TRANSPORTATION

Section 6-6

INTELLIGENT TRANSPORTATION SYSTEM

The City of Buckeye, Arizona

Engineering Design Standards

Section 6-6

Adopted August 2020
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# APPENDIX

**APPENDIX 1** – ITS STANDARD DETAILS .................................................. I
**APPENDIX 2** – CITY APPROVED PRODUCT LIST ........................................ II
Section 6-6 – Intelligent Transportation System

This section provides policy and standards establishing design criteria for constructing intelligent transportation systems (ITS) on public rights-of-way. The ITS infrastructure is owned and operated by the City of Buckeye. Public Works ITS infrastructure and operations will only be allowed within the City right-of-way. A level III IMSA certified technician is required to provide oversight of all ITS construction.

The City Engineer may approve modifications to the requirements of these design standards if in the professional judgement of the City Engineer changes are required for public health and safety concerns.

The City Engineer may also approve modifications to the design standards where industry standards change, or other situations exist that in the professional judgement of the City Engineer require modification to provide quality designs. Any request for a modification to these design standards must be submitted in writing and include a justification for the change requested. A copy of the City approved plans shall include a description of any approved modifications. Any final design must comply with the intent of these design standards.

The City Engineer is required, pursuant to Chapter 23, Article 23-2, of the City Code, to develop standards and detail regarding public improvements to be constructed within the City.
6-6 Intelligent Transportation System

6-6.000 General Information:

6-6.001 ITS Infrastructure Requirements:

This section is to aid the engineer in developing an Intelligent Transportation System (ITS) design to meet the City of Buckeye minimum standards.

Developers/Landowners are required to design and install ITS infrastructure as required by the City, ITS Master Plan, or approved stipulations.

Developers/Landowners shall install, at their expense, all City ITS infrastructure necessary within the limits of their developments.

6-6.002 Definitions and Abbreviations:

A. AASHTO – The American Association of State Highway and Transportation Officials
B. ADA – Americans with Disabilities Act
C. APL – Approved Products List
D. A.R.S. – Arizona Revised Statutes
E. ASTM – American Society for Testing and Materials
F. AWG – American Wire Gauge
G. CCTV – Closed Circuit Television Camera
H. COB – City of Buckeye
I. City – City of Buckeye
J. City Engineer – The City of Buckeye City Engineer
K. CMP – Community Master Plan
L. Developer – Shall also be interpreted to mean Landowner; including development companies authorized to act on behalf of the Developer/Landowner.
M. Development or development – Shall have the same meaning as defined in the City Development Code.
N. DMS – Dynamic Message Sign
O. Engineer – An engineer registered in the State of Arizona to do engineering within the purview of their practice area.
P. GIS – Geographic Information System
Q. HDD – Horizontal Directional Drilling
R. HDPE – High Density Polyethylene
S. IP – Internet Protocol
T. ITE – Institute of Transportation Engineers
U. ITS – Intelligent Transportation System
Section 6-6 INTELLIGENT TRANSPORTATION SYSTEM

V. Landowner – Shall also be interpreted to mean Developer; including development companies authorized to act on behalf of the Developer/Landowner

W. MAG – Maricopa Association of Governments

X. MCDOT – Maricopa County Department of Transportation


Z. NEC – National Electric Code

AA. NTCIP – National Transportation Communications for ITS Protocol

BB. Plan(s) – Design drawings that are 100 percent complete and sealed by a registered professional Engineer.

CC. PS&E – Plans, Specifications, and Estimate

DD. PUE – Public Utility Easement

EE. PVC – Polyvinyl Chloride

FF. ROW – Rights-of-Way

GG. SMFO – Single-Mode Fiber Optic

HH. THW – Thermoplastic, Heat and Water-Resistant Nylon-coated

II. TMC – Traffic Management Center

6-6.003 Design Policy:

A. Developers/Landowners and City CIP projects must adhere to the City’s requirements for ITS infrastructure within the City of Buckeye limits.

B. All construction documents shall be prepared by a registered Professional Civil Engineer licensed and practicing in the State of Arizona pursuant to the provisions of A.R.S. §32-101; §§32-121-131; §§32-141-152. Each sheet of the plans shall include the appropriate professional State of Arizona seal, signature, date and date of expiration below seal. The City of Buckeye does not require original seals and signatures (wet seal) on improvement documents during the review cycle.

C. The ITS infrastructure design shall be reviewed and approved by the City.

D. Developers shall install, at their expense, all ITS improvements along their property frontage or to provide fiber optic communications connection to any traffic signals installed for their development to the City’s System. The developer shall also connect to existing ITS systems directly adjacent to their property frontage.

6-6.004 Diligence:

A. Developers/Landowners and City CIP projects shall verify the requirements for ITS infrastructure as well as roadway and paving improvements that are required to provide service to a site. Available resources in which to find this information:

1. Obtain existing utility maps and as-built drawings


3. Contact the City Engineer to confirm the need for any required conditions.
6-6.005 Implementation:

A. The implementation and enforcement of the design standard set forth in this section shall be effective the date of City Council’s adoption of the resolution approving the standards and requirements of this section and shall apply to the following:

1. All new plans and reports submitted to the City following the effective date of City Council’s adoption of the resolution approving the standards and requirements of this section.

2. All plans seeking a new City Engineer’s signature or a re-approval from the City Engineer.

3. All expired plans shall be brought into conformance with the design standards of this section.

4. All plans produced under an approved CMP shall follow or be brought into conformance with the design standards of this section.

5. All current approved plans that have not been permitted shall comply with the requirements of this section. Prior to the issuance of the construction permit, the design engineer shall submit a written letter to the City Engineer acknowledging the construction and materials that shall be performed and supplied pursuant to the requirements of this section.

6. All expired or abandoned plans as defined below:
   a. The City will not hold or store plans. Any plan set or report that has not been picked up from the City within 90 days of the City’s first notification to the applicant that the plans are ready to be picked up will be deemed abandoned. The Developer/Landowner will be notified that the abandoned plan set will no longer be considered by the City. If a plan is abandoned, the Developer/Landowner will be required to resubmit the abandoned plan and pay the City all associated fees.
   b. If a construction permit for the plans has not been issued within 1 year from the date of approval noted on the cover, the plans will be required to be resubmitted for review and re-approval.
      i. In order to resubmit plans, the design engineer shall bring the plans into conformance of the City’s current standards and requirements.
      ii. All revised plan will be subject to the City’s current fee schedule.
      iii. This resubmittal is required to go through a comprehensive review of all plan sheets.
   c. If plans have not been resubmitted to the City for review or permitting within 2 years from the date of the last City action, the plans shall be considered expired. Once a plan is expired, the plans shall be resubmitted for first review and all associated fees shall be paid to the City.
      i. In order to resubmit plans, the design engineer shall bring the plans into conformance of the City’s current standard and requirements.
      ii. All expired plans being resubmitted will be subject to the City’s current fee schedule.
      iii. This new submittal is required to go through a comprehensive review of all plan sheets.

6-6.006 National, Regional and Local Standards:

A. The following is a list of national, regional and local resources (the latest editions unless otherwise stated) are referenced and used for the design of streets within the City of Buckeye.
B. Resources, Standards and References:
   b. *Arizona Supplement to the MUTCD* - ADOT
   d. *Uniform Standard Specifications for Public Works Construction* – MAG
   e. *Uniform Standard Details for Public Works Construction* – MAG
   f. *Roadside Design Guidelines for clear zones* – AASHTO
   g. *American Society for Testing and Materials* – ASTM
   h. *National Electric Code* – NEC
   i. *Underwriters Laboratories* – UL
   j. *American National Standards Institute* – ANSI
   k. *Telecommunications Industry Association* – TIA
   l. *Electronics Industry Alliance* - EIA

6-6.007 City of Buckeye ITS Policies:
A. The following policies have been adopted by the City Council. Requests to deviate from these policies must be submitted in writing to the City for consideration.
   1. Install ITS infrastructure along all expressways, parkways, major arterials and minor arterials.
   2. Require any ITS infrastructure construction, private or public, to be constructed by a minimum of one certified IMSA Level II Signal Technician and one IMSA Level I Signal Technician. All the installation shall be overseen by the City.
   3. Install ITS infrastructure to support the City of Buckeye ITS Strategic Plan
   4. Install ITS infrastructure to support the City of Buckeye Signal Development Map.
   5. All equipment and materials shall be per the City requirements and submitted to the City Engineer for review and approval by the City, 30 working days prior to ITS construction, for information call (623) 349-6825. See Appendix 2 for the City’s Approved Products List.

6-6.008 Pre-Design Conference:
A. Prior to beginning ITS design, a pre-design conference is required between the City and the design engineer.

6-6.100 ITS Design Requirements:

6-6.101 Conduits:
A. Conduit Materials and Construction Methods

   All underground ITS conduit shall be UL listed and schedule 40 PVC. PVC conduit shall be used for ITS trenchless, directional drilling or boring applications.
ITS conduit shall be installed at a nominal 36” below finished grade with a minimum depth of 24”.

B. Conduit Installation for Fiber Cable – Maximum Pulling Tension

The designer is responsible for designing a conduit system that will facilitate fiber-optic cable installation within and ensuring that the exerted force on the cable will not exceed 600 pounds of pulling tension during installation. Cable pulling programs that calculate pulling tension, or previous design or construction experience, are necessary to meet this requirement.

C. Fiber Optic Conduit Deflection

Conduit deflection should not deviate more than one inch horizontally and/or vertically per 12 inches of running length of conduit (1:12). Long conduit sweeps (48” radius for 45 degree sweeps and 36” radius for 90-degree sweeps) should be used wherever possible to change conduit direction. The conduit design should strive to stringently adhere to this requirement in order to reduce the pulling tension required during cable installation.

90-degree cumulative turns shall be made of individual elbows. Where complex sites leave no other option, such as into and out of structures requiring near 90-degree turns, a minimum radius of 36 inches is required. The smallest degree of bends possible should be utilized to minimize cable installation challenges. There shall be no more than 270 degrees of cumulative bends between pull points (i.e., pull boxes). For road crossing pull boxes should be set on both sides.

D. Conduit Traceability and Detection

The design of fiber optic conduit and cable must strive to avoid both potential damage to the conduit system and damage to the cable. Loss of communications is a critical issue with regards to the ITS.

The current City of Buckeye Policy, with regards to ITS, is to place continuous THW wire #12 AWG with 2500 lb mule tape. One #12 AWG tracer wire is required to be installed in 1-2” and 1-1/2” conduits. 2500 lb mule tape shall be installed in all unused conduits.

E. Conduit Configuration

The ITS conduit configuration shall be stacked 3 high by 2 wide as shown in the City ITS Details.

4-1.5 inch and 2-2 inch Schedule 40 PVC, conduits per the ITS standard details, shall be installed on the North or West side of the road.

F. Trenchless Conduit Installation Methods

Trenchless conduit installations are required for conduit installations under any existing pavements, railroads, graphic slopes and areas specifically called out on the project plans, by the designer, to minimize damage to existing surface features, or to accommodate grade differentials.

Horizontal and vertical clearances to all utilities and obstructions shall be adhered to when installing conduit via trenching installation. A conduit bore profile shall be prepared by the contractor for each trenchless conduit installation location and shall be approved by the City prior
to installation. At a minimum proposed conduit depth and all utilities crossings and minimum clearances shall be shown on the bore profile. The as-built conduit bore profile shall be submitted to City after conduit installation.

6-6.102 Pull Boxes:

A. ITS pull boxes are used in ground as pull points for fiber optic and other cabling. Pull boxes shall be spaced at a maximum of 600 feet apart.

B. Pull boxes should be designed to avoid exposing any sides of the pull box that might be a hazard to traffic. Pull boxes should not be installed within the roadway, within any paved area, or future widened roadway footprint unless each location is compliant with additional load and lid requirements and the location is approved by the City Engineer. Pull boxes shall be moved out of proposed paving or unapproved areas by the owner installing the improvement that is in conflict to these specifications.

C. Pull boxes should not be positioned in locations where drainage swales exist.

D. All ITS pull box locations shall be field verified by the designer to avoid any visible conflicts. Designers are required to field check each new proposed pull box location to ensure that it is not in pavement, on a slope, in a drainage swale or area that otherwise may collect standing water, a hazard to traffic or pedestrians, or in a location where it would likely be in the path of vehicle traffic. Where necessary to avoid hazardous conditions, the pull box spacing may be reduced and the number of pull boxes required increased.

E. Delineators shall be used to mark new pull box locations.

F. All ITS pull box lids shall be labeled “COB ITS”.

G. The City utilizes two types, or sizes, of pull boxes; the No. 7E pull box and the No. 9 pull box. ITS conduit is required to run from concurrent ITS pull boxes.

H. No. 9 and No. 7E pull boxes shall conform to the ITS Standard Details.

I. Fiber optic cabling splice closures shall be installed in No. 9 pull boxes only. 100 feet of fiber optic cable coiling should be installed in each No. 9 pull box for each line (50 feet entering and 50 feet exiting).

J. 50 feet of fiber optic cabling shall be installed in each No. 7E pull box.

K. Conduit breakouts at locations with multiple pull boxes shall conform to the Traffic Signal and ITS standard details. The ITS conduit breakout consists of 1-2 inch and 2-1 1/2 inch conduits going to each pull box. See City Details 661001 for break out of ITS pull box and conduit at an intersection.

6-6.103 Fiber Optic Cabling:

A. A 144-fiber count single mode fiber optic cable shall be installed for all ITS improvements. See Approved Products List provided in the Appendix.

B. Fiber optic cabling break outs to traffic signal controller cabinets shall consist of a 6 fiber Gator Patch with termination panel and SC connectors. See Approved Products List provided in the Appendix.
6-6.200 Plan Requirements

6-6.201 General Requirements:

A. All plans shall comply with “Design Standards - Section 1-2 Plan Submittal Requirements” General Construction Notes and Standard Sheets for Infrastructure Plan Submittals.

B. ITS plan symbols and legend shall comply with ADOT Standard Drawing FM-0.01. An ITS legend shall be included in the plan set.

C. ITS Plan Set shall comply with the City Details 66101 through 66124. ITS Plan set shall consist of the following sheets:

1. **Cover Sheet** - to be provided on standalone ITS improvement project. If ITS improvements are included as part of a large set, a separate cover sheet is not necessary. Cover sheet shall comply with City Detail 12200 provided in Section 1-2, Plan Submittal Requirements.

2. **ITS Plan Sheet Layout** – Engineer shall design ITS improvements necessary to accommodate new conduit, pull boxes, and fiber optic cabling.

3. **Splice Details** – Engineer shall design splice details for connections to traffic signal controller cabinets and to existing City fiber optic cables.

D. When ITS is included in a CIP or multidiscipline project, no ITS cover sheet is needed.

6-6.202 Design Plan Requirements:

A. All plans shall be neat and legible.

B. All ITS plans shall be drawn to scale.

1. Horizontal scale shall not be smaller than 1 inch = 40 feet on plan views.

C. Locate and identify all existing and/or proposed improvements, above and below ground. Include all utilities.

D. Locate existing vegetation (trees, etc.), which could be in conflict with any proposed equipment locations.

E. Locate all ITS pull boxes and signal cabinets and pull boxes by station and offset dimension.

F. All ITS infrastructure must be located within public ROW or easement.

G. Provide details of any items not covered by these standards.

6-6.203 General Notes:

A. Traffic control shall conform to the MUTCD, City of Phoenix Traffic Barricade Manual and/or as directed by the City Public Works Inspector.

B. Utility locations shown are based upon the best available information. The Contractor shall contact Blue Stake at 602-263-1100 before construction and verify actual utility locations.

C. Also see “Design Standards - Section 1-2 Plan Submittal Requirements,” for additional notes that may also be required.
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6-6.204 Submittal Requirements:
A. Plan Review Submittals:
   1. ITS infrastructure shall be shown on their respective plan sets.
B. In addition to bond copies, a CD with the following items is required to accompany the plans submitted for signature to the City:
   1. Base map for the area of the plans seeking approval including all property lines, ROW, PUE’s, easements etc.
   2. All ITS features, topographic features, monuments, etc.
   3. All the information shall be shown on a single map, not cut sheets like the plans and located on reasonable layers in CAD.

6-6.205 City of Buckeye Permit:
A. The Developer/Landowner shall secure a permit from the City for constructing all ITS infrastructure on the approved ITS plans.
B. If a revised plan set is submitted, approved, and signed then the Developer/Landowner is responsible for securing a revised permit from the City.

6-6.300 Materials
A. Submittals:
   1. All materials used on the project or incorporated into the construction are subject to approval or rejection by the City Engineer.
   2. City approved technical material/manufacturer data is required for all materials and appurtenances used on the project before work commences.
   3. All delivered materials shall match the approved technical data or it will be rejected.
   4. The contractor shall submit four (4) copies of the submittals to the City Engineer.
   5. All work installed prior to approval of submittals is subject to rejection by the City.
   6. A copy of the approved product submittals shall be on the jobsite at all times.
   7. Each of the submittals shall clearly show the manufacturer and have comprehensive technical data for the proposed product.
   8. All material submittals shall be submitted at or before the Pre-Construction meeting for review and approval by the City Engineer.
B. Materials:
   1. See City Approved Product List provided in the Appendix.
6-6.400 As-Built Drawings:

6-6.401 General Requirements:

   A. All plans shall comply with “Design Standards - Section 1-2 Plan Submittal Requirements.”
   B. Final Record drawings (only Final As-Builts are required):
      1. Final record drawings required for submittal.
      2. Station and offsets for all ITS infrastructure.
      3. Conduit bore profiles.
      4. Record drawings shall be accepted and approved before bond will be released.

[END SECTION]
Appendix 1 – ITS Standard Details

66101  Typical ITS Pull Box and Conduit Locations
66102  ITS Trench Detail
66120  No. 9 Pull Box Locations for Redundant ITS Trunk Lines
66121  Typical Pull Box Installation No. 7E Pull Boxes
66122  No. 9 Pull Box Wiring and Splicing Detail
66123  No. 9 Pull Box Fiber Optic Splice Procedure
66124-1 No. 9 Pull Box (1 of 2)
66124-2 No. 9 Pull Box (2 of 2)
SEE ITS TRENCH DETAIL IN COB STD. DET. 66102 (TYP).

600’ (MAXIMUM SPACING)

1–2” CONDUITS

2–1 1/2” CONDUITS

INSTALL No. 7 PULL BOX WITH EXTENSION SPACED 300’ (MAXIMUM) CENTER TO CENTER.

INSTALL No. 7 PULL BOX WITH EXTENSION SPACED 600’ (MAXIMUM) CENTER TO CENTER.

INSTALL No. 9 PULL BOX ON NW CORNER OF EACH SIGNALIZED INTERSECTION. MAXIMUM SPACING BETWEEN No. 9 PULL BOXES = 1/2 MILE.

NOTE:
1. THE CUMULATIVE SUM OF BENDS BETWEEN PULL BOXES SHALL NOT BE GREATER THAN 270° FOR EACH REDUNDANT RUN.
**GENERAL NOTES:**

1. ALL TRENCH BACKFILL ACROSS HARDENED SURFACES SHALL BE 100% 1/2 SACK SLURRY PER MAG SPEC 728.
2. ALL LONGITUDINAL TRENCH CUTS WITHIN 2' OF EXISTING PAVEMENT SHALL BE BACKFILL 100% WITH ABC AND COMPACTED TO 95%. LAST TWO FEET SHALL BE COMPACTED TO 100%.
3. ALL TRENCHING IN UNPAVED STREETS CAN USE NATIVE BACKFILL. THIS ALSO INCLUDES STREETS THAT WILL BE COMPLETELY RECONSTRUCTED.
4. TRENCH COMPACTION SHALL MEET BACKFILL TYPE 1, PER MAG STD. SPEC TABLE 601.
5. PIPE ZONE MATERIAL SHALL BE 1/2 SACK CLSM PER MAG STD SPEC 728.
6. EXCAVATED TRENCH WIDTH SHALL NOT BE LESS THAN 18 INCHES.
7. TRENCHES IN EXISTING ROADS SHALL BE PER MAG STD. DTL 200 "T—TOP".
8. ALL 2500 LB MULE TAPE SHALL BE INSTALLED IN UNUSED CONDUIT AFTER INSTALLATION.
9. 4 MIL NON DETECTABLE PLASTIC WARNING TAPE SHALL BE PLACED 12” TO 16” BELOW FINISHED SUBGRADE. THIS SHALL BE FIBER OPTIC SPECIFIC AND SHALL BE PERMANENTLY IMPRINTED EVERY 36” WITH, "CAUTION BURIED FIBER OPTIC LINE BELOW".
10. 2"x4"x8" MASONRY BLOCK AT 5 FOOT SPACING. PROVIDE CONDUIT TRENCH SPACER AT ALL MASONRY BLOCK LOCATIONS AROUND ALL CONDUITS.
11. CONTRACTOR TO INSTALL COB STANDARD NO. 7 PULL BOX. SPACING SHALL BE 600 FEET WITH 48 INCH SKEWES INTO AND OUT OF THE BOX. THERE SHALL BE A PULL BOX AT BOTH ENDS OF THE PROJECT AND SHALL NOT BE PLACED IN ANY HARDENED SURFACES.
12. ITS CONDUIT SHALL BE PLACED ON THE NORTH OR WEST SIDE OF THE ROAD.
13. #12 AWG TRACER WIRE TO BE INSTALLED IN 1–2” AND 1–1 1/2” CONDUITS.
NOTE:

1. DETAIL IS AN EXAGGERATED SCHEMATIC TO ILLUSTRATE THE BREAK OUT OF CONDUITS AND NO. 9 PULL BOXES AT THE INTERSECTION.

2. SEE CITY OF BUCKEYE TRAFFIC SIGNAL MANUAL AND STANDARDS FOR SIGNAL CONDUIT, PULL BOX, AND CONTROLLER/CABINET REQUIREMENTS.
TYPICAL PULL BOX INSTALLATION
NO. 7E PULL BOXES

NOTES:
1. BACKFILL WITH DESIGNATED SIZE NO. 57 AGGREGATE TO 24" BELOW FINISHED GRADE. BACKFILL 24" WITH BACKFILL MATERIAL AND THOROUGHLY COMPACT.
2. THIS BOX IS DESIGNED FOR NON-DELIBERATE (Tier 22) TRAFFIC AREAS.
3. CONDUITS PER PLANS.
4. CONDUIT C/L SHALL BE ALIGNED TO TOP EDGE OF PULL BOX TO FACILITATE CABLE PULLING.
5. PULL BOX LIDS SHALL BE APPROVED BY CITY OF BUCKEYE.
6. USE FELT PAPER TO BLOCK OPENING BETWEEN CONDUITS AND AROUND BASE TO PREVENT BACKFILL MATERIAL FROM ENTERING BOX.
7. FOR FIBER OPTIC CABLE 50' OF SLACK SHOULD BE PROVIDED (25' IN, 25' OUT).
8. MAXIMUM PULL BOX SPACING OF 600'. PULL BOXES ARE NOT ALLOWED IN SIDEWALKS OR SIDEWALK RAMPS.
9. SEE APPROVED MATERIALS LIST FOR PULL BOXES, LIDS, CONDUITS, AND FITTINGS.
10. PULL BOX LID SHALL BE 1 FOOT ABOVE FINISHED GRADE. PULL BOX SHALL HAVE A MINIMUM OF 1 FOOT CONCRETE COLLAR POURED AROUND THEM WHERE THEY ARE NOT LOCATED BEHIND CURB OR SIDEWALK.

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<td>CONCRETE BUILDING BLOCK 2&quot; X 4&quot; X 8&quot;</td>
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<td>30 DEGREE ELBOW, 36&quot; RADIUS (USED WITH PVC ONLY)</td>
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<td>BELL END (USED WITH PVC ONLY)</td>
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CONDUIT PLACEMENT AND COILING DETAIL
SIDE VIEW

MATERIAL LIST

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<td>8</td>
<td>12 LOCATOR WIRE (THW) WITH 25 FEET OF SLACK</td>
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<td>9</td>
<td>RACK &amp; HOOK (EACH WALL TYP)</td>
</tr>
<tr>
<td>10</td>
<td>SINGLE MODE FIBER OPTIC BRANCH CABLE (AS REQUIRED)</td>
</tr>
<tr>
<td>11</td>
<td>100' NOMINAL SLACK (50' ENTRY/50' EXIT)</td>
</tr>
</tbody>
</table>

NOTES:

1. BACKFILL WITH CLASS "B" CONCRETE AGGREGATE DESIGNATED SIZE NO. 57 AGGREGATE BELOW PULL BOX. BACKFILL AROUND SIDES OF PULL BOX WITH BACKFILL MATERIAL AND THOROUGHLY COMPACT AT 95% MAX. DENSITY.
2. CONTRACTOR SHALL COORDINATE WITH CITY STAFF FOR SPLICE CLOSURE PLACEMENT AND ATTACHMENT WITHIN PULL BOX.
3. INSTALL 4" PVC CONDUIT SLEEVE IN PULL BOX TERM—A—DUCT EXTENDING 2 FEET FROM PULL BOX TO PREVENT DIRT AND WATER FROM ENTERING PULL BOX. INSTALL 1–2" AND 2–1 1/2" CONDUITS IN EACH 4" CONDUIT SLEEVE.
FIBER OPTIC SPLICE PROCEDURE

NOTES:
1. Tracer wires to be attached to each other.
2. Provide 50 feet of each coiled fiber optic cable per each entry (100 feet total) and 10 feet of slack on any conductors.
3. All power and communication cables shall be tagged with cable identification. The cable shall be scalable and stamped SS, or BSS tag. Contact city staff for requirements.
4. Fiber slack mounted to rack off of ground.
5. Pull boxes are not allowed in sidewalks, ramps or drainage areas.
6. See additional NO. 9 pull box details for profile view requirements.
7. Dimensions are nominal and considered the minimum. Variances for larger dimensions per approval from the city.
8. See approved materials list for pull boxes, lids, conduits, and fittings.
9. All conduits shall be sealed with a waterproof duct plug.
10. Pull box lid shall be 1 foot above unfinished grade. Pull box shall have a minimum of 1 foot concrete collar poured around them where they are not located behind curb or sidewalk.

STEP 1
- Tag cables and place cable straps to secure cables
- 50' (nominal) slack for each fiber optic cable entering pull box
- To splice closure

STEP 2
- Trunkline fiber optic cable
- Fiber optic branch to cabinet
- Fiber branch cable to enter splice closure. Cables are to be cut to the same length and spliced. Closure shall be sealed with a waterproof duct plug.
- Cables are to be coiled and placed inside the pull box.

STEP 3
- Splice closure (mounted on rack)
- See notes 3 & 4
- Trunkline fiber optic cable
- Fiber optic branch to cabinet
GENERAL NOTES:
1. BACKFILL WITH CLASS "B" CONCRETE AGGREGATE DESIGNATED SIZE NO. 57 AGGREGATE BELOW PULL BOX. BACKFILL AROUND SIDES OF PULL BOX WITH SELECT EXCAVATED MATERIAL AND THOROUGHLY COMPACT AT 95% MAX. DENSITY.
2. CONDUIT FROM THE TYPICAL TRENCH SECTION SHALL NOT DEFLECT BY MORE THAN 1"/12" FROM THE ALIGNMENT PRECEDING OR FOLLOWING THE PULL BOX.
3. TOP OF CONDUITS SHALL BE LOCATED AT 24"–36" BELOW EXISTING GROUND. CONDUITS AT PULL BOXES SHALL DEFLECT NO MORE THAN 1"/12" TO ENTER PULL BOX. CONDUITS SHALL BE FLUSH WITH INSIDE OF PULL BOX.
4. ALL NEW PULL BOXES SHALL BE FURNISHED WITH RACKS AND HOOKS INSTALLED.
5. PLUG EACH UNUSED CONDUIT END WITH APPROVED, WATERPROOF DUCT PLUG.
6. "COB ITS" SHALL BE THE TITLE EMBOSSED ON THE LID.
7. PULL BOX LID SHALL BE 1" ABOVE FINISHED GRADE IN UNPAVED AREAS. SEE APPROVED MATERIALS LIST FOR PULL BOXES, UDS, CONDUITS, AND FITTINGS.
8. LID SHALL OPEN 180 DEGREES WITH A TORSION BAR LIFT ASSIST.
9. LID SHALL BE DIAMOND PLATE AND HAVE GALVANIZED FINISH.
10. BOX SHALL BE ORIENTED SO THAT LID OPENS AWAY FROM ANY ROADWAY LANE.
11. COVER HARDWARE SHALL BE CADMIUM PLATED.
12. RECESS LOCK MAY BE LOCATED ON EITHER SIDE OR ON THE OPENING SIDE OF THE COVER.
13. PULLING IRONS SHALL BE LOCATED AS SHOWN IN PLAN VIEW, NO DEVIATIONS ACCEPTED.
14. PULLING IRONS SHALL BE 3/8" 0 COLD ROLLED GALVANIZED STEEL.
15. WEIGHT COVER = 1075#, VAULT 3250# = 4250#, TOTAL 4325# = 5325#.
16. NON-SHRINK GROUT SHALL BE USED AROUND CONDUITS PENETRATING THE PULL BOX.
17. ALL BOX JOINTS SHALL BE SEALED USING CONSEAL CS-101 BUTYL RUBBER RING.

RACKING PACKAGE DETAIL
- 8 – 18 HOLE RACK
- 16 – 7/8" SPRING NUTS AND BOLT
- 16 – 7/8" STRAIGHT Hooks

PLAN SYMBOL
- EXISTING
- NEW

STRUCTURAL NOTES:
1. CONCRETE: 28 DAY COMPRESSIVE STRENGTH f'c = 4500 PSI
2. REBAR ASTM A-615 GRADE 60
3. MESH: ASTM A–185 GRADE 65
5. LOADS: HS20 WHEEL LOADING IN OFF–STREET LOCATIONS WHERE NOT SUBJECT TO HIGH DENSITY TRAFFIC
   - 80 PSF LATERAL LIVE LOAD SURCHARGE – UP TO 8”–0” DEPTH
   - SOIL: 40 PCF LATERAL SOIL PRESSURE ABOVE WATER TABLE
   - 80 PCF LATERAL SOIL PRESSURE BELOW WATER TABLE 120 PCF SOIL DENSITY
6. SOIL COVER: 0’ TO 5’ (MAX.)
Appendix 2 – City Approved Product List
<table>
<thead>
<tr>
<th><strong>EQUIPMENT</strong></th>
<th><strong>TYPE</strong></th>
<th><strong>MANUFACTURE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRAFFIC SIGNAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic Signal Controller Cabinet</td>
<td>Size R Cabinet, Nema Size 7</td>
<td>Econolite</td>
</tr>
<tr>
<td>Traffic Signal Controller</td>
<td>Cobalt ATC Traffic Controller</td>
<td>Econolite</td>
</tr>
<tr>
<td>Meter Pedestal</td>
<td>MEUG-35-M100-ADOT</td>
<td>Myers</td>
</tr>
<tr>
<td>MMU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Back-Up Unit</td>
<td>200 Amp</td>
<td>Alpha</td>
</tr>
<tr>
<td>Video Detection System</td>
<td>AutoScope Vision Camera System Grid Smart fish eye detection with performance measures</td>
<td>Econolite Grid Smart</td>
</tr>
<tr>
<td>Video Detection System Mounting</td>
<td>1-piece extended tilt and Pan, Aluminum Stellar cable mount Grid Smart Mounting Bracket</td>
<td>Pelco</td>
</tr>
<tr>
<td>Emergency Vehicle Pre-emption</td>
<td>Model 721 and 722 Model 764 Phase Selector</td>
<td>Opticom</td>
</tr>
<tr>
<td>Emergency Vehicle Pre-emption Mounting Bracket</td>
<td>Astro Mini-Brac</td>
<td>Pelco</td>
</tr>
<tr>
<td>Emergency Vehicle Pre-emption Cable</td>
<td>Opticom 138</td>
<td>Opticom</td>
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<tr>
<td>Electrical Conduit</td>
<td>Schedule 40 PVC</td>
<td>Various</td>
</tr>
<tr>
<td>No 5, 7, and 7E Pull Boxes</td>
<td>FiberLyte</td>
<td>Various</td>
</tr>
<tr>
<td>Traffic signal vehicular heads with 12-inch LED indications</td>
<td>Type F, Type G, Type R, Type Q-2, and Type Q</td>
<td>GE GTX for LED Arrow Signals GE VLA LED Signal Modules</td>
</tr>
<tr>
<td>Pedestrian Countdown Signal Heads</td>
<td>16 x 18 inch</td>
<td>GE LED Countdown</td>
</tr>
<tr>
<td>Pedestrian Pushbuttons</td>
<td>ADA Pushbutton</td>
<td>Polara Bulldog</td>
</tr>
<tr>
<td>Upright and Mast Arm Signal Head Mountings</td>
<td>ADOT Standard Type II and Type XI</td>
<td>Various</td>
</tr>
<tr>
<td>A-Pole Signal Head Mountings</td>
<td>ADOT Standard Type IV, VI and Type X</td>
<td>Various</td>
</tr>
<tr>
<td>Pedestrian Signal Head Mounting</td>
<td>ADOT Standard Type V and VII</td>
<td>Various</td>
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<tr>
<td>Conductors</td>
<td>IMSA</td>
<td>Various</td>
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<tr>
<td>Street Light LED Fixtures</td>
<td>GE Evolve II Shoebox LED ERL2018_330ADKBZLRG</td>
<td>GE</td>
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<tr>
<td>Internally Illuminated Street Name Sign (IISNS)</td>
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<td>Fluoresco</td>
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<tr>
<td>Signal Poles</td>
<td>ADOT Standard and Trombone</td>
<td>Valmont</td>
</tr>
<tr>
<td>Signal Mast Arms</td>
<td>ADOT Standard and Trombone</td>
<td>Valmont</td>
</tr>
</tbody>
</table>
## CITY OF BUCKEYE
### APPROVED PRODUCT LIST

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>TYPE</th>
<th>MANUFACTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 7E Pull Box</td>
<td>Fiberlyte</td>
<td>Various</td>
</tr>
<tr>
<td>No. 9 Pull Box</td>
<td>Vault with 180 degree torsion assist lid</td>
<td>Jensen</td>
</tr>
<tr>
<td>Electrical Conduit</td>
<td>Schedule 40 PVC</td>
<td>Various</td>
</tr>
<tr>
<td>Backbone Single Mode Fiber Optic Cable</td>
<td>Dry loose tube 144 fiber</td>
<td>Corning</td>
</tr>
<tr>
<td>Branch Single Mode Fiber Optic Cable (To TS cabinet)</td>
<td>Dry loose tube 6 fiber with SC Connectors</td>
<td>Gator Patch</td>
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<tr>
<td>Fiber Optic Splice Closure</td>
<td>450D with minimum of 2 splice trays</td>
<td>Tyco</td>
</tr>
<tr>
<td>Ethernet Switch</td>
<td>RS900G</td>
<td>Ruggedcom</td>
</tr>
<tr>
<td>Closed-Circuit Television (CCTV) Field Equipment</td>
<td>Q6055-E</td>
<td>AXIS</td>
</tr>
</tbody>
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