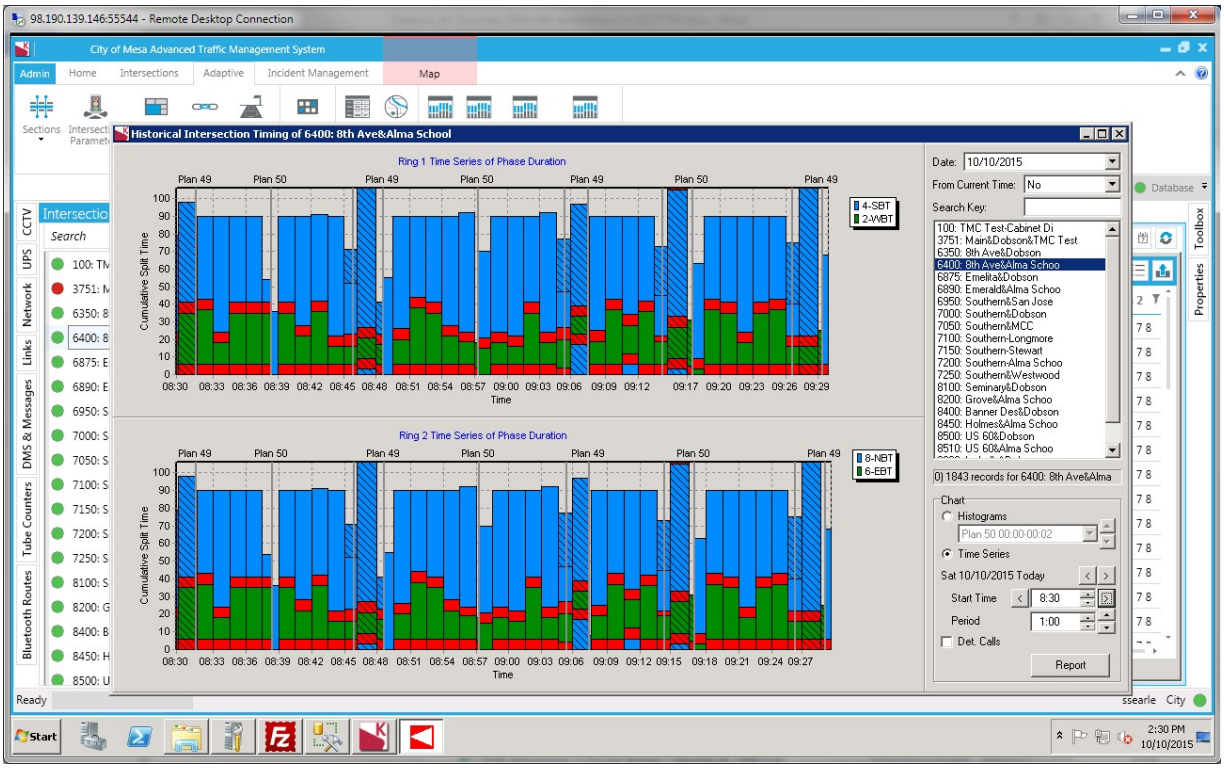
Kadence is a centralized adaptive system. Each intersection is connected to the Kadence server via IP communications using NTCIP. Kadence polls each controller once per second for status and downloads new cycle, split, offset, and sequence information approximately every three cycles. Kadence will receive commands from KITS, to turn intersections ON/ OFF and set operational modes.. KITS will also connect to each field intersection using NTCIP in parallel with Kadence. This has worked well in Mesa, Arizona where Kadence and Centracs both connect to the field intersections with no problems over IP communications.

Understanding of the System Requirements

Kadence meets more than 95% of your operational requirements without modification. Our system is open-architecture and supports all field devices using NTCIP standards- based communications and will integrate directly as a module of the existing KITS system. We believe that Kadence meets your adaptive needs and will be a solution that the City of Surprise will find to be simple to understand and operate. Kadence can be configured to be as flexible as your requirements suggest, but also can be made to operate quite simply. Since we use common traffic engineering terminology, it is easy to understand what is going on. Also, since Kadence simply downloads new parameters to the field controllers, you always can feel safe that the intersection controllers continue to cycle and operate as expected during preemption and during pedestrian crossings.

You clearly want a system with the following functions:

- Cycle, split, offset, and sequence tuning
- The ability to change the operational strategy by TOD—maximizing throughput in the AM and PM peaks and providing more equitable service to all phases during the midday and weekend periods
- A fully featured system with alarms, alerts, reports, and user security
- A system with configurable minimum and maximum bounds for phase timings and other user-configurable "knobs"
- A system that operates like a modern actuated-coordinated traffic controller with fixed or floating force offs, conditional service, flashing yellow arrow (FYA), and protected-permitted left-turn (PPLT).



Kadence GUI showing real-time changes to splits

All these features are provided by Kadence. Kadence is a suite of major upgraded features built on the proven algorithms and metrics developed in the ACSLITE program. At Kimley-Horn, we have taken the ACSLITE core application features and added cycle tuning, sequence tuning, TOD schedule tuning, and a ton of performance reports and displays. Kadence is a fully featured ATMS with alarms, alerts, and user security and completely operates as a module of KITS.

Along with the installation of Kadence, the City of Surprise will receive the most recent version of the full KITS suite including the new GUI interface, performance reports, internet maps, and a host of major enhancements to your existing system.

> ***The City of Surprise will receive a perpetual license to use and deploy Kadence on any signal within the entire City of Surprise. The long-term value for the City simply cannot be matched by other vendors.***

As indicated in the requirements table, there are a number of items that we propose adding as optional items. These features will be only be charged to MCDOT once as part of this project, so if one, two, three, of four sections of the Bell Road ASCT project select Kadence, these optional items will only be developed once. The license for Kadence extends throughout the entire corridor and on 200 additional intersections in the region in addition to the entire City of Surprise, not only the sections identified by MCDOT and the partner agencies, so there is significant accrued benefits in selecting Kadence for multiple locations.

To aid review of the proposal and the lengthy requirements table, we highlight those items that will require additional development work here:

1. *Enhancements to the adaptive methods for measurement of queue lengths (2.1.3.0-1 and associated, 6.0.5)*
2. *Omitting phases (select a different sequence) when the cycle length is reduced past a certain user-selected threshold (2.1.2.0-6)*
3. *Accelerating the ability of the cycle length to be modified when user-specified changes to the traffic conditions occur (2.2.0-5.0-4.0-1)*
4. *A module for tuning the baseline traffic signal parameters set (TOD schedule, cycles, splits, and offsets) that learns from the adaptive changes made by Kadence over time (Multiple)*
5. *Ability to replace failed detectors with a historical value or use a historical split (13.1.0-2.0-1 and 0-3)*

WORK PLAN

The project plan for each section of the corridor is as follows:

- Task 1: Project management and mobilization
- Task 2: Install Kadence services and upgrade KITS)
- Task 3: Configure and tune system
- Task 4: Integrate enhancement features
- Task 5: Configure and tune system #2
- Task 6: Training
- Task 7: Operate system
- Task 8: System maintenance and support

TASK 1: Intersection Detection Identification

In Task 1, Kimley-Horn will manage the deployment of Kadence in conjunction with City staff, MCDOT, and team representatives. Dr. Gettman and Stewart Allen of Kimley-Horn will manage the deployment of Kadence for the City. This task will include a kickoff meeting and periodic project progress meetings. Kimley-Horn will coordinate with City staff and detection installation contractors, as appropriate, to ensure that the field network and setup is ready to go before beginning installation and deployment of Kadence. Kimley-Horn anticipates waiting until the detection installation or lane-by-lane detection configuration is complete before beginning work on configuring Kadence. Kimley-Horn will upgrade the City of Surprise KITS system as soon as practicable during the installation and configuration of detectors. KHA 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 KHA for this project. Such detection will be provided by MCDOT under separate contract. KHA in conjunction with City of Surprise technical staff shall specify, detection distances, zone(s), output configuration (channels) and method of verification of suitable detection implementation. MCDOT shall review and approve system provider's recommendations for detection implementation. Final plans shall be the responsibility of MCDOT. KHA 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. Task 1 shall not be considered complete until final plans are approved and accepted by MCDOT.

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

TASK 2: Initial 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. After the detection field work is complete, the Kimley-Horn team will install the Kadence software at the City of Surprise TMC. Kadence is a suite of software services and a client GUI for configuration, real-time monitoring, and reporting. The Kadence system works on Windows server, desktop, and laptop computers with structured query language (SQL) server database. Kadence also requires installation of Microsoft Office (Excel and Access) and Adobe PDF for some reports. We will work with the City of Surprise Information Technology (IT) department to configure the Kadence server and install the GUI on client computers with City of Surprise IT network policies. Kimley—Horn will provide initial training for City and MCDOT staff on Kadence operations.

TASK 2.1: Configure and Tune System

After the services are installed, the Kimley-Horn team will configure the Kadence parameters for the 20 signals in the City of Surprise.

- Upload configuration data from each field controller using NTCIP
- TOD schedule
- Detector to phase assignments
- Coordination patterns (cycle, splits, offset, sequence, etc.)
- Phase timings (min green, yellow, red, walk, etc.) which links
- Determine which algorithms to use on each location and setup their configuration parameters
- Put the system in "monitoring" mode to verify configuration is correct
- Enable system in adaptive mode
- Tune as desired based on field operation feedback

The Kimley-Horn project manager (Dr. Gettman) and software development lead (Stewart Allen) will be on-site during configuration.

TASK 3: Installation of features (Bundle 1)

We will upgrade Kadence to include additional functionality as requested in the RFP at no additional cost .

1. Accelerating the ability of the cycle length to be modified when user-specified changes to the traffic conditions occur

2. Ability to replace failed detectors with a historical value or use a historical split

We will also develop an acceptance test procedure (based on use cases) for each feature set in conjunction with MCDOT and the signal partners so we are in agreement on what will be developed and how it will be implemented. We anticipate that implementation of these upgrades will be accomplished within six months of NTP.

TASK 4: Installation of features (Bundle 2)

We will upgrade Kadence to include additional functionality as requested in the RFP at no additional cost

1. Omitting phases (select a different sequence) when the cycle length is reduced past a certain user-selected threshold

2. A module for tuning the baseline traffic signal parameters set (TOD schedule, cycles, splits, and offsets) that learns from the adaptive changes made by Kadence over time

3. Queue estimates and displays

We will also develop an acceptance test procedure (based on use cases) for each feature set in conjunction with MCDOT and the signal partners so we are in agreement on what will be developed and how it will be implemented. We anticipate that implementation of these upgrades will be accomplished within six months of NTP.

TASK 4.1: Configure and Tune System (#2)

After the services are upgraded for each enhancement feature in Task 4, the Kimley-Horn team will configure the Bell Road system for the new functionality in conjunction with the City of Surprise. Since Kadence will already be running with base functionality, this additional configuration and tuning will focus on how the additional features impact operations and configuration in certain real- world situations. We anticipate that this configuration and tuning will require several weeks of on-site work to ensure that the City staff are comfortable with field operations and use of the new functionality. The Kimley-Horn project manager (Dr. Gettman) will be on-site during configuration and setup of the new features and tuning of the operations.

TASK 5: Final Acceptance

KHA 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.

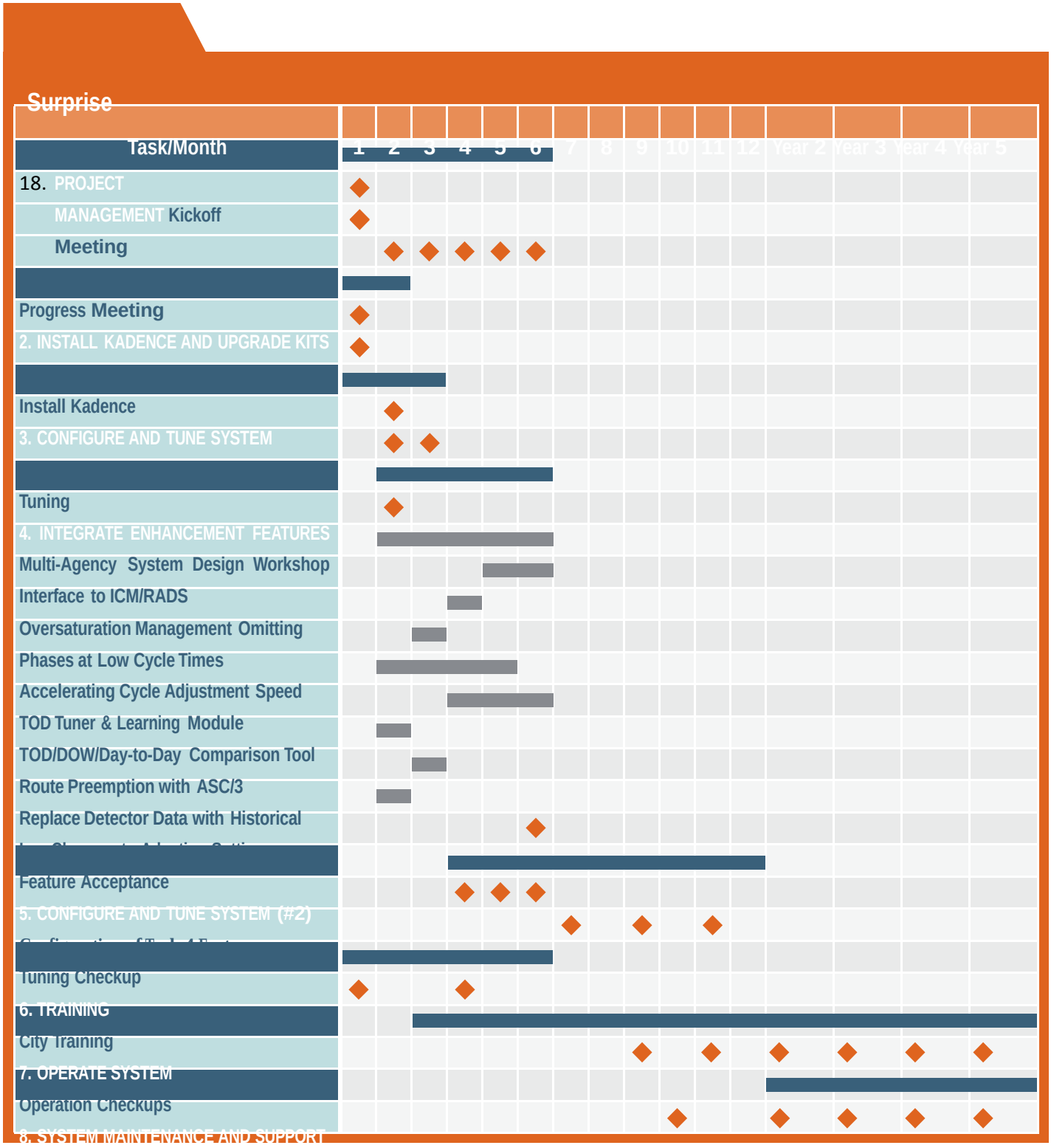
TASK 5.1: Training

After the system is configured per the City's liking, training for the City will be provided. This training will be provided for a variety of user skill sets and levels per the requirements. Managers and officials will be provided an overview of operational principles and key metrics. Technicians and hands-on users will be provided more in-depth explanation and discussions of algorithm principles and configuration parameters. Training will last approximately one day. Additional refresher training sessions are anticipated to be provided on a quarterly basis, as desired by the City.. Kimley-Horn will provide a section of the online manual on Kadence configuration and operations as part of this task.

TASK 6: System Management and Support

After the system is operating, Kimley-Horn will provide support via on-site visits, webinar, phone, remote login, and email. Remote login capability via secure remote desktop or virtual private network (VPN) is critical for providing rapid response support from our Software and Traffic Engineering Support team in Phoenix, AZ. During the maintenance period of the project, Kimley-Horn will provide any necessary updates to services and support the City staff with operational questions when they arise. Maintenance and support services are supplied for this project for Years 2-5 on a lump sum basis at the beginning of Year 2. As part of the project, Kimley-Horn will include all travel expenses for one City staff member to attend the annual Kadence User Group meeting each year..

PROJECT SCHEDULE



DELIVERABLES

1. Upgrade to KITS to most recent version including the enhanced GUI
2. License to use Kadence on any signal in the City of Surprise
3. Configuration of Kadence on up to 20 signals on Bell Road
4. User manual for Kadence
5. A minimum of 40 hours of training on Kadence
6. Two training sessions within 6 months of NTP (one of the training sessions will be months after installation so users have the opportunity to gain experience and generate questions)
7. Four years of maintenance
8. Kadence server computer
9. Upgrade for accelerating the ability of the cycle length to be modified when user-specified changes to the traffic conditions occur
10. A module for tuning the baseline traffic signal parameters set (TOD schedule, cycles, splits, and offsets) that learns from the adaptive changes made by Kadence over time
11. Upgrade for ability to replace failed detectors with a historical value or use a historical split
12. Upgrade for ability to display of queue estimates from advance detectors
13. Upgrade for the ability to alter the sequence below a certain cycle time

ATTACHMENT C-1				
TECHNICAL REQUIREMENTS & RESPONSES				
PROJECT AREA 1				
Version 2.1	**March 26, 2015**	**Project Area #1: Bell Road and Grand Avenue from Cotton Lane through Ave of the Arts/114th Avenue**	***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
1		**1 Network Characteristics**				
1.0-1	5	The ASCT shall control a minimum of 22 signals concurrently	*4.2.0-1* The system operator needs to eventually adaptively control up to 22 signals from the City of Surprise TMC located on Litchfield Road, south of Bell Road and from satellite locations at the City of Surprise City Hall and signal shop located at the maintenance yard located north of Bell Road and 134th Avenue and the ADOT TOC located at 2302 West Durango Street, Phoenix, AZ 85009.	yes	The license for Kadence will include license for use for any signal in the entire City of Surprise.	observation
1.0-2	5	The ASCT shall support groups of signals.	*4.2.0-2* The system operator needs to be able to adaptively control a minimum of 2 groups of signals. The system will control intersections in groups that are defined by the operator. *4.2.0-3*	yes	There is no practical limit to the number of groups.	observation

			The system operator needs to vary the number of signals in an adaptively controlled group. A group of intersections may be comprised of simply one intersection, or up to the total number of intersections that are sufficiently close to warrant coordination under 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* The system operator needs to be able to adaptively control a minimum of 2 groups of signals. The system will control intersections in groups that are defined by the operator.	yes	Groups can include any number of signals and have any desired coordination pattern (does not have to only be linear)	observation
1.0-2.0-2	5	The ASCT shall control a minimum of 2 groups of signals	*4.2.0-2* The system operator needs to be able to adaptively control a minimum of 2 groups of signals. The system will control intersections in groups that are defined by the operator.	yes	There is no practical limit to the number of groups.	observation
1.0-2.0-3	4	The size of a group shall range from 1 to 22 signals.	*4.2.0-3* The system operator needs to vary the number of signals in an adaptively controlled group. A group of intersections may be	yes	There is no practical limit to the number of signals in a group	observation

			comprised of simply one intersection, or up to the total number of intersections that are sufficiently close to warrant coordination under the prevailing traffic conditions.			
1.0-2.0-4	4	Each group shall operate independently	*4.2.0-2* The system operator needs to be able to adaptively control a minimum of 2 groups of signals. The system will control intersections in groups that are defined by the operator.	yes		observation
1.0-2.0-5.0-1	5	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.)	*4.2.0-3* The system operator needs to vary the number of signals in an adaptively controlled group. A group of intersections may be comprised of simply one intersection, or up to the total number of intersections that are sufficiently close to warrant coordination under the prevailing traffic conditions.	yes	Kadence is based on changing coordination pattern sets by TOD schedule	View action log display
1.0-2.0-	5	The boundaries		yes	See page 1 of separate	Configure

5.0-2		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.)			response	congestion detector and observe pattern switching
1.0-2.0-5.0-3	5	The boundaries surrounding signal controllers that operate in a coordinated fashion shall be altered by the system when commanded by the user.		yes	By commanding patterns	observation
2		**2 Type of Operation**				
2.1		**2.1 General**				
2.1.1		**2.1.1 Mode of Operation**				
2.1.1.0-2	5	The ASCT shall operate non-adaptively when the adaptive control equipment fails.	*4.14.0-1* The system operator needs to fall back to TOD or isolated free operation, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and	yes	See page 1 of separate response	stop Kadence service at central
2.1.1.0-2.0-1	5	The ASCT shall operate non-adaptively when a user-specified detector fails.		yes	The detector diagnostics on the controller need to be configured for this purpose.	unplug detector card

2.1.1.0-2.0-2	5	The ASCT shall operate non-adaptively when the number of failed detectors connected to a signal controller exceeds a user-defined value.	software failure.	yes	Kadence will disable tuning for each phase that has no working detectors and return the system to its original split. There is no threshold for the user to set	unplug detector cards
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	See page 1 of separate response	unplug lots of detector cards
2.1.1.0-2.0-4	4	The ASCT shall operate non-adaptively when a user-defined communications link fails.		yes	The controller will return to TOD operation if it loses communication from the Kadence central service.	
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* The system operator needs to over-ride adaptive operation. When operator is advised of an incident that will increase demand, the operator selects an appropriate flush plan. The operator will schedule an ending time for the event. The flush plan will remain in place until either the scheduled end time passes or the operator cancels the plan.	yes	Individual intersections and groups can be manually commanded to stop adapting.	demonstration
2.1.1.0-4	5	The ASCT shall operate non-adaptively when a user manually commands the ASCT to cease adaptive operation.		yes	Flush plans assigned through KITS can override adaptive operation	demonstration
2.1.1.0-5	5	The ASCT shall	*4.7.0-2*	yes	See page 1 of separate	observation

		operate non-adaptively in accordance with a user-defined time-of-day schedule.	The system operator needs to schedule pre-determined operation by time of day.		response	
			4.7.0-3			
			The system operator needs to over-ride adaptive operation. When operator is advised of an incident that will increase demand, the operator selects an appropriate flush plan. The operator will schedule an ending time for the event. The flush plan will remain in place until either the scheduled end time passes or the operator cancels the plan.			
2.1.1.0-6	4	The ASCT shall operate non-adaptively when commanded by an external system process.	*4.17.0-2*	yes	Kadence can be turned off from KITS. We would have to add the feature to receive a command from an external system to disable Kadence through a C2C TMDD service.	use case acceptance testing
			The system operator needs to react to commands issued by KITS and future decision support system, such as an ICM system. A signal may be received from an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan will remain in operation until the command from the external source is removed.			

2.1.1.0-7	5	The ASCT shall alter the adaptive operation to achieve required objectives in user-specified conditions. 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.)	*4.1.0-1.0-3*	yes	See page 1 of separate response	observation
			Distribute phase times in an equitable fashion. During moderate to light traffic conditions, one or more phases may be omitted (e.g., a protected phase if protected/permissive left turns are operated), in order to more efficiently serve other movements, provided it is safe to do so. This may be accomplished through a time of day schedule or based on the measured traffic conditions.			
			4.1.0-3			
			The system operator needs to change the operational strategy (for example, from smooth flow to managing queues) based on changing traffic conditions.			
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.	4.1.0-3	yes	See page 2 of separate response.	observation
			The system operator needs to change the operational strategy (for example, from smooth flow to managing queues) based on changing traffic conditions.			

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.	*4.1.0-1.0-4* The objective of the coordination will 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 will involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon will be stopped. It will also involve control of offsets and phase lengths so that queues may be stored in locations where they will not adversely affect capacity of the system.	yes	See page 2 of separate response.	observation
2.1.1.0-7.0-3	5	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* Distribute phase times in an equitable fashion. During moderate to light traffic conditions, one or more phases may be omitted (e.g., a protected phase if protected/permissive left turns are operated), in order to more efficiently serve other movements,	yes	See page 2 of separate response.	observation

			provided it is safe to do so. This may be accomplished through a time of day schedule or based on the measured traffic conditions.			
			4.1.0-3			
			The system operator needs to change the operational strategy (for example, from smooth flow to managing queues) based on changing traffic conditions.			
2.1.1.0-7.0-4	5	When current measured traffic conditions meet user-defined criteria, the ASCT shall alter the state of signal controllers providing two-way progression on a coordinated route.	*4.1.0-1.0-2*	yes	See page 2 of separate response.	observation
			The objective of the coordination will be to provide for smooth flow along the arterial road, minimizing the number of stops experienced by vehicles traveling along the road. Where two-way progressions are permitted by "natural" cycle lengths, the system will generally operate at one of those cycle lengths unless longer phase lengths are required to accommodate the demand.			
			4.1.0-3			
			The system operator needs to change the operational strategy (for example, from smooth flow to managing queues) based			

			on changing traffic conditions.			
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. During moderate to light traffic conditions, one or more phases may be omitted (e.g., a protected phase if protected/permissive left turns are operated), in order to more efficiently serve other movements, provided it is safe to do so. This may be accomplished through a time of day schedule or based on the measured traffic conditions.	yes	See page 3 of separate response.	observation
2.1.1.0-8.0-1	5	The ASCT shall provide a user-specified maximum value for each phase at each signal controller.	*4.10-1.0-6* At an isolated intersection with widely varying traffic patterns and a high degree of saturation during peak times, the system will calculate the optimum cycle length, phase sequence and phase times in real time to match the changing traffic conditions.	yes	See page 3 of separate response.	observation
2.1.1.0-8.0-1.0-1	5	The ASCT shall not provide a phase length longer that the maximum value.		yes	See page 3 of separate response.	observation
2.1.1.0-8.0-2	5	The ASCT shall provide a user-specified minimum value for each phase at each signal controller.		yes	See page 3 of separate response.	observation

2.1.1.0-8.0-2.0-1	5	The ASCT shall not provide a phase length shorter than the minimum value.		yes	See page 3 of separate response.	observation
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* 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 will block another movement in the cycle unnecessarily. For example, the operator may need to prevent a queue resulting from the trailing end of the through green from blocking the storage needed by an entering side-street left turn in the subsequent phase. An overall queue management strategy, particularly when congestion is present, is covered under 4.1.0-1.0-5.	yes	See page 3 of separate response.	observation
2.1.1.0-9.0-1	5	The ASCT shall alter operations, to minimize repeated phase failures.		yes	See page 3 of separate response.	observation
2.1.1.0-10	3	The ASCT shall determine the order of phases at a user-specified intersection. (The calculation will be based on the optimization	*4.1.0-1.0-2* The objective of the coordination will be to provide for smooth flow along the arterial road, minimizing the number of stops experienced by vehicles traveling along the	yes	Kadence will select a phase sequence which will improve throughput and flow by comparing the combination of flows on the compatible left turns and through movements with the combination of both through movement flows and	observation

		function.)	road. Where two-way progressions are permitted by "natural" cycle lengths, the system will generally operate at one of those cycle lengths unless longer phase lengths are required to accommodate the demand.		both left-turn flows to select lead-lead, lead-lag, lag-lead, and lag-lag appropriately according to the following algorithm: ADD TABLE. Test by setting the phase sequence at a known location to be deliberately backwards (lead-lag when lag-lead is clearly superior). Observe that sequence is switched to the appropriate sequence.	
			4.1.0-1.0-4			
			The objective of the coordination will 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 will involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon will be stopped. It will also involve control of offsets and phase lengths so that queues may be stored in locations where they will not adversely affect capacity of the system.			
2.1.2		**2.1.2 Allowable Phases**				
2.1.2.0-1	5	The ASCT shall not	*4.9.0-1.0-14*	yes	See page 4 of separate	

		prevent protected/permissive left turn phase operation.	Protected/permissive phasing and permissive only phasing.		response.	
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	This is a function of the signal controller. Kadence is fully compatible	observation
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	This is a function of the signal controller. Kadence is fully compatible	observation
2.1.2.0-4	4	The ASCT shall prevent 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 KITS and future decision support system, such as an ICM system. A signal may be received from an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan will remain in	yes	This is a function of the signal controller. Kadence is fully compatible	observation

			operation until the command from the external source is removed.			
2.1.2.0-5	5	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 a function of the signal controller. Kadence is fully compatible	observation
2.1.2.0-6	5	The ASCT shall omit a user-specified phase when the cycle length is below a user-specified value.		No	See page 4 of separate response.	use case acceptance testing
2.1.2.0-7	5	The ASCT shall omit a user-specified phase based on measured traffic conditions.		yes	This is a function of the signal controller. Kadence is fully compatible	observation
2.1.2.0-8	4	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 KITS and future decision support system, such as an ICM system. A signal may be received from an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan will remain in operation until the command from the	yes	This is a function of the signal controller. Kadence is fully compatible	observation

			external source is removed.			
2.1.2.0-9	5	The ASCT shall omit a user-specified phase according to a time of day schedule	*4.9.0-1.0-6*	yes	This is a function of the signal controller. Kadence is fully compatible	observation
			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.			
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		observation
		* Next phase;	Allow the operator to specify which phase receives unused time from a preceding phase. Within these operational objectives, the ASCT system will change its operation to accommodate the rise and fall of volumes through the peaks and the changing patterns of flow throughout the day and week. However, there is also a stochastic element			
		* Next coordinated phase;			See page 4 of separate response.	observation
		* User-specified phase.			See page 4 of separate response.	observation
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	This is a function of the signal controller. Kadence is fully compatible	observation
		* Previous phase;				
		* Next phase;				
		* Next coordinated phase;				

		* User-specified phase.	to traffic in the short term, with the number of arrivals for a phase varying from cycle to cycle, and pedestrians not being present on all phases in all cycles. It is therefore desirable for the system to have some local tactical control. While vehicle-actuated coordination typically allows phases to run longer or shorter from cycle to cycle to match the actual number of vehicles using the phase, the system will also allow the operator to decide where the unused time will be used. If a phase is to be skipped, the operator can specify that the spare time will be added to the existing phase, the following phase or the next coordinated phase.			
2.1.3		**2.1.3 Oversaturation**				
2.1.3.0-1	5	The ASCT shall detect the presence of queues at pre-configured locations.	*4.1.0-1.0-4* The objective of the coordination will 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	yes	See page 4 of separate response.	observation

			capacity available during the green phases. This will involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon will be stopped. It will also involve control of offsets and phase lengths so that queues may be stored in locations where they will not adversely affect capacity of the system.			
2.1.3.0-2	5	When queues are detected at user-specified locations, the ASCT shall execute user-specified timing plan/operational mode.	*4.1.0-1.0-5* Manage the locations of queues within the network. 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 within the system would normally be to increase cycle length, phase times and other parameters to increase the capacity for the relevant	yes	queue detectors can be configured in Kadence and used to trigger specific response plans when the queue exceeds detector thresholds. Similarly if the occupancy level on the queue detector is below a threshold, an alternative pattern can be enabled or the system can go back to "normal" adaptive operation. Test by configuring queue detectors and queue detection thresholds and observing that the system will enable a queue management pattern and go back to "normal" operation when the queue is reduced at the detection location.	observation

			movements, when the queuing originates outside the system, this will 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 will 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.			
2.1.3.0-3	5	When queues are detected at user-specified locations, the ASCT shall execute user-specified adaptive strategy in accordance with requirements 2.1.1.0-2 (The ASCT shall operate non-adaptively when adaptive control equipment fails.).	*4.1.0-4* 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 will block another movement in the cycle unnecessarily. For example, the operator may need to prevent a queue resulting from the	yes	queue detectors can be configured in Kadence and used to trigger specific response plans when the queue exceeds detector thresholds. Similarly if the occupancy level on the queue detector is below a threshold, an alternative pattern can be enabled or the system can go back to "normal" adaptive operation. Test by configuring queue detectors and queue detection thresholds and observing that the system will	observation

			trailing end of the through green from blocking the storage needed by an entering side-street left turn in the subsequent phase. An overall queue management strategy, particularly when congestion is present, is covered under 4.1.0-1.0-5.		enable a queue management pattern and go back to "normal" operation when the queue is reduced at the detection location.	
			4.5.0-1			
			The system operator needs to detect queues from outside the system and modify the ASCT operation to accommodate the queuing. Occasionally, as the result of an incident or other event outside the control of the system and outside the area covered by the system, congestion will propagate back into the adaptive control area and the measured traffic conditions will be outside the range of data that can be processed by the system. In locations where this is likely to occur, the intersection detectors, or queue detectors installed specifically for this purpose, will measure increased occupancy. In such cases, when user-specified signal timing and			

			detector occupancy conditions are met, the system will recognize that its response to the input data may not be appropriate, and it will revert to an appropriate, user-specified fallback mode, either time-of-day operation or free operation. The fallback mode will be specified by the user based on location and time of day.			
			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. Periodic interruptions to flow on a side street, such as due to a railroad grade crossing, will create queues that may extend back to the coordinated route. The system will 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. The grade			

			crossing blocks the coordinated routes when the gates are down. The gates are down for two to 10 minutes approximately once per hour. The gates have a history of remaining stuck in the down position four to six times a year. Grand Avenue is currently involved in the railroad preemption, but 134th Drive is not. Vehicles block the 134th Drive intersection with each preemption and requires clearance in both directions once the preemption is released. A grade separated interchange at Bell Road and Grand Avenue (US 60) is identified for construction in 2015. ASCT may be beneficial for traffic operations during construction. Proposers should provide high-level explanation of how the ASCT could be implemented prior to the start of the interchange construction and adjusted once the grade separation is completed. If not recommended, state this, and major			

			challenges/reasons.			
			4.5.0-3			
			The system operator needs to detect queues propagating outside its boundaries from within the ASCT boundaries (Grand Avenue and SR Loop 303), and modify its operation to accommodate the queuing.			
			4.5.0-4			
			The system operator needs to store queues in locations where they can be accommodated without adversely affecting adaptive operation.			
			4.5.0-5			
			The system operator needs to prevent queues forming			

			at user-specified locations.			
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	queue detectors can be configured in Kadence and used to trigger specific response plans when the queue exceeds detector thresholds. Similarly if the occupancy level on the queue detector is below a threshold, an alternative pattern can be enabled or the system can go back to "normal" adaptive operation. Test by configuring queue detectors and queue detection thresholds and observing that the system will enable a queue management pattern and go back to "normal" operation when the queue is reduced at the detection location.	
			The objective of the coordination will 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 will involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon will be stopped. It will also involve control of offsets and phase lengths so that queues may be stored in locations where they will not adversely affect capacity of the system.			
			4.1.0-1.0-5			

			Manage the locations of queues within the network. 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 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 will 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 will 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.			
			4.1.0-4			
			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 will block another movement in the cycle unnecessarily. For example, the operator may need to prevent a queue resulting from the trailing end of the through green from blocking the storage needed by an entering side-street left turn in the subsequent phase. An overall queue management strategy, particularly when congestion is present, is covered under 4.1.0-1.0-5.			
			4.5.0-4			

			The system operator needs to store queues in locations where they can be accommodated without adversely affecting adaptive operation.			
			4.5.0-5			
			The system operator needs to prevent queues forming at user-specified locations.			
2.2		**2.2 Sequence-based Adaptive Coordination**				
2.2.0-2	2	The ASCT shall select cycle length based on a time of day schedule.	*4.1.0-1.0-2*	yes	Kadence follows an underlying TOD schedule which can change the cycle time by pattern. From this baseline cycle time, Kadence can then tune the cycle for the group based on saturation on critical phases at user-specified critical locations. Test by observation of the TOD schedule.	observation
			The objective of the coordination will be to provide for smooth flow along the arterial road, minimizing the number of stops experienced by vehicles traveling along the road. Where two-way progressions are permitted by "natural" cycle lengths, the system will generally operate at one of those cycle lengths unless longer phase lengths are required to accommodate the demand.			
			4.1.0-1.0-3			
			Distribute phase times in an equitable fashion. During moderate to light traffic conditions, one or more phases may be omitted (e.g., a protected			

			phase if protected/permissive left turns are operated), in order to more efficiently serve other movements, provided it is safe to do so. This may be accomplished through a time of day schedule or based on the measured traffic conditions.			
			4.1.0-1.0-4			
			The objective of the coordination will 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 will involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon will be stopped. It will also involve control of offsets and phase lengths so that queues may be stored in locations where they will not adversely affect capacity of the system.			
2.2.0-3	4	The ASCT shall	*4.1.0-1.0-3*	yes		observation

		calculate phase lengths for all phases at each signal controller to suit the current coordination strategy.	Distribute phase times in an equitable fashion. During moderate to light traffic conditions, one or more phases may be omitted (e.g., a protected phase if protected/permissive left turns are operated), in order to more efficiently serve other movements, provided it is safe to do so. This may be accomplished through a time of day schedule or based on the measured traffic conditions.		The split tuning algorithm allocates split time to provide equitable service to all phases at each intersection. Any split can be biased to receive additional split time to improve coordination performance and to manage the location of queues in the network. Test by observing the split tuner allocation of time to each phase to balance phase utilization on each split. Observe when biasing is applied to any phase that less split time is subtracted from that phase even if the utilization is low.	
			4.1.0-1.0-5			
			Manage the locations of queues within the network. 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 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 will 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 will 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.			
			4.1.0-4			
			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 will block another movement in the cycle unnecessarily.			

			For example, the operator may need to prevent a queue resulting from the trailing end of the through green from blocking the storage needed by an entering side-street left turn in the subsequent phase. An overall queue management strategy, particularly when congestion is present, is covered under 4.1.0-1.0-5.			
2.2.0-4	4	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.	*4.1.0-1.0-2* The objective of the coordination will be to provide for smooth flow along the arterial road, minimizing the number of stops experienced by vehicles traveling along the road. Where two-way progressions are permitted by "natural" cycle lengths, the system will generally operate at one of those cycle lengths unless longer phase lengths are required to accommodate the demand.	yes	See page 4 of separate response.	observation
2.2.0-4.0-	2	The ASCT shall apply	*4.1.0-1.0-4*	yes	See page 4 of separate	observation

1		offsets for the user-specified reference point of each signal controller along a coordinated route.	The objective of the coordination will 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 will involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon will be stopped. It will also involve control of offsets and phase lengths so that queues may be stored in locations where they will not adversely affect capacity of the system.		response.	
2.2.0-5	2	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).	*4.1.0-1.0-2* The objective of the coordination will be to provide for smooth flow along the arterial road, minimizing the number of stops experienced by vehicles traveling along the road. Where two-way progressions are permitted by "natural" cycle lengths, the system will generally operate at one of those	yes	See page 4 of separate response.	observation

			cycle lengths unless longer phase lengths are required to accommodate the demand.			
2.2.0-5.0-1	3	The ASCT shall limit cycle lengths to user-specified values.	*4.1.0-1.0-3* Distribute phase times in an equitable fashion. During moderate to light traffic conditions, one or more phases may be omitted (e.g., a protected phase if protected/permissive left turns are operated), in order to more efficiently serve other movements, provided it is safe to do so. This may be accomplished through a time of day schedule or based on the measured traffic conditions.	yes	The step size can be chosen to limit the cycles to specific values.	observation
2.2.0-5.0-2	3	The ASCT shall limit cycle lengths to a user-specified range.	*4.1.0-1.0-4* The objective of the coordination will 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 will involve controlling phase	yes	The min and max values can be changed by pattern.	observation
2.2.0-5.0-3	2	The ASCT shall calculate optimum cycle lengths according to the user-specified coordination strategy.		yes	See page 5 of separate response.	observation
2.2.0-5.0-4	3	The ASCT shall limit changes in cycle length to a user-specified value.		yes	See page 5 of separate response.	observation

2.2.0-5.0-4.0-1	2	The ASCT shall increase the limit for a user defined number of following cycles based on a change in conditions.	lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon will be stopped. It will also involve control of offsets and phase lengths so that queues may be stored in locations where they will not adversely affect capacity of the system.	yes	See page 5 of separate response.	use case acceptance testing
2.2.0-5.0-4.0-1.0-1	2	The change in conditions shall be a user defined number of successive adaptive increases in cycle length at the maximum rate.		no	A price for an accelerated rate of cycle change based on user-specified conditions has been provided.	use case acceptance testing
2.2.0-5.0-4.0-1.0-2	4	The increase shall be user-defined.		no	see above	
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* The system operator needs to minimize the chance that a queue forms at a specified location.	yes	See page 5 of separate response.	
2.3		**2.3 Non-sequence-based adaptive coordination**				
2.3.0-2	5	The ASCT shall calculate the appropriate state of the signal at the critical signal controller. The ASCT shall have the ability to vary cycle length.	*4.1.0-1.0-2* The objective of the coordination will be to provide for smooth flow along the arterial road, minimizing the number of stops experienced by vehicles traveling along the road. Where two-way progressions are permitted	NA	Kadence is a sequence based system	observation

			by "natural" cycle lengths, the system will generally operate at one of those cycle lengths unless longer phase lengths are required to accommodate the demand.			
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, relative to a reference point at the critical intersection, to suit the current coordination strategy.	*4.1.0-1.0-3* Distribute phase times in an equitable fashion. During moderate to light traffic conditions, one or more phases may be omitted (e.g., a protected phase if protected/permissive left turns are operated), in order to more efficiently serve other movements, provided it is safe to do so. This may be accomplished through a time of day schedule or based on the measured traffic conditions.	NA	Kadence is a sequence based system	observation
2.3.0-4	4	When demand is present, the ASCT shall implement a user-specified maximum time between successive displays of each phase at each intersection.	*4.1.0-1.0-4* The objective of the coordination will 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 will	NA	Kadence is a sequence based system	observation

			involve controlling phase lengths so that the size of platoons entering a downstream block do not exceed the storage length if the platoon will be stopped. It will also involve control of offsets and phase lengths so that queues may be stored in locations where they will not adversely affect capacity of the system.			
2.3.0-5	5	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.	*4.1.0-5* The system operator needs to minimize the chance that a queue forms at a specified location.	NA	Kadence is a sequence based system	observation
2.4		**2.4 Single intersection adaptive operation**				
2.4.0-2	5	The ASCT shall calculate a cycle length of a single intersection, based on current measured traffic conditions. (The calculation is based on the optimization objectives.)	*4.1.0-1.0-6* At an isolated intersection, optimize operation with a minimum of phase failures (based on the optimization objectives).	yes	See page 5 of separate response.	observation
2.4.0-3	5	The ASCT shall	*4.1.0-1.0-3*	yes	See page 5 of separate	observation

		calculate optimum phase lengths, based on current measured traffic conditions. (The calculation is based on the optimization objectives.)	Distribute phase times in an equitable fashion. During moderate to light traffic conditions, one or more phases may be omitted (e.g., a protected phase if protected/permissive left turns are operated), in order to more efficiently serve other movements, provided it is safe to do so. This may be accomplished through a time of day schedule or based on the measured traffic conditions.		response.	
2.4.0-3.0-2	5	When queues are detected at user-specified locations, the ASCT shall execute user-specified timing plan/operational mode.	*4.1.0-1.0-6* At an isolated intersection, optimize operation with a minimum of phase failures (based on the optimization objectives).	yes	See page 5 of separate response.	observation
2.4.0-4	2	The ASCT shall calculate phase order, based on current measured traffic conditions. (The calculation is based on the optimization objectives.)	*4.1.0-1.0-6* At an isolated intersection, optimize operation with a minimum of phase failures (based on the optimization objectives).	yes	See page 6 of separate response.	observation
2.5		**2.5 Phase-based adaptive coordination**				

2.5.0-2	5	The ASCT shall alter the state of the signal controller for all phases at the user-specified intersection.	*4.1.0-2* The system operator needs to manage the coordination in small groups of signals to link phase service at some intersections with phase service at adjacent intersections.	yes	This is a function of the signal controller. Kadence is fully compatible	observation
2.5.0-3	5	The ASCT shall calculate the time at which a user-specified phase shall be green at an intersection.		yes	by use of offsets and max recall settings on phases, their start times can be exactly controlled.	observation
2.5.0-4	5	When demand is present, the ASCT shall implement a user-specified maximum time between successive displays of each phase at each intersection.		yes	by use of maximum recalls the time between successive displays can be exactly controlled	observation
2.5.0-5	5	The ASCT shall alter the operation of the non-critical intersections to minimize stopping of traffic released from user-specified phases at the user-specified critical intersection.		yes	by use of offsets in a coordination pattern	observation
2.5.0-6	5	The ASCT shall alter the operation of the non-critical intersections to minimize stopping of traffic arriving at user-specified phases		yes	by use of offsets in a coordination pattern	observation

		at the user-specified critical intersection.				
2.5.0-7	5	The ASCT shall adjust the state of the signal controller so that vehicles approaching a signal that have been served during a user-specified phase at an upstream signal do not stop.	*4.1.0-5* The system operator needs to minimize the chance that a queue forms at a specified location. *4.1.0-2* The system operator needs to manage the coordination in small groups of signals to link phase service at some intersections with phase service at adjacent intersections.	yes	by use of offsets in a coordination pattern	observation
2.6		**2.6 Responsiveness**				
2.6.0-1	3	The ASCT shall limit the change in consecutive cycle lengths to be less than a user-specified value.	*4.8.0-1* The system operator needs to modify the ASCT operation to closely follow changes in traffic conditions.	yes	See page 6 of separate response.	observation
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.)		yes	See page 6 of separate response.	observation
2.6.0-3	3	The ASCT shall limit the changes in the direction of primary	*4.8.0-1* The system operator needs to modify the ASCT	no	See page 6 of separate response.	use case acceptance testing

		coordination to a user-specified frequency.	operation to closely follow changes in traffic conditions.			
			4.8.0-2			
			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	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	See page 6 of separate response.	demonstration
			The system operator needs to respond quickly to sudden large shifts in traffic conditions.			
2.6.0-5	2	The ASCT shall select cycle length from a list of user-defined cycle lengths.	*4.8.0-2*	yes	See page 6 of separate response.	observation
			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.			
3		**3 External/Internal Interfaces**				
3.0-1		The ASCT shall support external interfaces according to the interface control documents and the following detailed requirements. Interface				

		requirements include:				
	5	· Information layer protocol	*4.3.0-1*	yes	See page 7 of separate response.	observation
			The system operator needs to adaptively control signals operated by the City of Surprise and ADOT.			
	4	· Application layer protocol	*4.3.0-2*	yes	See page 7 of separate response.	use case acceptance testing
			The system operator needs to send data to another system that would allow the other system to coordinate with the ASCT system.			
	4	· Lower layer protocol	*4.3.0-4*	yes	See page 7 of separate response.	use case acceptance testing
			The system operator needs to receive data from another system that will allow the ASCT system to coordinate its operation with the adjacent system.			
	4	· Data aggregation	*4.11.0-5*	yes	See page 7 of separate response.	use case acceptance testing
			The system operator needs to report performance data in real time to KITS and Regional Archived Data System (RADS).			
	4	· Frequency of storage	*4.17.0-2*	yes	See page 7 of separate response.	use case acceptance testing
	4	· Frequency of reporting	The system operator needs to react to commands			

	4	· Duration of storage)	issued by KITS and future decision support system, such as an ICM system. A signal may be received from an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan will remain in operation until the command from the external source is removed.			
3.0-1.0-1	4	The ASCT shall send operational data to KITS and Regional Archived Data System (RADS).	*4.3.0-2*	yes	See page 7 of separate response.	use case acceptance testing
			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 KITS and Regional Archived Data System (RADS)..			
3.0-1.0-2	5	The ASCT shall send control data to KITS.	*4.3.0-2*	yes	Kadence is fully integrated with KITS	observation
			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	*4.11.0-1*	yes	Kadence is fully integrated	observation

		monitoring data to KITS.	The agency needs KITS to be able to monitor the ASCT system automatically.		with KITS	
3.0-1.0-4	5	The ASCT shall send coordination data to KITS.	*4.3.0-2*	yes	Kadence is fully integrated with KITS	observation
			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 performance data to KITS and Regional Archived Data System (RADS).	*4.11.0-5*	yes	See page 8 of separate response.	use case acceptance testing
			The system operator needs to report performance data in real time to KITS and Regional Archived Data System (RADS).			
3.0-1.0-6	5	The ASCT shall receive commands from KITS and a future decision support system, such as an ICM system.	*4.17.0-2*	yes	See page 8 of separate response.	use case acceptance testing
			The system operator needs to react to commands issued by KITS and future decision support system, such as an ICM system. A signal may be received from an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan will remain in operation until the command from the external source is removed.			
3.0-1.0-7	5	The ASCT shall implement the following commands from KITS when commanded:		yes	Kadence is fully integrated with KITS. These parameter changes are fully supported by pattern	observation
		· Specified cycle length				
		· Specified direction of progression				
		· Specified adaptive strategy				
4		**4 Crossing Arterials and Boundaries**				

4.0-1	2	The ASCT shall conform its operation to an external system's operation.	*4.3.0-4*	yes	As part of our proposal, we are providing the partner agencies a full license for Kadence that can be used on any and all signals on Bell Road, Surprise, MCDOT, and Glendale and on up to 200 additional signals of partner agencies. Kadence groups can be coordinated with other Kadence groups through the congestion management logic that can send each group to the same cycle time and coordination strategy through the RCN. See other answers about receiving commands through C2C	use case acceptance testing
			The system operator needs to receive data from another system that will 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.			
			4.17.0-2			
			The system operator needs to react to commands issued by KITS and future decision support system, such as an ICM system. A signal may be received from an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan will remain in operation until the command from the external source is removed.			
4.0-1.0-1	2	The ASCT shall alter its operation to minimize	*4.3.0-4*	yes	Kadence can use detector data from external devices not connected to the signal	observation
			The system operator needs to receive data from			

		interruption of traffic entering the system. (This may be achieved via detection, with no direct connection to the other system)	another system that will allow the ASCT system to coordinate its operation with the adjacent system.		controller through the congestion management logic to respond to external changes in traffic flow	
			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.			
4.0-1.0-2	2	The ASCT shall be based on a fixed cycle length to match an adjacent system.	*4.3.0-5*	yes	The cycle adjustment logic can be turned off by pattern to achieve this.	observation
			The system operator needs to constrain the adaptive system to operate a cycle length compatible with the crossing arterial.			
5		**5 Access and Security**				
5.0-1		The ASCT shall be implemented with a security policy that addresses the following selected elements:	*4.4.0-1*	yes	Kadence supports the security configuration parameters in KITS	observation
			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.			
5.0-1.0-1	5	Local access to the ASCT.		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-2	5	Remote access to the ASCT.		yes		observation
5.0-1.0-3	5	System monitoring.		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-4	5	System manual override.		yes		observation
5.0-1.0-5	5	Development		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-6	5	Operations		yes		observation

5.0-1.0-7	5	User login		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-8	5	User password		yes		observation
5.0-1.0-9	5	Administration of the system		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-10	5	Signal controller group access		yes		observation
5.0-1.0-11	5	Access to classes of equipment		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-12	5	Access to equipment by jurisdiction		yes		observation
5.0-1.0-13	5	Output activation		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-14	5	System parameters		yes		observation
5.0-1.0-15	5	Report generation		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-16	5	Configuration		yes		observation
5.0-1.0-17	5	Security alerts		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-18	5	Security logging		yes		observation
5.0-1.0-19	5	Security reporting		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-1.0-20	5	Database		yes		observation
5.0-1.0-21	5	Signal controller		yes	Kadence supports the security configuration parameters in KITS	observation
5.0-2		The ASCT shall provide monitoring and control access at the following locations:				
5.0-2.0-1	5	City of Surprise TMC on Litchfield Road, south of Bell Road.	*4.10.0-1.0-1*	yes	Kadence is fully client-server like KITS so the client application can be installed anywhere on the network	observation
			Agency TMC			
5.0-2.0-2	5	Maintenance facility located north of Bell Road and 134th Avenue	*4.10.0-1.0-2*	yes	Kadence is fully client-server like KITS so the client application can be installed anywhere on the network	observation
			Maintenance facility			

5.0-2.0-3	5	Agency LAN or WAN	*4.10.0-1.0-3* Workstations on agency LAN or WAN located at the City of Surprise TMC.	yes	Kadence is fully client-server like KITS so the client application can be installed anywhere on the network	observation
5.0-2.0-4		Not used				
5.0-2.0-5	4	Local controller cabinets	*4.10.0-1.0-5* Local controller cabinets	yes	See page 8 of separate response.	observation
5.0-2.0-6	3	Maintenance vehicles	*4.10.0-1.0-6* Maintenance vehicles	yes	See page 8 of separate response.	observation
5.0-2.0-7	4	Remote location via internet	*4.10.0-1.0-7* Remote locations at the City of Surprise City Hall and signal shop located at the maintenance yard	yes	See page 8 of separate response.	observation
5.0-3	5	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	The Kadence security setup is the same as KITS with Windows-based security policy.	observation
5.0-4	5	The ASCT shall not prevent access to the local signal controller database, monitoring or reporting functions by any	*4.10.0-2* The operator needs to access to the database management, monitoring and reporting features and functions of the signal	yes	KITS can still be fully used to upload and download settings from the controller and perform all other actions.	observation

		installed signal management system.	controllers and any related signal management system from the access points defined for those system components.			
6		**6 Data Log**				
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.	yes	Kadence does not prevent any of these events from being logged as they already are in KITS	observation
6.0-1.0-1	4	Time-stamped vehicle phase calls		yes	Kadence does not prevent any of these events from being logged as they already are in KITS	observation
6.0-1.0-2	4	Time-stamped pedestrian phase calls		yes		observation
6.0-1.0-3	4	Time-stamped emergency vehicle preemption calls		yes		observation
6.0-1.0-4	4	Time-stamped transit priority calls		yes		observation
6.0-1.0-5	4	Time-stamped railroad preemption calls		yes		observation
6.0-1.0-6	5	Time-stamped start and end of each phase		yes		observation
6.0-1.0-7	5	Time-stamped controller interval changes		yes	Kadence does not prevent any of these events from being logged as they already are in KITS	observation
6.0-1.0-8	4	Time-stamped start and end of each transition to a new timing plan		yes	Kadence does not prevent any of these events from being logged as they already are in KITS	observation
6.0-2	5	The ASCT shall export its systems log in the following	*4.11.0-4*	yes	All reports and Historical timing data can be exported to the formats requested	observation

		formats:				
		* 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 KITS.			
		* Text				
		* CVS				
		* Open source SQL database				
6.0-3	5	The ASCT shall store the event log for a minimum of 30 days		**yes**	**This is configurable to be any length of time in the database, including forever if you have enough hard drive space**	**observation**
6.0-4	5	The ASCT shall store results of all signal timing parameter calculations for a minimum of 30 days.	*4.11.0-2*	**yes**	**This is configurable to be any length of time in the database, including forever if you have enough hard drive space**	**observation**
			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 form used as input to calculations for a minimum of 30 days:	*4.11.0-2*	**yes**	**See page 8 of separate response.**	**observation**

		* 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	5	The ASCT system shall archive all data automatically after a user-specified period not less than 30 days.	*4.11.0-4*	**yes**	**The SQL database can be configured to archive data after a specified "clean out" date**	**observation**
			The system operator needs to store all operational data and signal timing parameters calculated by the adaptive system, and export selected data to KITS.			
6.0-7	5	The ASCT shall provide data storage for a system size of 22 signal controllers. The data to be stored shall include the following:		**yes**	**This should not be a problem with Surprise's existing database**	**observation**
		* 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	The existing system detector report includes detector fault information if it is reported by the controller. A price is provided for the upgrade of Kadence to include reporting of the impact of detector failures on ASCT operation. This feature is included with the price for 6.0-9.	use case acceptance testing
		* 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	5	The ASCT shall report comparisons of logged data when requested by the user:		no	This features is not being provided	N/A
		* 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	*4.11.0-4*	yes	SQL server is used by Kadence	observation

		data logs in a standard database.	The system operator needs to store all operational data and signal timing parameters calculated by the adaptive system, and export selected data to KITS.			
6.0-11	5	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.	*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	See page 8 of separate response.	use case acceptance testing
7		**7 Advanced Controller Operation**				
7.0-1	4	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* Service a phase more than once per cycle	yes	phase reservice is a function of the signal controller. Kadence is fully compatible with this operation.	observation
7.0-2	4	The ASCT shall provide a minimum of 8 phase overlaps.	*4.9.0-1.0-2* Operate at least eight overlap phases	yes	overlaps are fully supported by Kadence, including the use of overlaps for interchange operation.	observation
7.0-3	5	The ASCT shall accommodate a minimum of 8 phases at each signal	*4.9.0-1.0-3* Operate three rings, eight phases and up to two phases per ring.	yes	Kadence can operate with up to 32 phases and 4 rings.	observation
7.0-4	5	The ASCT shall accommodate a minimum of 3 rings at each signal.		yes	Kadence can operate with up to 32 phases and 4 rings.	observation

7.0-5	5	The ASCT shall accommodate a minimum of 2 phases per ring		yes	Kadence can operate with up to 32 phases and 4 rings.	observation
7.0-6	5	The ASCT shall provide a minimum of 8 different user-defined phase sequences for each signal.	*4.1.0-6* The system operator needs to modify the sequence of phases to support the various operational strategies.	yes	See page 9 of separate response.	observation
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* Permit different phase sequences under different traffic conditions	yes	See page 9 of separate response.	observation
7.0-6.0-2	5	Each permissible phase sequence shall be executable by a time of day schedule.		yes	See page 9 of separate response.	observation
7.0-6.0-3	5	Each permissible phase sequence shall be executable based on measured traffic conditions		yes	See page 9 of separate response.	observation
7.0-7	5	The ASCT shall not prevent a phase/overlap output by time-of-day.	*4.1.0-6* The system operator needs to modify the sequence of phases to support the various operational strategies.	yes	See page 9 of separate response.	observation
7.0-8	5	The ASCT shall not prevent a phase/overlap output based on an external input.	*4.17.0-2* The system operator needs to react to commands issued by KITS and future decision support system, such as an ICM system. A	NO	This feature is not being provided	N/A

			signal may be received from an external decision support system or an Integrated Corridor Management system, commanding the ASCT to initiate a flush plan. This flush plan will remain in operation until the command from the external source is removed.			
7.0-9		The ASCT shall not prevent the following phases to be designated as coordinated phases: Phases 2 & 6	*4.1.0-6*	yes	You bet. Any phases can be designated as coord phases.	observation
	5		The system operator needs to modify the sequence of phases to support the various operational strategies.			
			4.9.0-1.0-9			
			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.	*4.9.0-1.0-12*	yes	This is a function of the signal controller. Kadence is fully compatible	observation
			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	This is a function of the signal controller. Kadence is fully compatible.	observation
			Use flashing yellow arrow to control permissive left turns.			
7.0-12	5	The ASCT shall not	*4.9.0-1.0-11*	yes	This is a function of the signal	observation

		prevent the local signal controller from performing actuated phase control using 40 extension/passage timers as assigned to user-specified vehicle detector input channels in the local controller.	Allow the controller to respond independently to individual lanes of an approach. This may be implemented in the signal controller using 40 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.		controller. Kadence is fully compatible	
7.0-12.0-1	4	The ASCT shall operate adaptively using user-specified detector channels.		yes	See page 9 of separate response.	observation
8		**8 Pedestrians**				
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	this is a function of the signal controller. Kadence can be configured to allow or disallow the phase splits to be tuned lower than the pedestrian crossing times. Test by observation	observation
			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 cycle or nearly every cycle.)			
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* 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	This is a function of the signal controller. Kadence is fully compatible.	observation
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	This is a function of the signal controller. Kadence is fully compatible.	observation
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	This is a function of the signal controller. Kadence is fully compatible.	observation
9		**9 Special Functions**				
9.0-1	5	The ASCT shall set a	*4.9.0-1.0-11*	yes	This is a function of the signal	observation

		specific state for each special function output based on the occupancy on a user-specified detector.	Allow the controller to respond independently to individual lanes of an approach. This may be implemented in the signal controller using 40 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.		controller. Kadence is fully compatible.	
9.0-2	4	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 can be accomplished using the logic processor of the ASC/3. Kadence is fully compatible.	observation
9.0-3	5	The ASCT shall set a specific state for each special function output based on a time-of-day schedule.		yes	This can be accomplished with the action plans of the ASC/3. Kadence is fully compatible.	observation
10		**10 Detection**				
10.0-1	5	The ASCT shall be compatible with the following detector technologies:		yes	Kadence is completely detector-technology agnostic	observation
		* Video Detection				
		* Inductive Loops				
		* Radar (Wavetronix				

		SmartSensor Matrix)				
		* Furnished Detection				
11		**11 Railroad and EV Pre-emption**				
11.0-1	5	The ASCT shall maintain adaptive operation at non-preempted intersections during railroad preemption.	*4.13.0-1* The system operator needs to accommodate railroad preemption. The grade crossing blocks the coordinated routes when the gates are down. The gates are down for two to 10 minutes approximately once per hour. The gates have a history of remaining stuck in the down position four to six times a year. Grand Avenue is currently involved in the railroad preemption, but 134th Drive is not. Vehicles block the 134th Drive intersection with each preemption and requires clearance in both directions once the preemption is released. When an intersection responds to a railroad preemption, other signals specified by the user will also be preempted. Once the preemption is released, all the signals in the coordinated group return to adaptive control.	yes	Kadence will also accelerate the recovery of traffic performance after the preempt by adjusting the parameters.	observation

11.0-2	5	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 with user defineable capability to allow adaptive control of phases that remain operational during preemption.	yes	Kadence will also accelerate the recovery of traffic performance after the preempt by adjusting the parameters.	observation
11.0-3	5	The ASCT shall execute user-specified actions at non-preempted signal controllers during a preemption.	*4.13.0-1* The system operator needs to accommodate railroad preemption. The grade crossing blocks the coordinated routes when the gates are down. The gates are down for two to 10 minutes approximately once per hour. The gates have a history of remaining stuck in the down position four to six times a year. Grand Avenue is currently involved in the railroad preemption, but 134th Drive is not. Vehicles block the 134th Drive intersection with each preemption and requires clearance in both directions once the preemption is released. When an intersection responds to a railroad preemption, other signals specified by the user will	yes	Kadence will wait until the signal is back in coordination before resuming adaptive control at any signal that is preempted.	observation

			also be preempted. Once the preemption is released, all the signals in the coordinated group return to adaptive control.			
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.)	*4.13.0-1* The system operator needs to accommodate railroad preemption. The grade crossing blocks the coordinated routes when the gates are down. The gates are down for two to 10 minutes approximately once per hour. The gates have a history of remaining stuck in the down position four to six times a year. Grand Avenue is currently involved in the railroad preemption, but 134th Drive is not. Vehicles block the 134th Drive intersection with each preemption and requires clearance in both directions once the preemption is released. When an intersection responds to a railroad preemption, other signals specified by the user will also be preempted. Once	yes	Kadence will wait until the signal is back in coordination before resuming adaptive control at any signal that is preempted.	observation

			the preemption is released, all the signals in the coordinated group return to adaptive control.			
11.0-6	5	The ASCT shall return to normal adaptive operation when preemption of a signal controller is released.	*4.13.0-2* The system operator needs to accommodate emergency vehicle preemption with user defineable capability to allow adaptive control of phases that remain operational during preemption.	yes	Kadence will also accelerate the recovery of traffic performance after the preempt by adjusting the parameters.	observation
11.0-7	5	The ASCT shall preempt a user-specified group of signal controllers when a user-specified preemption is requested.		yes	This can be done with the KITS route preemption feature. A price has been provided for integration of this feature with KITS and Kadence and the ASC/3.	observation
12		**12 Transit Priority**	**NOT USED**			
13		**13 Failure Events and Fallback**				
13.1		**13.1 Detector Failure**				
13.1.0-1	5	The ASCT shall take user-specified action in the absence of valid detector data from 1 or more vehicle detectors within a group.	*4.14.0-1* The system operator needs to fall back to TOD or isolated free operation, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and software failure.	yes	user-specified detector failure response will be added for the project in addition to the other detector-failure features already supported.	use case acceptance testing
13.1.0-1.0-1	5	The ASCT shall release control to central system control.		yes	user-specified detector failure response will be added for the project in addition to the other detector-failure features	use case acceptance testing

					already supported.	
13.1.0-1.0-2	5	The ASCT shall release control to local operations to operate under its own time-of-day schedule.		yes	See page 9 of separate response.	use case acceptance testing
13.1.0-2	4	The ASCT shall use the following alternate data sources for operations in the absence of the real-time data from a detector:		yes		
13.1.0-2.0-1	4	* Data from a user-specified alternate detector. * Historical Data		no	See page 10 of separate response.	use case acceptance testing
13.1.0-2.0-3	4	The ASCT shall switch to the alternate source in real time without operator intervention.		no	See page 10 of separate response.	use case acceptance testing
13.1.0-3	5	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	*4.12.0-1* 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	yes	detector failure, comm failure, preemption, and many other field operation events are logged and alarmable in Kadence.	observation

		by using an external maintenance management system.	and alerts to the KITS 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.	yes	Kadence has a fully featured log retrieval, display, and reporting suite.	observation
13.1.0-5	5	The permanent failure log shall be searchable, archivable, and exportable.		yes	Kadence has a fully featured log retrieval, display, and reporting suite.	observation
13.2		**13.2 Communications Failure**				
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 or isolated free operation, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and software failure.	yes	See page 10 of separate response.	observation
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.		yes	This will be added as part of the project.	use case acceptance testing
13.2-1.0-2	5	The ASCT shall switch to the alternate operation in real time without		yes	This will be added as part of the project.	use case acceptance testing

		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.	*4.12.0-1* The system operator needs to immediately notify maintenance and operations staff of alarms and alerts.	yes	detector failure, comm failure, preemption, and many other field operation events are logged and alarmable in Kadence.	observation
13.2-3	5	The ASCT shall issue an alarm within 1 minute of detection of a failure.	*4.12.0-2* The system operator needs to immediately and automatically pass alarms and alerts to the KITS and Regional Archived Data System (RADS).	yes	response time is configurable.	observation
13.2-4	5	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	Kadence has a fully featured log retrieval, display, and reporting suite.	observation
13.2-5	5	The permanent failure log shall be searchable, archivable, and exportable.		yes	Kadence has a fully featured log retrieval, display, and reporting suite.	observation
13.3		**13.3 Adaptive Processor Failure**				

13.3-1	5	The ASCT shall execute user-specified actions when adaptive control fails:	*4.14.0-1* The system operator needs to fall back to TOD or isolated free operation, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and software failure.	yes	if the kadence software service fails, the controllers will revert to TOD operation	observation
13.3-1.0-1	5	The ASCT shall release control to central system control.		yes	if the kadence software service fails, the controllers will revert to TOD operation	observation
13.3-1.0-2	5	The ASCT shall release control to local operations to operate under its own time-of-day schedule.		yes	if the kadence software service fails, the controllers will revert to TOD operation	observation
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.)	*4.12.0-2* The system operator needs to immediately and automatically pass alarms and alerts to the KITS and Regional Archived Data System (RADS).	yes	windows can be configured to log events when a service fails	observation
13.3-3	5	The permanent failure log shall be searchable, archivable, and exportable.		yes		
13.3-4	5	During adaptive	*4.14.0-1*	yes	This is not applicable to a	

		processor failure, the ASCT shall provide all local detector inputs to the local controller.	The system operator needs to fall back to TOD or isolated free operation, as specified by the operator, without causing disruption to traffic flow, in the event of equipment, communications and software failure.		central system like Kadence. Kadence does not withold phase calls from the controller.	
14		**14 Software**				
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	Kadence runs on windows only as used in Surprise currently	observation
		* Windows-PC	The system operator needs to use equipment and software acceptable under current agency IT policies and procedures. The software must interface with Windows. If Linux-based the software must operate on Windows platforms.			
		* Linux				
14.0-2	5	The system shall interface with detectors from all manufacturers.	*4.15.0-1.0-2*	yes	Kadence is completely detector-technology agnostic	observation
			Detector type			
14.0-3	5	The system shall interface with Econolite ASC3 controllers.	*4.15.0-1.0-1*	yes	Kadence is already integrated with the ASC/3	observation
			Controller type			
15		**15 Training**				

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		observation
15.0-1.0-1	5	The vendor shall provide training on the operations of the adaptive system.		yes		observation
15.0-1.0-2	5	The vendor shall provide training on troubleshooting the system.		yes		observation
15.0-1.0-3	5	The vendor shall provide training on preventive maintenance and repair of equipment.		yes		observation
15.0-1.0-4	5	The vendor shall provide training on system configuration.		yes		observation
15.0-1.0-5	5	The vendor shall provide training on administration of the system.		yes		observation
15.0-1.0-6	5	The vendor shall provide training on system calibration.		yes		observation
15.0-1.0-7	5	The vendor's training delivery shall include: printed course materials and references, electronic copies of presentations and references.		yes		observation
15.0-1.0-8	5	The vendor's training shall be delivered at		yes		observation

		the agency TMC.				
15.0-1.0-9	5	The vendor shall provide a minimum of 40 hours training to up to 6 staff.		yes	we expect to provide the required training hours, and much more operational support during the installation, configuration, tuning, and on-going operation of Kadence	attendance at our awesome training
15.0-1.0-10	5	The vendor shall provide a minimum of 2 training sessions over 6 months.		yes	we expect to provide the required training hours, and much more operational support during the installation, configuration, tuning, and on-going operation of Kadence	attendance at our awesome training
16		**16 Maintenance, Support and Warranty**				
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	*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		observation

		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 the life of the system. Preservation of requirements fulfillment especially includes all IT management requirements as previously identified.	*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		observation
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	*4.16.0-3* 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.	yes		observation

		is defined as any circumstance in which the material does not perform according to its specification.				
17		**17 Schedule**				
17.0-1	5	The ASCT shall set the state of external input/output states according to a time-of-day schedule.	*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 a function of the signal controller. Kadence is fully compatible	observation
17.0-2	5	The ASCT output states shall be settable according to a time-of-day schedule		yes	this is a function of the signal controller. Kadence is fully compatible	observation
17.0-3	5	The ASCT operational parameters shall be settable according to a Time of Day schedule		yes	All Kadence configuration parameters are changeable by coordination pattern.	observation
18		**18 Performance Measurement, Monitoring and Reporting**				
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	See page 10 of separate response.	observation
18.0-2	5	The ASCT shall report all intermediate calculated values that are affected by calibration parameters.		yes	See page 10 of separate response.	observation

18.0-3	5	The ASCT shall maintain a log of all signal state alterations directed by the ASCT.	*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. *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	the action log of all adaptive changes to cycle, split, offset, sequence is stored and available to user for a configurable number of days.	observation
18.0-3.0-1	5	The ASCT log shall include all events directed by the external inputs.	*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.	no	This is not being provided	N/A
18.0-3.0-2	5	The ASCT log shall include all external output state changes.		no	This is not being provided	N/A
18.0-3.0-3	5	The ASCT log shall include all actual parameter values that are subject to user-specified values.		no	This is not being provided	N/A
18.0-3.0-4	5	The ASCT shall maintain the records in this ASCT log for 30 days.		no	This is not being provided	N/A
18.0-3.0-5	5	The ASCT shall archive the ASCT log after 31 days in the following		no	This is not being provided	N/A

		manner: .CSV, MS Excel, Text, Open Source SQL database				

Exhibit C

Software Maintenance/Support/License Agreement(s)

Kimley –Horn will provide user support via email, text, phone, and remote VPN access for four (4) additional years after final acceptance. Typical activities that are addressed during the maintenance phase include analysis of database performance, adding new users, installing the user interface on new agency computers, confirm compliance of the system with OS patches, and resolution of operational deficiencies as reported by the agency. For Kadence operation we will periodically review performance with City staff and support the City in adjusting parameters and features to maximize effectiveness according to agency objectives. New functionality, additions, and enhancements made to the software, that do not constitute a separately packaged and marketed version or module of the system, developed by the Consultant during this period shall be offered to the City at no additional license fee. Upon approval by the City, these enhancements shall be installed and integrated based on current hourly rates. Since Kadence security relies on Windows Active Directory, it is expected the City will continue to manage domain level users as well as KHA remote access into the City's network (via Citrix or VPN).

Central Server and Workstation Hardware warranties will be transferred to MCDOT or assignees (City of Surprise) or designated agencies, as appropriate. Hardware warranties will match the five years of warranty support provided by Kimley-Horn. Software warranty terms as identified here will be transferable by MCDOT to City of Surprise. MCDOT/City of Surprise will have a perpetual, irrevocable license to use Kadence on any signal within the City of Surprise jurisdiction.

EARLY TERMINATION OF MAINTENANCE

MCDOT shall have the option to discontinue maintenance and support of Kadence 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: $60,000 refund

Termination of M&S after year 2: $45,000 refund

Termination of M&S after year 3: $30,000 refundTermination of M&S after year 4: $15,000 refund

STATEMENT OF RESPONSE TIME

Kimley-Horn will perform warranty support to correct failures of the System Software and to remedy deficiencies such that the System Software operates in accordance with the requirements, during the maintenance period.

MCDOT or assignees at City of Surprise will notify Kimley-Horn of the need for corrective actions for malfunctions at a particular "Problem Severity Level". Appropriate evidence of problem occurrence is on the burden of Surprise to include screen captures, screen movies, and associated diagnostic actions, outputs, summaries, and so on to rule out that potential deficiencies are related to network integrity, changes to security settings, or other IT and hardware anomalies or changes. Agency users will contact with Kimley-Horn the need for potential corrective action. Kimley-Horn will provide corrective actions as appropriate in the following table:

Table 1. Statement of Response Time

Level	Definition	Live Support	Response	Resolution goal	Status Update Frequency
Critical	An error or malfunction, including a Deficiency, that causes the System Software or a component or application of the System Software to completely halt processing, and for which no reasonable workaround is available.	**5am-11pm Arizona Time, Sun-Sat**	**One hour**	**Two days**	**Six hours**
Important	An error or malfunction, including a Deficiency, that impairs required functionality, but at the time of the error or malfunction, a reasonable workaround is available to proceed, and such workaround does not impair the C/CAG normal business operations.	**7am-7pm Arizona Time, Sun-Sat**	**Four hours**	**Two weeks**	**Twice per week**
Minor	An error or malfunction, including a Deficiency, which is inconvenient or an annoyance but does not affect functionality.	**7am-7pm Mountain Mon-Fri**	**One Day**	**One month**	**As progress made**

System updates and patches will be provided for the associated deficiencies as noted in the table above including modifications in KITS and Kadence.

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

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.

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 includespersons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;

iii. "Native Americans," which includespersons 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 ofthis 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. 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.

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. 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, D BE 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. Packagers, 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.

MARICOPA COUNTY DEPARTMENT
OF TRANSPORTATION PROJECT
SPECIFIC CONSULTANT PAYMENT
REQUEST

SUBMIT THIS PAYMENT REQUEST TO: Maricopa County Department of Transportation, Attention: Financial Branch Services, 2901 West Durango Street, Phoenix, Arizona 85009-6357.

CONSULTANT'S NAME: _____ DATE: _____
CONSULTANT'S ADDRESS: _____
PROJECT NAME: _____ PAYMENT REQUEST NO.: _____
CONTRACT NO.: _____ TIME PERIOD: _____ TO _____
WORK ORDER NO.: _____
MCDOT PROJECT MANAGER (not procurement contact): _____

A. CONSULTANT'S CONTRACTS FEES
1. Contract Amount (Basic/ Lump Sum Fee) $_____
2. Contract Additions (Approved Change Orders and Contract Amendments, Allowance, Work Authorizations, and Not-to-Exceed Work or Expenses)
   1. _____ 3. _____ 5. _____
   2. _____ 4. _____ 6. _____
3. Total Contract Additions: $_____
4. Total Current Contract Amount (A1 plns A3) $_____

B. CONSULTANT'S FEE EARNED TO DATE
1 Value of Basic Fee Work Completed _____% x _____ = $_____
2 Requested Payment for: Allowanced, NTE Work or Expenses, Work, Authorizations, Change Orders, Contract Amendments, etc. (attach backup Documents for allowances, NTE work and expenses, work authorizations)
   1. _____ 3. _____ 5. _____
   2. _____ 4. _____ 6. _____
3 Total Contract Additions: $_____
4 Total Fee Earned To Date (B1 plus B3) $_____
5 Percentage Total Contract Work Completed _____

C. PAYMENT REQUEST DATA
1. Less Prior Net Payments $_____
2. Less Prior Retainage $_____
3. Total Payment Request (B4 minus C1 minus C2) $_____
4. Less Tetainage this Payment Request $_____
5. Total Retainage to Date (C2 plus C4) $_____
6. Net Payment Request (C3 minus C4) $_____

If this is a full and final payment request be certain to include the required Certificate of Performance (COP).

Submitted by: _____
Consultant Date

Payment Request Verification: _____
MCDOT Project Manager Date

Approval to Pay: _____
MCDOT Division Head Date

*If substitute security accounts have been approved by MCDOT, write "ESCROW".
A Design and Progress Report MUST accompany this payment request, when applicable. Requests for release/ reduction of retention must include a separate memo & invoice justifying release/ reduction, dated with MCDOT's Project Manager's concurrence.

Rev. 6/1/07

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 contacting 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.

* * * * *

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 ':0.cts" 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.

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 **Ill** 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).

KIMLEY-HORN AND ASSOCIATES, INC., 7740 N. 16TH STREET, STE. 300, PHOENIX, AZ 85020

PRICING SHEET: NIGP CODE 91842

Terms:	NET 30
Vendor Number:	VC0000005552
Certificates of Insurance	Required
Contract Period:	To cover the period ending **August 31, 2021.**