THE CITY OF COPPELL
TEXAS · 1890

CONSTRUCTION SPECIFICATIONS
AND
CONTRACT DOCUMENTS
FOR

Denton Tap Intersection Improvements

Denton Tap Road / Southwestern Boulevard
Denton Tap Road / Bethel School Road
Denton Tap Road / Sandy Lake Road
Denton Tap Road / Parkway Boulevard
Vehicle Detection Intersection Improvements

THE CITY OF COPPELL

Bid No. Q-1121-02
Project No. ST-19-01

Kimley»Horn
2201 West Royal Lane, Irving, Texas 75063
kimley-horn.com 214.420.5600
Texas Firm Registration No. F-928

November 2020

The Engineer's seal and signature applies to the all documents herein not specifically selected by sealed and signature shown below:

The Engineer's seal and signature appearing on this sheet applies to the following:
Bid Item & Clarifications:

Section VII – Traffic Signal Improvements
Section IX – Vehicle Detection Intersection Upgrades

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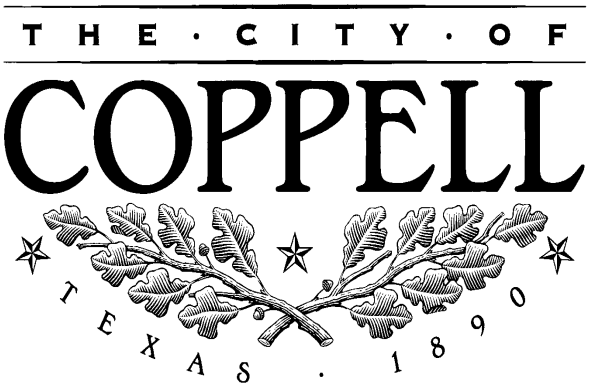
SECTION 1
BIDDING DOCUMENTS



NOTICE TO BIDDERS

The City of Coppell is accepting bids for the construction of Denton Tap Road Intersection Improvements (Project No. ST-19-01). This work shall consist of the construction of approximately 4,700 square yards of full-depth pavement for right and left turns lanes, traffic signal improvements, storm sewer inlet relocation, and 1,200 square yards of sidewalk construction at the Denton Tap Road intersections of Southwestern Boulevard, Bethel School Road, Sandy Lake Road, and Parkway Boulevard. Additionally, this work also includes the improvements to vehicle detection systems at various intersections throughout the City (27 intersections).

Digital copies of the bidding documents can be downloaded at www.BidSync.com. To ensure proper notification of Addendums, Bidders shall ensure they are a registered plan holder on the plan holder's list.

Sealed bids addressed to the Procurement Agent, City of Coppell, Texas, for the construction of Denton Tap Road Intersection Improvements (Project No. ST-19-01) will be received in the Procurement Office at the City of Coppell Town Center, 255 E. Parkway Boulevard, Coppell, Texas, until 2:00 p.m. on Thursday, November 19, 2020, and then publicly opened and read aloud remotely via a Zoom meeting. Each Bidder shall submit two identical copies of this bid with the City of Coppell Bid No. Q-1121-02 designated clearly on the exterior of the bid envelope.

A Non-Mandatory Pre-Bid Conference has been scheduled for this project at the Coppell City Hall (255 E. Parkway Boulevard, Coppell TX 75019) at 2:00 p.m. on Thursday, November 12, 2020. Attendance at the Pre-Bid Conference is not mandatory but strongly encouraged. The city is following social distancing protocols, and face masks are required to be worn in the building. Virtual attendance of the Pre-Bid Conference will be available via a Zoom meeting. Please contact Charles Ellis, Procurement Services, at cellis@coppelltx.gov to receive a Zoom meeting incitation for the Pre-Bid.

The Owner reserves the right to reject any or all bids and to waive formalities. Unreasonable or unbalanced unit prices will be considered sufficient cause for rejection of any bid or bids. NO BID TRANSMITTED BY FAX WILL BE ACCEPTED.

Bidders are expected to inspect the site of the work and to inform themselves regarding local conditions and conditions under which the work is to be done.

Complete sets of bidding documents must be used in preparing Bids; the City of Coppell assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

NO SALES TAX ON TANGIBLE PERSONAL PROPERTY INCORPORATED INTO OR MADE A PART OF THE PROJECT. The bidder shall not include or provide for sales tax on tangible personal property to be incorporated into the project. (Note: This procedure may not be used, however, for materials which do not become a part of the finished product, such as, equipment rental or purchase, form materials, etc.). In order to be exempt from the sales tax on such tangible personal

property, the contract shall separate and provide separate charges for materials to be incorporated into the project from charges for labor. The City will provide the Contractor with an exemption certificate for the materials. The contractor is expected to issue a resale certificate in lieu of paying a sales tax at the time of purchase. The bidder shall show the cost of materials (tangible personal property) in the space provided on the bid form. The successful bidder's bid form will be used to develop a separated contract and determine the extent of the tax exemption.

INSTRUCTIONS TO BIDDERS

1. Defined Terms.

Terms used in these Instructions to Bidders which are defined in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments Fourth Edition and the Supplementary Conditions of Agreement have the meanings assigned to them in these General Conditions. The term "Bidder" means one that submits a Bid directly to Owner, as distinct from a sub-bidder, who submits a bid to a Bidder. The term "Successful Bidder" means the lowest, qualified, responsible Bidder, as determined after review of overall price, and qualifications, to whom the Owner (on the basis of the Owner's evaluation as hereinafter provided) makes an award. The term "Bidding Documents" includes the Notice to Bidders, Instructions to Bidders, the Bid Form, the Construction Plans and Specifications, and the proposed Contract Documents (including all Addenda issued prior to receipt of bids). Specific defined terms are:

Owner: Wherever the word “Owner” or "OWNER" is used in the specifications and Contract Documents, it shall be understood as referring to the City of Coppell, Texas.

Engineer: Wherever the word “Engineer” or "ENGINEER" is used in the Specifications and Contract Documents, it shall be understood as referring to the City Engineer or his authorized representative, City of Coppell, P.O. Box 9478, Coppell, Texas 75019.

Consulting Engineer: Wherever the word “Consulting Engineer” or "Design Engineer" is used in the Specifications and Contract Documents, it shall be understood as referring to the Design Engineer or his authorized representative, Kimley-Horn and Associates, Inc.

Inspector: The authorized representative of the City of Coppell assigned to observe and inspect any or all parts of the work and the materials to be used therein.

2. Scope of Work.

This work shall consist of the construction of approximately 4,700 square yards of full-depth pavement for right and left turns lanes, traffic signal improvements, storm sewer inlet relocation, and 1,200 square yards of sidewalk construction at the Denton Tap Road intersections of Southwestern Boulevard, Bethel School Road, Sandy Lake Road, and Parkway Boulevard. Additionally, this work also includes the improvements to vehicle detection systems at various intersections throughout the City (27 intersections).

3. Copies of Bidding Documents.

3.1 Digital copies of the bidding documents can be downloaded at www.BidSync.com. To ensure proper notification of Addendums, Bidders shall ensure they are a registered plan holder on the plan holder's list.

The following general requirements pertain to the Bidding Documents:

A) No bidding documents will be issued later than two (2) days prior to the bid opening date.

B) After award of the Contract, the successful Bidder will be furnished two (2) full-size sets and three (3) half-size sets of Contract Documents at no charge. Additional sets will be furnished for an additional fee per set.

3.2 Complete sets of Bidding Documents must be used in preparing Bids; the City of Coppell assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents. No partial sets of plans, specifications or proposal forms will be issued.

3.3 The Owner, in making copies of Bidding Documents available on the above terms, does so only for the purpose of obtaining Bids on the Work and does not confer a license or grant for any other use.

4. Minimum Qualifications of Bidders.

The City will only consider Bidders who meet the Minimum Qualifications identified in this section. Should the City determine, at its sole discretion, that the Bidder does not meet these Minimum Qualifications, the City will disqualify the Bidder and their bid will be rejected as non-responsive. Experience performing projects of similar scope, quantities, and cost will be a primary consideration of meeting the minimum qualifications.

The Bidder shall submit within five (5) days of the Owner's request such evidence as the Owner may require to establish his financial responsibility, experience and possession of such equipment as may be needed to prosecute the work in an expeditious, safe and satisfactory manner. Bidders are subject to disqualification if they fail to provide evidence within the five day period. Confident bidders are strongly encouraged to have this evidence ready by Bid Opening. Submissions will be made to City Engineer, City of Coppell, 265 E. Parkway Boulevard, Coppell, Texas. The City reserves to right to conduct site/yard visits to the Bidders' place of business, yard sites or current project sites. The required information to be submitted shall consist of, but shall not necessarily be limited to, the following:

A. **Current Project Experience**. A list of all projects presently under construction by the bidder including approximate cost, project start date and estimated completion date shall be submitted upon request.

B. **Past Project Experience.** A minimum of three (3) comparable projects in each category listed below meeting the following requirements shall be submitted.

1. Roadway Projects

a. Completed within the previous five years
b. Located in the Dallas-Fort Worth Metroplex
c. Total Construction Cost for paving and drainage and related improvements of at least $2,000,000
d. Projects must be for roadways
e. Scope of work consisting of similar items and quantities including concrete paving and sidewalks, street lighting, storm drainage improvements, landscape and irrigation
f. Project start date and completion date must be provided
g. Project owner references shall be included
h. Copy of actual project schedule used during construction

2. Traffic Signal and Lighting Projects

a. Completed in the past five years
b. Projects located in Texas
c. Total Construction Cost for traffic signal & lighting improvements of at least $300,000
d. Scope of work consisting of similar items and quantities
e. Copy of actual project schedule used during construction

Note: Individual projects may be used for more than one category. However, the project cost for each project category must be greater than the minimum costs listed above. For example, a collector roadway reconstruction project with paving related improvements of at least $2,000,000 which also included water and sewer replacement of at least $300,000 may be listed in both categories.

C. **Key Personnel Resumes**. Bidder shall provide resumes of **LOCAL** personnel expected to oversee this project. Resumes shall be provided for executive and management team as well as on-site project manager, superintendent and foreman who will be assigned to the project.

D. **Work Performed by Subcontractor.** Bidder shall submit all qualifications as required under this section for each subcontractor performing work totaling more than 10% of the greatest amount bid.

E. **Equipment Inventory**. A list of equipment currently owned and leased which will be used on this project. The Bidder shall demonstrate that he has adequate equipment to complete this project, properly and expeditiously and shall state what additional equipment, if any, that he must rent/lease as may be required to complete this project. The City reserves the right to conduct equipment verifications.

F. **Financial Statement**. Each Bidder shall be prepared to submit upon request of the Owner a financial statement prepared by an independent Certified Public Accountant with no evidence of threatening losses (current within the last six (6) months of bid date). This information will be used to confirm that the Bidder has suitable financial status to meet obligations incidental to performing the work.

G. **Proof that the bidder maintains a permanent place of business** (must be submitted within five (5) days if requested).

5. Conflict of Interest.

City Charter states that no officer or employee of the City shall have a financial interest (direct or indirect) in any contract with the City, nor shall be financially interested (directly or indirectly) in the sale to the City of any land, or rights or interest in any land, materials, supplies or services. This prohibition does not apply when the interest is represented by ownership of stock in a corporation involved, provided such stock ownership amounts to less than one percent (1%) of the corporation stock. Any violation of this prohibition will constitute malfeasance in office. Any officer or employee of the City found guilty thereof should thereby forfeit his office or position. Any violation of this prohibition with the knowledge, expressed or implied, of the persons or corporations contracting with the City shall render the contract voidable by the City Manager or the City Council. By submitting a bid, the Contractor represents that no employee or officer of the City has an interest in the Contractor.

6. Examination of Contract Documents and Site.

6.1 Access to the site shall be from Denton Tap Road. It shall be the Contractor's responsibility before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work, (c) consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors or discrepancies in the Contract Documents. Failure to make these examinations shall in no way relieve any Bidder from the responsibility of fulfilling all of the terms of the contract, without additional cost to the OWNER.

6.2 Information and data reflected in the Contract Documents with respect to Underground Facilities at or contiguous to the site is based upon information and data furnished to the Owner by Owners of such underground Facilities or others, and the Owner does not assume responsibility for the accuracy or completeness thereof. All existing structures, improvements, and utilities shall be adequately protected, at the expense of the Contractor, from damage that might otherwise occur due to construction operations. Where construction comes in close proximity to existing structures or utilities, or if it becomes necessary to move services, poles,

guy wires, pipe lines, or other obstructions, it shall be the Contractor's responsibility to notify and cooperate with the utility or structure owner. The utility lines and other existing structures shown on the plans are for information only and are not guaranteed by the City to be complete or accurate as to location and/or depth. It shall be the Contractor's responsibility to verify locations and depths sufficiently in advance of construction such that necessary adjustments may be made to allow for the proper installation of proposed improvements as indicated in the plans. The Contractor shall be liable for damage to any utilities resulting from the construction of this project.

6.3 Intentionally Omitted

6.4 Before submitting a Bid, each Bidder will, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

6.5 On request in advance, the Owner will provide each Bidder access to the site to conduct explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, clean up and restore the site to its former conditions, according to the City standards, upon completion of such explorations.

6.6 The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work, are identified in the Contract documents.

6.7 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 6, that without exception the Bid is premised upon performing and furnishing the work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

7. Interpretations and addenda.

7.1 All questions about the meaning or intent of the Contract Documents are to be directed to the Procurement Agent. Interpretations or clarifications considered necessary by the Procurement Agent in response to such questions will be issued by Addenda will be posted to BidSync. The deadline for submitting questions shall be Friday, November 13, 2020 at 5:00pm. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will

be without legal effect. Each Bidder shall acknowledge on the bid proposal that all Addenda issued have been received.

7.2 Addenda may also be issued to modify the Bidding Documents as deemed advisable by the Owner.

8. Intentionally Omitted.

9. Substitute or "Or-Equal" Items.

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement. No substitutions should be considered during the bidding process.

10. Subcontractors, Suppliers, and Others.

10.1 If the Owner requests the identity of any Subcontractors, Suppliers, or other persons or organizations to be submitted to the Owner in advance of the specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within seven (7) days after the request submit to the Owner a list of all such Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work for which such identification is requested. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, supplier, person or organization if requested by the Owner. If the Owner, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, Owner may, before the Notice of Award is given, request the apparent Successful Bidder to submit an acceptable substitute in which case the apparent Successful Bidder shall submit an acceptable substitute. Bidder's Bid price may be increased (or decreased) by the difference in cost occasioned by such substitution, and the Owner may consider such price adjustment in evaluating Bids and making the contract award.

If the apparent Successful Bidder declines to make any such substitution, the Owner may award the contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, other persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Bidder.

10.2 No Contractor shall be required to employ any Subcontractor, Supplier, other person or organization against whom Contractor has reasonable objection.

11. Bid Proposal.

11.1 Two (2) completed Bid Proposals must be submitted in a sealed envelope as described in Item 15 of these Instructions to Bidders. The blank spaces in the Bid Form shall be filled in for each item for which a quantity is given and the Bidder shall state the price for which he proposes to do each item of work. All blanks on the bid form must be completed in ink or typed. No substitutions, revisions, or omissions from the plans and/or specifications will be accepted unless authorized in writing by the Owner.

11.2 Electronic Bids. Bidders may not use their own computer generated bid forms. Bidders must use the bid form provided in the bidding documents. An electronic version of the Bid Proposal in Excel format has been provided on BidSync. Use of this form shall be at the Bidder's risk. Any modifications by Bidder to the content of the bid form (other than unit prices and other information required to complete the bid) may result in rejection of bid.

11.3 The legal status of the Bidder, that is, as a corporation, partnership, or individual, must be stated on the Bid Form.

A corporation Bidder must name the state in which the organization is chartered. Bids which are signed for a corporation shall have the correct corporate name thereof, its post office address, and the signature of the president or other authorized officer of the corporation, manually written below the corporate name in the following manner: "By _(name) - (corporate title)_."

If the bid is made by a firm or partnership, the name and post office address of the managing member of the firm or partnership shall be given or the bid may be signed by an attorney-in-fact. If signed by an attorney-in-fact, there shall be attached to the bid a power of attorney evidencing authority to sign the bid, executed by the members of the firm or partners.

If the bid is made by an individual, his post office address shall be given. Bids which are not signed by the individuals making them shall have attached thereto a power of attorney evidencing authority to sign the bid in the name of the person for whom it is signed.

12. Provision Concerning Escalator Clauses.

Bids containing any condition which provides for changes in the stated bid prices due to increase or decrease in the costs of materials, labor, or other items required for this project, may be rejected and returned to the Bidder without being considered.

13. Estimates of Quantities.

The quantities listed in the Bid Form will be considered as approximate and will be used for the comparison of bids, **unless stated otherwise in the description of pay items**. Payments will be made to the Contractor only for the actual quantities of

work performed or materials furnished in accordance with the contract. The quantity of work to be done and the materials may be increased or decreased as provided for in the Contract Documents. **If an item is noted as a "Plans Quantity" then only the quantity shown in the unit bid price schedule will be paid.**

14. Submission of Bids.

Bids will be received by the Procurement Agent, and shall be submitted to the Procurement Office at the City of Coppell Town Center, 255 E. Parkway Boulevard, Coppell, Texas 75019 until, ***2:00 p.m. on Thursday, November 19, 2020***, and then publicly opened and read aloud remotely via a Zoom meeting. Two identical copies of the bid enclosed in an opaque sealed envelope and marked with the Project title, City of Coppell ***Bid No. Q-1121-02*** and the name and address of the Bidder shall be submitted. If the Bid is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED Construction of**: Denton Tap Road Intersection Improvements (Project No. ST-19-01)** on the face of it and addressed to the Procurement Agent, City of Coppell, Texas. Bid submission shall include Bid Form, Bid Affidavit, Bid Bond and Conflict of Interest Form.

15. Modification and Withdrawal of Bids.

15.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

15.2 If, within twenty-four hours after the Bids are opened, any Bidder files a duly signed written notice with the Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of the Bid, that Bidder may withdraw his bid. Thereafter, that Bidder will be disqualified from further bidding on the work.

16. Rejection of Bids.

Bids may be rejected if they show alterations of form, additions not called for, conditional bids, incomplete bids, erasures or irregularities of any kind. The Owner reserves the right to waive any irregularities in the bids as received and to reject any and all bids without qualification(s). More than one bid from an individual, firm or partnership, corporation or association, under the same or different names, will not be considered. Reasonable grounds for believing that a Bidder is interested in more than one such bid may cause the rejection of all bids in which said Bidder is interested. Bids in which prices are obviously unbalanced (as determined by Owner) may be rejected. Bids submitted without a Proposal Guaranty, per NCTCOG's Item 102.5 of the Standard Specifications for Public works will be rejected.

17. Bids to Remain Subject to Acceptance.

All Bids will remain subject to acceptance for ninety (90) calendar days after the day of the Bid opening, but the Owner may, in its sole discretion, release any Bid prior to that date.

18. Contract Time.

18.1 The time of completion of the project will be set at 390 Calendar Days. Early completion time will not be a factor in the awarding of a contract for this project.

18.2 Prior to the issuance of the Notice to Proceed by the Owner, the Contractor shall submit a detailed Progress and Schedule chart to the Owner for approval.

18.3 Extension of the contract time shall be based on a Change Order or written amendment as specified in Item 108.8 of the General Provisions.

19. Award of Contract.

19.1 The Owner reserves the right to accept or reject any or all of the bid alternates, where applicable. The Contract will be awarded based upon the combination of base bid and alternates most advantageous to the Owner. The Contractor must provide bids for all alternates in order for the bid package to remain complete and be considered for award.

19.2 The Owner reserves the right to reject any and all Bids, to waive any and all formalities except for the time of submission of the Bid and to negotiate contract terms with the Successful Bidder. The Owner also reserves the right to reject all nonconforming, non-responsive, unbalanced or conditional Bids. Also, the Owner reserves the right to reject the Bid of any Bidder if the Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or has doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Owner. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

19.3 In evaluating Bids, the owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid form or prior to the Notice of Award. Time of completion will be a consideration in the award of the bid.

19.4 The Owner may consider the qualifications and experience of any Subcontractors, Suppliers, or other persons or organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as requested by the Owner. The Owner also may consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

19.5 The Owner may conduct such investigations as the Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial stability of Bidders, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to the Owner's satisfaction within the prescribed time.

19.6 If contract is to be awarded, it will be awarded to the lowest and best qualified Bidder whose evaluation by the Owner indicates to the Owner that the award will be in the best interests of the Project.

19.7 If the contract is to be awarded, the Owner will give the Successful Bidder a Notice of Award within ninety (90) calendar days after the date of the Bid opening.

20. Liquidated damages.

20.1 Time of Completion. The maximum time of completion that will be allowed for the construction of Denton Tap Road Intersection Improvements is 390 calendar days.

20.2 Liquidated Damages. Failure to complete the work within the established number of calendar days, plus any additional calendar days granted, will result in liquidated damages being assessed for every calendar day in excess of the stated number.

20.3 Contract Completion. Contract Completion will be defined as occurring when all work shown in the plans and required under the contract has been completed and accepted by the Owner. Liquidated damages of $500 per calendar day shall also apply for any work that exceeds the total number of contract calendar days ("Original Contract Time" plus any additional days granted by change order). There is no maximum for liquidated damages. Additional provisions for the liquidated damages are set forth in Item 1.6 of the Specific Project Requirements (Section 4).

21. Execution of Agreement.

Within fifteen (15) days after written notification of award of the contract, the Successful Bidder shall execute and furnish to the Owner three (3) original signed contracts and a Certificate of Insurance.

22. Affidavit of Bills Paid.

Prior to final acceptance of this project by the Owner, the Contractor shall execute an affidavit that all bills for labor, materials, and incidentals incurred in the project construction have been paid in full, and that there are no claims pending.

23. Bid Compliance.

Bid must comply with all Federal, State, county and local laws. Contractor shall not hire nor work any illegal alien.

24. Notice to Proceed.

Upon execution of the Contract, the Owner will issue a written Notice to Proceed to the Contractor requesting that he proceed with the construction. The Calendar day count for the project shall commence within ten (10) calendar days after the date of the Notice to Proceed or when the contractor begins work, whichever occurs first.

25. Sales Tax.

The bidder shall not include or provide for sales tax on tangible personal property to be incorporated into the project. In order to be exempt from the sales tax on such tangible personal property, the contract shall separate and provide separate charges for materials to be incorporated into the project from charges for labor. The City will provide the Contractor with an exemption certificate for the materials. The contractor is expected to issue a resale certificate in lieu of paying a sales tax at the time of purchase. The bidder shall show the cost of materials to be incorporated into the contract (tangible personal property) in the space provided on the bid form. The successful bidders bid form will be used to develop a separated contract and will determine the extent of the tax exemption. Upon execution of the construction contract, the successful bidder shall provide a per item breakdown of:

a) materials incorporated into the project; and
b) labor, equipment, supervision and materials not incorporated into the project.

26. Silence of Specification.

The apparent silence of these specifications as to any detail or to the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practices are to prevail. All interpretations of these specifications shall be made on the basis of this statement by Owner or their authorized representative.

27. Change Orders.

No oral statement of any person shall modify or otherwise change, or affect the terms, conditions or specifications stated in the resulting Contract. All change orders to the Contract will be made in writing by the Owner using the Change Order Form included in the Appendix.

28. Assignment.

The Successful Bidder shall not sell, assign, transfer or convey this Contract, in whole or in part, without the prior written consent of Owner.

29. Venue.

This agreement will be governed and construed according to the laws of the State of Texas. This agreement is performable in Dallas County, Texas.

30. Maintenance Bond.

The Contractor shall provide a two-year Maintenance Bond in the amount of 50% of the value of the work at the completion of the project. The bond must be provided prior to final payment by the City.

31. Testing Requirements.

The Owner shall make arrangements with an independent laboratory acceptable for testing as required by the construction plans and standard specifications. The Contractor shall bear all related costs of retests or re-inspections. The Contractor shall notify the ENGINEER in a timely manner of when and where tests or inspections are to be made so that they may be present. One copy shall be provided to the Contractor of all reports and laboratory test results. Testing by the City does not alleviate the contractor's responsibility for his own quality assurance/quality control testing. Contractor shall replace any deficient construction items at his own expense. This does not include testing to be performed under Bid Item for "Density Testing of Existing Backfill".

32. Overtime.

Hours worked before 8:00 a.m. or after 5:00 p.m., all weekends and holidays are subject to overtime. Overtime request or scheduled testing must be made in writing and approved by the City of Coppell. Seventy-two hours advance-notice is required. All overtime incurred by the City for inspection services and any overtime incurred by the testing laboratory shall be paid by the Contractor. If not paid, such cost may be deducted from partial payments. The pay rate for Inspector overtime charges will be $54 / hr.

33. Overnight Work.

Contractor shall be permitted to perform work overnight for certain elements of construction including utility crossings, storm drain repairs, utility connections, concrete paving and other elements as deemed acceptable by the City and its ordinances. Overnight work may not include complete closure of Denton Tap Road. All overnight cost incurred by the City for inspection services and any overnight cost incurred by the testing laboratory shall be paid by the Contractor. The pay rate for overnight inspection charges will be $54 / hr.

34. Payment.

Contractor shall submit Applications for Payment in accordance with Item 109.5 of the General Provisions. Applications for Payment will be processed by Engineer as

provided in the General Provisions. Application for Payment shall be prepared using the form included in the Appendix.

35. Documentation of Existing Conditions.

Contractor must prepare a video and provide a copy to City of existing conditions within entire work area prior to the start of construction. Refer to Bid Item for "Pre-Project Video Survey" for additional information.

36. Bid Security.

Contractor must submit a bid security in the amount of five (5%) percent of the amount of the maximum total bid as a guarantee that the Bidder will promptly enter into a Contract and execute a Performance, Payment and Maintenance Bonds on the forms included in the Contract Documents if awarded the contract.

Acceptable Bid Security are:

a) Certified or cashier's check made payable to the Owner.
b) An approved Bidder's Bond underwritten by a surety named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Department.

37. Bonds

Performance, Payment and Maintenance Bonds are required for this project and shall be provided in accordance with the General Conditions.

BID FORM

PROJECT IDENTIFICATION: Denton Tap Road Intersection Improvements
Project No. ST-19-01
Coppell, Texas

BID OF Rebcon, Inc. (NAME OF FIRM) DATE 11/19/20

THIS BID IS SUBMITTED TO: City of Coppell (hereinafter called OWNER)
c/o Procurement Agent
255 E. Parkway Boulevard
P.O. 9478
Coppell, Texas 75019

CITY OF COPPELL BID NO: Q-1121-02

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER accepts all of the terms and conditions of the Advertisement or Notice to Bidders and Instructions to Bidders. This Bid will remain subject to acceptance for ninety (90) days after the day of Bid opening. BIDDER will sign and submit the Agreement with other documents required by the Bidding Requirements within fifteen (15) days after the date of OWNER's Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

   (a) BIDDER has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

No:	1	2	3	
Date:	11/13/20	11/17/20	11/18/20	
Rec'd:	RLS	RLS	RLS	

(b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

(c) BIDDER has studied carefully all reports of exploration and tests of subsurface conditions contained in the contract documents and which have been used in preparation of the contract documents. CONTRACTOR may rely upon the accuracy of the technical data contained in such reports, but not upon nontechnical data, interpretations or opinions contained therein or for the completeness thereof for CONTRACTOR's purposes. Except as indicated in the immediately preceding sentence, CONTRACTOR shall have full responsibility with respect to subsurface conditions at site.

BIDDER has studied carefully all drawings of the physical conditions in or relating to existing surface or subsurface structures on the site, which are contained in the contract documents and which have been utilized in preparation of the contract documents. CONTRACTOR may rely upon the accuracy of the technical data contained in such drawings, but not for the completeness thereof for CONTRACTOR's purposes. Except as indicated in the immediately preceding sentence, CONTRACTOR shall have full responsibility with respect to physical conditions in or relating to such structures.

(d) BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work as BIDDER considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, explorations, tests reports or similar information or data are or will be required by BIDDER for such purposes.

(e) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.

(f) BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

(g) BIDDER has given ENGINEER written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER.

(h) This bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

(i) It is understood and agreed that the following quantities of work to be done at unit prices are approximate only, and are intended principally to serve as a guide in evaluating bids.

(j) It is understood and agreed that the quantities of work to be done at unit prices and materials to be furnished may be increased or diminished as may be considered necessary in the opinion of the OWNER to complete the work fully as planned and contemplated, and that all quantities of work, whether increased or decreased, are to be performed at the unit prices set forth, except as provided for otherwise in the Contract Documents.

4. BIDDER understands that the work for each street will be completed in **multiple** phases. Plans for phasing or move-ins by utility and paving contractors will require approval by the Engineer. It is understood and agreed that all work under this contract will be completed within the bid calendar days. Completion date will be established in the Notice to Proceed. It is understood that time of completion will be a consideration in the award of the bid.

5. It is understood and agreed that the contractor's experience in this type of work will be a strong consideration in the award of the bid.

6. It is strongly recommended that each BIDDER visit the site prior to submitting a bid. Construction constraints exist, including heavy traffic volume along the roadway and accessibility requirements to & from adjacent streets, neighborhoods and properties, which could affect productivity.

7. BIDDER will complete the Work for the following price(s):

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION I - MISC ITEMS					
1	MOBILIZATION	1	LS		
	Complete in Place, for the Sum of Seventy Five Thousand Dollars and No Cents per unit			$75,000.00	$75,000.00
2	PROJECT SIGN	4	EA		
	Complete in Place, for the Sum of Seven Hundred Fifty Dollars and No Cents per unit			$750.00	$3,000.00
3	PROJECT COMMUNICATION	1	LS		
	Complete in Place, for the Sum of Four Thousand Dollars and No Cents per unit			$4,000.00	$4,000.00
4	PRE-PROJECT VIDEO SURVEY	1	EA		
	Complete in Place, for the Sum of Seven Hundred Fifty Dollars and No Cents per unit			$750.00	$750.00
5	POST-PROJECT VIDEO SURVEY	1	EA		
	Complete in Place, for the Sum of Seven Hundred Fifty Dollars and No Cents per unit			$750.00	$750.00
6	FURNISH, INSTALL, MAINTAIN AND REMOVE EROSION CONTROL	1	LS		
	Complete in Place, for the Sum of Fourteen Thousand Dollars and No Cents per unit			$14,000.00	$14,000.00
7	FURNISH, INSTALL AND MAINTAIN TEMPORARY TRAFFIC CONTROL	1	LS		
	Complete in Place, for the Sum of One Hundred Ten Thousand Dollars and No Cents per unit			$110,000.00	$110,000.00
8	BENCHMARK REESTABLISHMENT	2	EA		
	Complete in Place, for the Sum of Five Hundred Dollars and No Cents per unit			$500.00	$1,000.00
9	REPLACE EXISTING TREE	5	EA		
	Complete in Place, for the Sum of Four Hundred Eighty Five Dollars and No Cents per unit			$485.00	$2,425.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION I - MISC ITEMS

$210,925.00
(SUBTOTAL Amount Bid, Numerical Value)

Two Hundred Ten Thousand Nine Hundred Twenty Five Dollars and No Cents

***The Owner reserves the right to delete any bid items or portions thereof. If the Owner elects to delete any portions of the PROJECT from the contract, then the contract can be awarded on that basis.**

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION II - DEMOLITION/PREPARATION					
10	RIGHT OF WAY PREPARATION	33	STA		
	Complete in Place, for the Sum of Two Thousand Eight Hundred Dollars and No Cents per unit			$2,800.00	$92,400.00
11	UNCLASSIFIED EXCAVATION	1,890	CY		
	Complete in Place, for the Sum of Forty Five Dollars and No Cents per unit			$45.00	$85,050.00
12	REMOVE & DISPOSE OF EXISTING CONCRETE PAVEMENT (TO	2,015	SY		
	Complete in Place, for the Sum of Thirty Dollars and No Cents per unit			$30.00	$60,450.00
13	REMOVE & DISPOSE EXISTING CONCRETE SIDEWALK & RAMPS	1,300	SY		
	Complete in Place, for the Sum of Fifteen Dollars and No Cents per unit			$15.00	$19,500.00
14	REMOVE EXISTING SMALL CURB INLET (4'-8')	1	EA		
	Complete in Place, for the Sum of One Thousand Six Hundred Dollars and No Cents per unit			$1,600.00	$1,600.00
15	REMOVE EXISTING LARGE CURB INLET MAJOR (10'-20')	5	EA		
	Complete in Place, for the Sum of Two Thousand Four Hundred Dollars and No Cents per unit			$2,400.00	$12,000.00
16	REMOVE EX 21" RCP STORM DRAIN	15	LF		
	Complete in Place, for the Sum of Nineteen Dollars and No Cents per unit			$19.00	$285.00
17	REMOVE EX 24" RCP STORM DRAIN	20	LF		
	Complete in Place, for the Sum of Nineteen Dollars and No Cents per unit			$19.00	$380.00
18	REMOVE EXISTING TREE	30	EA		
	Complete in Place, for the Sum of Five Hundred Fifty Dollars and No Cents per unit			$550.00	$16,500.00
19	REMOVE & RELOCATE EXISTING WAYFINDING SIGN ONTO NEW	2	EA		
	Complete in Place, for the Sum of One Thousand Five Hundred Dollars and No Cents per unit			$1,500.00	$3,000.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION II - DEMOLITION/PREPARATION

$291,165.00
(SUBTOTAL Amount Bid, Numerical Value)

Two Hundred Ninety One Thousand One Hundred Sixty Five Dollars and No Cents

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Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION III - PAVING IMPROVEMENTS					
20	**8" REINFORCED CONCRETE STREET PAVEMENT**	4,035	SY		
	Complete in Place, for the Sum of Ninety Five Dollars and No Cents per unit			$95.00	$383,325.00
21	**6" REINFORCED DRIVEWAY CONCRETE PAVEMENT**	220	SY		
	Complete in Place, for the Sum of Ninety Dollars and No Cents per unit			$90.00	$19,800.00
22	**8" LIME STABILIZED SUBGRADE**	4,970	SY		
	Complete in Place, for the Sum of Twelve Dollars and No Cents per unit			$12.00	$59,640.00
23	**LIME FOR STABILIZED SUBGRADE (40 LB/SY)**	102	TON		
	Complete in Place, for the Sum of One Hundred Eighty Dollars and No Cents per unit			$180.00	$18,360.00
24	**8" REINFORECED STAMPED COLORED CONCRETE PAVEMENT**	465	SY		
	Complete in Place, for the Sum of Two Hundred Twenty Dollars and No Cents per unit			$220.00	$102,300.00
25	**6" REINFORCED STAMPED COLORED CONCRETE PAVEMENT**	535	SY		
	Complete in Place, for the Sum of Two Hundred Thirty Five Dollars and No Cents per unit			$235.00	$125,725.00
26	**4" REINFORCED CONCRETE SIDEWALK (ALL WIDTHS)**	1,185	SY		
	Complete in Place, for the Sum of Fifty Two Dollars and No Cents per unit			$52.00	$61,620.00
27	**CONCRETE RETAINING WALL W/ INTEGRAL SIDEWALK (CAST-IN-**	290	SF		
	Complete in Place, for the Sum of Two Hundred Seventy Five Dollars and No Cents per unit			$275.00	$79,750.00
28	**CONCRETE MEDIAN NOSE**	28	SY		
	Complete in Place, for the Sum of Two Hundred Fifty Five Dollars and No Cents per unit			$255.00	$7,140.00
29	**BARRIER FREE PEDESTRIAN RAMP**	27	SY		
	Complete in Place, for the Sum of Two Hundred Forty Seven Dollars and No Cents per unit			$247.00	$6,669.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION III - PAVING IMPROVEMENTS

$864,329.00
(SUBTOTAL Amount Bid, Numerical Value)

Eight Hundred Sixty Four Thousand Three Hundred Twenty Nine Dollars and No Cents

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Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION IV - PAVEMENT MARKING AND SIGNING IMPROVEMENTS					
30	**4" THERMOPLASTIC SOLID MARKING (Y)**	**930**	**LF**		
	Complete in Place, for the Sum of One Dollar and Twenty Cents per unit			$1.20	$1,116.00
31	**4" THERMOPLASTIC BROKEN MARKING (W)**	**1,290**	**LF**		
	Complete in Place, for the Sum of One Dollar and Forty Cents per unit			$1.40	$1,806.00
32	**8" THERMOPLASTIC SOLID MARKING (W)**	**2,950**	**LF**		
	Complete in Place, for the Sum of Two Dollars and Forty Cents per unit			$2.40	$7,080.00
33	**12" THERMOPLASTIC SOLID MARKING (W)**	**785**	**LF**		
	Complete in Place, for the Sum of Four Dollars and Ten Cents per unit			$4.10	$3,218.50
34	**24" THERMOPLASTIC SOLID MARKING (W)**	**470**	**LF**		
	Complete in Place, for the Sum of Eight Dollars and Twenty Five Cents per unit			$8.25	$3,877.50
35	**THERMOPLASTIC ARROW (W)**	**26**	**EA**		
	Complete in Place, for the Sum of One Hundred Sixty Five Dollars and No Cents per unit			$165.00	$4,290.00
36	**THERMOPLASTIC WORD (W)**	**26**	**EA**		
	Complete in Place, for the Sum of One Hundred Seventy Six Dollars and No Cents per unit			$176.00	$4,576.00
37	**TYPE I-C 4" RAISED PAVEMENT MARKERS**	**107**	**EA**		
	Complete in Place, for the Sum of Six Dollars and No Cents per unit			$6.00	$642.00
38	**TYPE II-C-R 4" RAISED PAVEMENT MARKERS**	**570**	**EA**		
	Complete in Place, for the Sum of Six Dollars and No Cents per unit			$6.00	$3,420.00
39	**TYPE II-A-A 4" RAISED PAVEMENT MARKERS**	**12**	**EA**		
	Complete in Place, for the Sum of Six Dollars and No Cents per unit			$6.00	$72.00
40	**STREET SIGNS**	**16**	**EA**		
	Complete in Place, for the Sum of Five Hundred Twenty Dollars and No Cents per unit			$520.00	$8,320.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION IV - PAVEMENT MARKING AND SIGNING IMPROVEMENT

$38,418.00

(SUBTOTAL Amount Bid, Numerical Value)

Thirty Eight Thousand Four Hundred Eighteen Dollars and No Cents

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Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION V - UTILITY IMPROVEMENTS					
41	**18" REINFORCED CONCRETE PIPE CLASS III STORM DRAIN**	**19**	**LF**		
	Complete in Place, for the Sum of One Hundred Sixty Five Dollars and No Cents per unit			$165.00	$3,135.00
42	**24" REINFORCED CONCRETE PIPE CLASS III STORM DRAIN**	**51**	**LF**		
	Complete in Place, for the Sum of One Hundred Ninety Eight Dollars and No Cents per unit			$198.00	$10,098.00
43	**5' RECESSED CURB INLET**	**1**	**EA**		
	Complete in Place, for the Sum of Three Thousand Nine Hundred Dollars and No Cents per unit			$3,900.00	$3,900.00
44	**10' RECESSED CURB INLET**	**3**	**EA**		
	Complete in Place, for the Sum of Four Thousand Seven Hundred Dollars and No Cents per unit			$4,700.00	$14,100.00
45	**15' RECESSED CURB INLET**	**1**	**EA**		
	Complete in Place, for the Sum of Seven Thousand Dollars and No Cents per unit			$7,000.00	$7,000.00
46	**20' RECESSED CURB INLET**	**1**	**EA**		
	Complete in Place, for the Sum of Nine Thousand Four Hundred Dollars and No Cents per unit			$9,400.00	$9,400.00
47	**SLOTTED DRAIN SYSTEM (12 IN)**	**270**	**LF**		
	Complete in Place, for the Sum of One Hundred Twenty Dollars and No Cents per unit			$120.00	$32,400.00
48	**SLOTTED DRAIN OUTFALL (12 IN)**	**5**	**LF**		
	Complete in Place, for the Sum of Eighty Eight Dollars and No Cents per unit			$88.00	$440.00
49	**STANDARD FIRE HYDRANT ASSEMBLY (NEW)**	**2**	**EA**		
	Complete in Place, for the Sum of Three Thousand Eight Hundred Dollars and No Cents per unit			$3,800.00	$7,600.00
50	**REMOVE EXISTING FIRE HYDRANT**	**2**	**EA**		
	Complete in Place, for the Sum of Five Hundred Dollars and No Cents per unit			$500.00	$1,000.00
51	**ADJUST EXISTING WATER VALVE**	**3**	**EA**		
	Complete in Place, for the Sum of Two Hundred Seventy Five Dollars and No Cents per unit			$275.00	$825.00

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
52	RELOCATE EXISTING WATER SERVICE & METER	1	EA		
	Complete in Place, for the Sum of One Thousand Eight Hundred Dollars and No Cents per unit			$1,800.00	$1,800.00
53	ADJUST EXISTING SANITARY SEWER MANHOLE RIM TO GRADE	1	EA		
	Complete in Place, for the Sum of One Thousand Nine Hundred Dollars and No Cents per unit			$1,900.00	$1,900.00
54	TRENCH SAFETY FOR DRAINAGE IMPROVEMENTS	69	LF		
	Complete in Place, for the Sum of Eleven Dollars and No Cents per unit			$11.00	$759.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION V - UTILITY IMPROVEMENTS

$94,357.00

(SUBTOTAL Amount Bid, Numerical Value)

Ninety Four Thousand Three Hundred Fifty Seven Dollars and No Cents

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Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION VI - ILLUMINATION IMPROVEMENTS					
55	REMOVE & DISPOSE OF EXISTING STREET LIGHT FOUNDATION	4	EA		
	Complete in Place, for the Sum of Seven Hundred Fifty Dollars and No Cents per unit			$750.00	$3,000.00
56	DRILLED SHAFT (ROADWAY ILLUMINATION POLE) (24 IN)	4	EA		
	Complete in Place, for the Sum of Two Thousand Thirty Five Dollars and No Cents per unit			$2,035.00	$8,140.00
57	RELOCATE EX ROADWAY ILLUMINATION ASSEMBLY ONTO NEW	4	EA		
	Complete in Place, for the Sum of Two Thousand Four Hundred Twenty Dollars and No Cents per unit			$2,420.00	$9,680.00
58	CONDT (PVC) (SCH 40) (2") (TRENCH) (ILLUMINATION)	600	LF		
	Complete in Place, for the Sum of Seventeen Dollars and Sixty Cents per unit			$17.60	$10,560.00
59	GROUND BOX TY A	4	EA		
	Complete in Place, for the Sum of One Thousand Three Hundred Twenty Dollars and No Cents per unit			$1,320.00	$5,280.00
60	ELEC CONDR (NO.8) BARE (ILLUMINATION)	600	LF		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$1,320.00
61	ELEC CONDR (NO.2) INSULATED (ILLUMINATION)	1,200	LF		
	Complete in Place, for the Sum of Three Dollars and Thirty Cents per unit			$3.30	$3,960.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION VI - ILLUMINATION IMPROVEMENTS

$41,940.00

(SUBTOTAL Amount Bid, Numerical Value)

Forty One Thousand Nine Hundred Forty Dollars and No Cents

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Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION VII - TRAFFIC SIGNAL IMPROVEMENTS					
62	**DRILL SHAFT (TRF SIG POLE) (36 IN)**	**39**	**LF**		
	Complete in Place, for the Sum of Four Hundred Twenty Three Dollars and Fifty Cents per unit			$423.50	$16,516.50
63	**DRILL SHAFT (TRF SIG POLE) (48 IN)**	**88**	**LF**		
	Complete in Place, for the Sum of Four Hundred Sixty Seven Dollars and Fifty Cents per unit			$467.50	$41,140.00
64	**PORT CTB (FUR & INST)(LOW PROF)(TY 1)**	**60**	**LF**		
	Complete in Place, for the Sum of Eighty Three Dollars and Fifty Two Cents per unit			$83.52	$5,011.20
65	**CONDT (PVC) (SCH 40) (2") (TRENCH) (SIGNAL)**	**105**	**LF**		
	Complete in Place, for the Sum of Fifteen Dollars and Forty Cents per unit			$15.40	$1,617.00
66	**CONDT (PVC) (SCH 40) (3") (TRENCH) (SIGNAL)**	**595**	**LF**		
	Complete in Place, for the Sum of Sixteen Dollars and Fifty Cents per unit			$16.50	$9,817.50
67	**CONDT (PVC) (SCH 40) (4") (TRENCH) (SIGNAL)**	**60**	**LF**		
	Complete in Place, for the Sum of Seventeen Dollars and Sixty Cents per unit			$17.60	$1,056.00
68	**CONDT (PVC) (SCH 40) (4") (BORE) (SIGNAL)**	**525**	**LF**		
	Complete in Place, for the Sum of Forty Six Dollars and Twenty Cents per unit			$46.20	$24,255.00
69	**CONDT (PVC) (SCH 80) (2") (TRENCH) (SIGNAL)**	**10**	**LF**		
	Complete in Place, for the Sum of Sixteen Dollars and Fifty Cents per unit			$16.50	$165.00
70	**ELEC CONDR (NO.6) BARE (SIGNAL)**	**1,835**	**LF**		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$4,037.00
71	**ELEC CONDR (NO.6) INSULATED (SIGNAL)**	**540**	**LF**		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$1,188.00
72	**GROUND BOX TY C (162911)W/APRON**	**15**	**EA**		
	Complete in Place, for the Sum of One Thousand Five Hundred Forty Dollars and No Cents per unit			$1,540.00	$23,100.00
73	**REMOVE GROUND BOX**	**20**	**EA**		
	Complete in Place, for the Sum of Three Hundred Dollars and No Cents per unit			$300.00	$6,000.00
74	**ELC SRV TY D 120/240 070(NS)SS(E)PS(U)**	**1**	**EA**		
	Complete in Place, for the Sum of Eight Thousand Two Hundred Fifty Dollars and No Cents per unit			$8,250.00	$8,250.00

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
75	INSTALL HWY TRF SIG (ISOLATED)	1	EA		
	Complete in Place, for the Sum of Sixteen Thousand One Hundred Fifteen Dollars and No Cents per unit			$16,115.00	$16,115.00
76	REMOVING TRAFFIC SIGNALS	4	EA		
	Complete in Place, for the Sum of Four Thousand Four Hundred Dollars and No Cents per unit			$4,400.00	$17,600.00
77	INSTALL HWY TRF SIG (UPGRADE)	3	EA		
	Complete in Place, for the Sum of Seven Thousand One Hundred Fifty Dollars and No Cents per unit			$7,150.00	$21,450.00
78	VEH SIG SEC (12")LED(GRN)	20	EA		
	Complete in Place, for the Sum of Four Hundred Forty Dollars and No Cents per unit			$440.00	$8,800.00
79	VEH SIG SEC (12")LED(GRN ARW)	23	EA		
	Complete in Place, for the Sum of Four Hundred Forty Dollars and No Cents per unit			$440.00	$10,120.00
80	VEH SIG SEC (12")LED(YEL)	20	EA		
	Complete in Place, for the Sum of Four Hundred Forty Dollars and No Cents per unit			$440.00	$8,800.00
81	VEH SIG SEC (12")LED(YEL ARW)	39	EA		
	Complete in Place, for the Sum of Four Hundred Forty Dollars and No Cents per unit			$440.00	$17,160.00
82	VEH SIG SEC (12")LED(RED)	20	EA		
	Complete in Place, for the Sum of Four Hundred Forty Dollars and No Cents per unit			$440.00	$8,800.00
83	VEH SIG SEC (12")LED(RED ARW)	16	EA		
	Complete in Place, for the Sum of Four Hundred Forty Dollars and No Cents per unit			$440.00	$7,040.00
84	PED SIG SEC (LED)(COUNTDOWN)	21	EA		
	Complete in Place, for the Sum of One Thousand One Hundred Dollars and No Cents per unit			$1,100.00	$23,100.00
85	BACK PLATE (12")(3 SEC)	13	EA		
	Complete in Place, for the Sum of One Hundred Sixty Five Dollars and No Cents per unit			$165.00	$2,145.00
86	BACK PLATE (12")(4 SEC)	16	EA		
	Complete in Place, for the Sum of One Hundred Seventy Six Dollars and No Cents per unit			$176.00	$2,816.00
87	BACK PLATE (12")(5 SEC)	7	EA		
	Complete in Place, for the Sum of One Hundred Eighty Seven Dollars and No Cents per unit			$187.00	$1,309.00

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
88	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	2,230	LF		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$4,906.00
89	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	725	LF		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$1,595.00
90	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	675	LF		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$1,485.00
91	TRF SIG CBL (TY A)(14 AWG)(10 CONDR)	2,715	LF		
	Complete in Place, for the Sum of Four Dollars and Forty Cents per unit			$4.40	$11,946.00
92	TRF SIG CBL (TY A)(14 AWG)(20 CONDR)	1,355	LF		
	Complete in Place, for the Sum of Five Dollars and Fifty Cents per unit			$5.50	$7,452.50
93	TRF SIG CBL (TY C)(12 AWG)(2 CONDR)	95	LF		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$209.00
94	INS TRF SIG PL AM(S)1 ARM(36')	1	EA		
	Complete in Place, for the Sum of Twelve Thousand Dollars and No Cents per unit			$12,000.00	$12,000.00
95	INS TRF SIG PL AM(S)1 ARM(44')	2	EA		
	Complete in Place, for the Sum of Twelve Thousand Five Hundred Dollars and No Cents per unit			$12,500.00	$25,000.00
96	INS TRF SIG PL AM(S)1 ARM(55')	1	EA		
	Complete in Place, for the Sum of Forty One Thousand Two Hundred Dollars and No Cents per unit			$41,200.00	$41,200.00
97	INS TRF SIG PL AM(S)1 ARM(60')	1	EA		
	Complete in Place, for the Sum of Thirty Eight Thousand Three Hundred Dollars and No Cents per unit			$38,300.00	$38,300.00
98	INS TRF SIG PL AM(S)1 ARM(65')	2	EA		
	Complete in Place, for the Sum of Forty Two Thousand Dollars and No Cents per unit			$42,000.00	$84,000.00
99	PED POLE ASSEMBLY	16	EA		
	Complete in Place, for the Sum of Three Thousand Three Hundred Dollars and No Cents per unit			$3,300.00	$52,800.00
100	PED DETECT PUSH BUTTON (APS)	17	EA		
	Complete in Place, for the Sum of Eight Hundred Eighty Dollars and No Cents per unit			$880.00	$14,960.00

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
101	PED DETECT PUSH BUTTON (STANDARD)	4	EA		
	Complete in Place, for the Sum of Two Hundred Seventy Five Dollars and No Cents per unit			$275.00	$1,100.00
102	PED DETECTOR CONTROLLER UNIT	2	EA		
	Complete in Place, for the Sum of Four Thousand Five Hundred Dollars and No Cents per unit			$4,500.00	$9,000.00
103	TREE TRIMMING	1	AC		
	Complete in Place, for the Sum of Three Thousand Dollars and No Cents per unit			$3,000.00	$3,000.00
104	VIVDS CAMERA ASSEMBLY	4	EA		
	Complete in Place, for the Sum of Eight Thousand Two Hundred Fifty Dollars and No Cents per unit			$8,250.00	$33,000.00
105	VIVDS CAMERA ASSEMBLY (RELOCATE)	5	EA		
	Complete in Place, for the Sum of One Thousand One Hundred Dollars and No Cents per unit			$1,100.00	$5,500.00
106	VIVDS COMMUNICATION CABLE (COAXIAL)	1,590	LF		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$3,498.00
107	CONDUIT (PREPARE)	1,710	LF		
	Complete in Place, for the Sum of No Dollars and Fifty Five Cents per unit			$0.55	$940.50
108	CAT 5 ETHERNET CABLE	520	LF		
	Complete in Place, for the Sum of Four Dollars and Forty Cents per unit			$4.40	$2,288.00
109	ILSN (LED) (6 D)	2	EA		
	Complete in Place, for the Sum of Four Thousand Five Hundred Dollars and No Cents per unit			$4,500.00	$9,000.00
110	ILSN (LED) (RELOCATE)	5	EA		
	Complete in Place, for the Sum of Eight Hundred Thirty Dollars and No Cents per unit			$830.00	$4,150.00
111	OPTICOM CABLE	1,390	LF		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$3,058.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION VII - TRAFFIC SIGNAL IMPROVEMENTS

$657,796.20
(SUBTOTAL Amount Bid, Numerical Value)

Six Hundred Fifty Seven Thousand Seven Hundred Ninety Six Dollars and Twenty Cents

***The Owner reserves the right to delete any bid items or portions thereof. If the Owner elects to delete any portions of the PROJECT from the contract, then the contract can be awarded on that basis.**

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantity	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION VIII - LANDSCAPE IMPROVEMENTS					
112	RESTORE IRRIGATION SYSTEM	1	LS		
	Complete in Place, for the Sum of _____ Dollars and _____ Cents per unit			$	$
113	RESTORE PARKWAYS & DISTURBED AREAS	44	STA		
	Complete in Place, for the Sum of _____ Dollars and _____ Cents per unit			$	$

SUBTOTAL AMOUNT BID - BASE BID - SECTION VIII - LANDSCAPE IMPROVEMENTS

$ -

(SUBTOTAL Amount Bid, Numerical Value)

_____ Dollars

and _____ Cents

***The Owner reserves the right to delete any bid items or portions thereof. If the Owner elects to delete any portions of the PROJECT from the contract, then the contract can be awarded on that basis.**

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION IX - VEHICLE DETECTION INTERSECTION UPGRADES					
113	**VIVDS CAM ASSY (REMOVE)**	102	EA		
	Complete in Place, for the Sum of Three Hundred Three Dollars and No Cents per unit			$303.00	$30,906.00
114	**INSTALL ITERIS VANTAGE VECTOR SENSOR**	67	EA		
	Complete in Place, for the Sum of Eight Hundred Eighty Dollars and No Cents per unit			$880.00	$58,960.00
115	**INSTALL ITERIS VANTAGE NEXT SENSOR**	34	EA		
	Complete in Place, for the Sum of Eight Hundred Eighty Dollars and No Cents per unit			$880.00	$29,920.00
116	**CONDUIT (PREPARE)**	16,950	LF		
	Complete in Place, for the Sum of No Dollars and Fifty Five Cents per unit			$0.55	$9,322.50
117	**GROUND BOX (PREPARE)**	195	EA		
	Complete in Place, for the Sum of One Hundred Ten Dollars and No Cents per unit			$110.00	$21,450.00
118	**VIVDS/RADAR CABLING**	22,600	LF		
	Complete in Place, for the Sum of Two Dollars and Twenty Cents per unit			$2.20	$49,720.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION IX - VEHICLE DETECTION INTERSECTION UPGRADES

$200,278.50

(SUBTOTAL Amount Bid, Numerical Value)

Two Hundred Thousand Two Hundred Seventy Eight Dollars and Fifty Cents

***The Owner reserves the right to delete any bid items or portions thereof. If the Owner elects to delete any portions of the PROJECT from the contract, then the contract can be awarded on that basis.**

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
BASE BID - SECTION X - ALLOWANCES					
X1	**PROJECT ALLOWANCE FOR WATER IMPROVEMENTS**	1	LS		
	Complete in Place, for the Sum of Twenty Five Thousand Dollars and No Cents per unit			$25,000.00	$25,000.00
X2	**PROJECT ALLOWANCE FOR STORM IMPROVEMENTS**	1	LS		
	Complete in Place, for the Sum of Twenty Five Thousand Dollars and No Cents per unit			$25,000.00	$25,000.00
X3	**PROJECT ALLOWANCE FOR PAVING IMPROVEMENTS**	1	LS		
	Complete in Place, for the Sum of Twenty Five Thousand Dollars and No Cents per unit			$25,000.00	$25,000.00
X4	**PROJECT ALLOWANCE FOR LANDSCAPE IMPROVEMENTS**	1	LS		
	Complete in Place, for the Sum of Forty Thousand Dollars and No Cents per unit			$40,000.00	$40,000.00
X5	**PROJECT ALLOWANCE FOR IRRIGATION SYSTEM REPAIRS**	1	LS		
	Complete in Place, for the Sum of Twenty Five Thousand Dollars and No Cents per unit			$25,000.00	$25,000.00

SUBTOTAL AMOUNT BID - BASE BID - SECTION X - ALLOWANCES

$140,000.00
(SUBTOTAL Amount Bid, Numerical Value)

One Hundred Forty Thousand Dollars and No Cents

***The Owner reserves the right to delete any bid items or portions thereof. If the Owner elects to delete any portions of the PROJECT from the contract, then the contract can be awarded on that basis.**

Item No.	Name of Pay Item with Unit Price in Words	Est. Quantit	Unit	Unit Price	SUBTOTAL Price
ALTERNATE BID A - FLEX BASE ALTERNATE					
A1	**UNCLASSIFIED EXCAVATION**	**950**	**CY**		
	Complete in Place, for the Sum of Forty Five Dollars and No Cents per unit			$45.00	$42,750.00
A2	**8" LIME STABILIZED SUBGRADE**	**-4,970**	**SY**		
	Complete in Place, for the Sum of Twelve Dollars and No Cents per unit			$12.00	-$59,640.00
A3	**HYDRATED LIME (40 LB/SY)**	**-102**	**TON**		
	Complete in Place, for the Sum of One Hundred Eighty Dollars and No Cents per unit			$180.00	-$18,360.00
A4	**8" FLEXIBLE BASE (TYPE A) (GRADE 1 OR 2)**	**4,970**	**SY**		
	Complete in Place, for the Sum of Forty Seven Dollars and No Cents per unit			$47.00	$233,590.00

SUBTOTAL AMOUNT BID - ALTERNATE BID A - FLEX BASE ALTERNATE

$198,340.00
(SUBTOTAL Amount Bid, Numerical Value)

One Hundred Ninety Eight Thousand Three Hundred Forty Dollars and No Cents

***The Owner reserves the right to delete any bid items or portions thereof. If the Owner elects to delete any portions of the PROJECT from the contract, then the contract can be awarded on that basis.**

BID SUMMARY – BID NO. Q-1121-02
Denton Tap Road Intersection Improvements

BID ITEMS

SECTION I - MISC. ITEMS	$210,925.00
SECTION II – DEMOLITION/PREPARATION	$291,165.00
SECTION III – PAVING IMPROV.	$864,329.00
SECTION IV – PAV. MARKING AND SIGNING IMPROV.	$38,418.00
SECTION V – UTILITY IMPROV.	$94,357.00
SECTION VI – ILLUMINATION IMPROV.	$41,940.00
SECTION VII – TRAFFIC SIGNAL IMPROV.	$657,796.20
SECTION VIII – LANDSCAPE IMPROV.	$39,600.00
SECTION IX – VEHICLE DETECTION INTER. UPGRADES	$200,278.50
SECTION X – ALLOWANCES	$140,000.00
TOTAL - BASE BID	$2,578,808.70
TOTAL - ALTERNATE BID A	$198,340.00
TOTAL - BASE BID + ALTERNATE BID A	$2,777,148.70
TOTAL TIME BID TO COMPLETE PROJECT	390 CALENDAR DAYS

8. Communications concerning this Bid shall be addressed to the address of BIDDER indicated on the applicable signature page.

9. BIDDER understands that the Owner is exempt from State Limited Sales and Use Tax on tangible personal property to be incorporated into the project. Said taxes are not included in the Contract Price (see Instructions to Bidders).

10. The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the General Conditions.

The City of Coppell reserves the right to delete any portion of this project as it may deem necessary to stay within the City's available funds. Should the City elect to delete any portion, the contract quantities will be adjusted accordingly.

PROPOSAL GUARANTY

- **A Proposal Guaranty shall be provided in accordance with Item 102.5 of the Standard Specifications for Public Works Construction – North Central Texas Council of Governments Fourth Edition.**

SUBMITTED ON 11/19/20

By: [signature]

Name: Robert C. Bibby

Title: President

Company: Rebcon, Inc.

Address: 1868 W. Northwest Hwy
Dallas, TX 75220

Classification	Hourly Rate
CONCRETE FINISHER (Paving & Structures)	14.12
ELECTRICIAN	19.80
FORM BUILDER / FORM SETTER	
Paving & Curb	13.16
Structures	13.84
LABORER	
Asphalt Raker	12.69
Flagger	10.06
Laborer, Common	10.72
Laborer, Utility	12.32
Pipelayer	13.24
Work Zone Barricade Servicer	11.68
POWER EQUIPMENT OPERATOR	
Asphalt Distributor	15.32
Asphalt Paving Machine	13.99
Broom or Sweeper	11.74
Concrete Pavement Finishing Machine	16.05
Concrete Saw	14.48
Crane Operator, Lattice Boom 80 Tons or Less	17.27
Crane Operator, Lattice Boom over 80 Tons	20.52
Crane, Hydraulic 80 Tons or Less	18.12
Crawler Tractor	14.07
Excavator, 50,000 pounds or less	17.19
Excavator, over 50,000 pounds	16.99
Foundation Drill, Truck Mounted	21.07
Foundation Drill, Crawler Mounted	17.99
Front End Loader 3 CY or Less	13.69
Front End Loader, over 3 CY	14.72
Loader / Backhoe	15.18
Mechanic	17.68
Milling Machine	14.32
Motor Grader, Fine Grade	17.19
Motor Grader, Rough	16.02
Pavement Marking Machine	13.63
Reclaimer/Pulverizer	11.01
Roller, Asphalt	13.08
Roller, Other	11.51
Scraper	12.96
Small Slipform Machine	15.96
Spreader Box	14.73
Servicer	14.58
Steel Worker (Reinforcing)	16.18

Classification	Hourly Rate
TRUCK DRIVER	
Lowboy-Float	16.24
Off Road Hauler	12.25
Single Axle	12.31
Single or Tandem Axle Dump Truck	12.62
Tandem Axle Tractor with Semi Trailer	12.86
Transit-Mix	14.14
WELDER	14.84

BID AFFIDAVIT

The undersigned certifies that the bid prices contained in this bid have been carefully reviewed and are submitted as correct and final. Bidder further certifies and agrees to furnish any and/or all commodities upon which prices are extended at the price offered, and upon the conditions contained in the Specifications of the Invitation to Bid. The period of acceptance of this bid will be ninety (90) calendar days from the date of the bid opening.

STATE OF Texas COUNTY OF Dallas

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared Robert C. Bibby (Name) who after being by me duly sworn, did depose and say:

"I, Robert C. Bibby (Name) am a duly authorized office/agent for Rebcon Inc. (Name of Firm) and have been duly authorized to execute the foregoing on behalf of the said Rebcon, Inc. (Name of Firm)

I hereby certify that the foregoing bid has not been prepared in collusion with any other Bidder or individual(s) engaged in the same line of business prior to the official opening of this bid. Further, I certify that the Bidder is not now, nor has been for the past six (6) months, directly or indirectly concerned in any pool, agreement or combination thereof, to control the price of services/ commodities bid on, or to influence any individual(s) to bid or not to bid thereon."

Name and Address of Bidder: Rebcon, Inc.
1868 W. Northwest Hwy, Dallas, TX 75220
Telephone: (972) 444-8230 by: Robert C. Bibby
Title: President Signature:

SUBSCRIBED AND SWORN to before me by the above named Robert C. Bibby
on this the 19th day of November 2020

Notary Public in and for the State of Texas

CYNTHIA A MENDEZ
Notary Public, State of Texas
Comm. Expires 01-25-2021
Notary ID 12928293-4

IF BIDDER IS:

An Individual

By _____ (Seal)
(Individual's Name)

doing business as

_____

Business address

_____

_____ Phone No. _____

A Partnership

By _____ (Seal)
(Firm Name)

_____
(General Partner)

Business address _____

_____ Phone No. _____

A Corporation

By Rebcon, Inc.
(Corporation Name)

Texas
(State of Incorporation)

By Robert C. Bibby
(Name of person authorized to sign)

President
(Title)

(Corporate Seal)

Attest _____ Mark Gaines
(Secretary)

Business address 1868 W. Northwest Hwy

Dallas, TX 75220 Phone No. 972-444-8230

A Joint Venture

By _____
(Name) (Address)

By _____
(Name) (Address)

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a partner to the joint venture should be in the manner indicated above.)

mnh
BONDS AND INSURANCE
5057 Keller Springs Road · Suite 400 · Addison, Texas 75001
972.201.0100 main mnhins.com 972.201.0123 fax

AIA Document 310 - 2010 Bid Bond

CONTRACTOR (Name, legal status and address):

Rebcon, Inc.
1868 W. Northwest Hwy
Dallas, TX 75220-7018

SURETY (Name, legal status and principal place of business):

Colonial American Casualty and Surety Company
1299 Zurich Way, 5th Floor
Schaumburg, IL 60196-1056

OWNER (Name, legal status and address):
City of Coppell
255 E. Parkway Blvd.
Coppell, TX 75019-2602

Bond Amount: **Five Percent of the Greatest Amount Bid (5% GAB)**

PROJECT: (Name, location or address, and Project number, if any):

Denton Tap Intersection Improvements

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters in to a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding ninety (90) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond ninety (90) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed by the Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this **19th** day of **November, 2020**

(Witness) (Seal)

(Witness) (Seal)

Rebcon, Inc.
(Principal) (Seal)

(Name & Title): Robert B. Bby, President

Colonial American Casualty and Surety Company
(Surety)

(Name & Title): Andrea Rose Crawford , Attorney-in-Fact

Language conforms to AIA Document A310 Bid Bond
BID70001ZZ0311f

CONFLICT OF INTEREST QUESTIONNAIRE
FORM CIQ

For vendor or other person doing business with local governmental entity

This questionnaire is being filed in accordance with chapter 176 of the Local Government Code by a person doing business with the governmental entity.

By law this questionnaire must be filed with the records administrator of the local government not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. *See* Section 176.006, Local Government Code.

A person commits an offense if the person violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY
Date Received

1 **Name of person doing business with local governmental entity.**

Robert Bibby, Rebcon, Inc.

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.**

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than September 1 of the year for which an activity described in Section 176.006(a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3 **Name each employee or contractor of the local governmental entity who makes recommendations to a local government officer of the governmental entity with respect to expenditures of money AND describe the affiliation or business relationship.**

N/A

4 **Name each local government officer who appoints or employs local government officers of the governmental entity for which this questionnaire is filed AND describe the affiliation or business relationship.**

N/A

FORM CIQ

CONFLICT OF INTEREST QUESTIONNAIRE

Page 2

For vendor or other person doing business with local governmental entity

5 **Name of local government officer with whom filer has affiliation or business relationship. (Complete this section only if the answer to A, B, or C is YES.**

This section, item 5 including subparts A, B, C & D, must be completed for each officer with whom the filer has affiliation or other relationship. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income from the filer of the questionnaire? ☐ Yes ☐ No

B. Is the filer of the questionnaire receiving or likely to receive taxable income from or at the direction of the local government officer named in this section AND the taxable income is not from the local governmental entity? ☐ Yes ☐ No

C. Is the filer of this questionnaire affiliated with a corporation or other business entity that the local government officer serves as an officer or director, or holds an ownership of 10 percent or more? ☐ Yes ☐ No

D. Describe each affiliation or business relationship.

6

Signature of person doing business with the governmental entity

11/19/20
Date

SECTION 2
CONTRACT DOCUMENTS

THE · CITY · OF

COPPELL

TEXAS · 1890

STANDARD FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR
ON THE BASIS OF A STIPULATED PRICE

THIS AGREEMENT is dated as of the _____ day of _____ in the year 2020 by and between the **CITY OF COPPELL, TEXAS**, a municipal corporation (hereinafter called OWNER) and ___REBCON, INC.___ (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK.

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

> This work shall consist of the construction of approximately 4,700 square yards of full-depth pavement for right and left turns lanes, traffic signal improvements, storm sewer inlet relocation, and 1,200 square yards of sidewalk construction at the Denton Tap Road intersections of Southwestern Boulevard, Bethel School Road, Sandy Lake Road, and Parkway Boulevard. Additionally, this work also includes the improvements to vehicle detection systems at various intersections throughout the City (27 intersections).

The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Construction of:
Denton Tap Road Intersection Improvements
PROJECT NO. ST-19-01
Bid No. Q-1121-02

Article 2. ENGINEER.

The Project has been designed by Kimley-Horn and Associates, Inc. Contract administration will be provided by the City of Coppell Engineering Department who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

Article 3. CONTRACT TIME.

3.1. The Work will be completed within **390** calendar days. The Contract time commences to run as provided in Item 103.2 of the General Provisions, and the work shall be completed and ready for final payment in accordance with Item 109.5 of the General Provisions.

3.2. Liquidated Damages. This project is to be completed in the contract time specified. The time of completion is of the essence of this contract. As stated in Item 20 of the Instructions to Bidders a liquidated damages procedure shall be incorporated into the contract based upon the provisions as set forth in Item 20 of the Instructions to Bidders, Section 1 of these contract documents.

Article 4. CONTRACT PRICE.

4.1. OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds subject to additions and deductions by Change Orders as provided in the contract documents in accordance with the unit prices listed in the Proposal and Bid Schedule, Section 1 of these contract documents.

The total contract sum shall be the amount of:	**$**
The total tangible personal property cost included in the contract sum is:	$

Article 5. PAYMENT PROCEDURES.

CONTRACTOR shall submit Applications for Payment in accordance with Item 109.5 of the General Provisions. Applications for Payment will be processed by ENGINEER as provided in the General Provisions.

5.1. Progress Payments. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, each month during construction as provided below. All progress payments will be on the basis of the progress of the Work measured by the schedule of values established in Item 109.5 of the General Provisions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Provisions.

5.1.1. Prior to Completion, progress payments will be made in an amount equal to the percentage indicated in Item 109.5.2 of the General Provisions, but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with Item 109.4 of the General Provisions.

5.2. Final Payment. Upon final completion and acceptance of the Work in accordance with Item 109.5.4 of the General Provisions, OWNER shall pay the

remainder of the Contract Price as recommended by ENGINEER as provided in said Item 109.5.4.

Article 6. INTEREST.

No interest shall ever be due on late payments.

Article 7. CONTRACTOR'S REPRESENTATIONS.

In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

7.1. CONTRACTOR has studied carefully all reports of explorations and tests of subsurface conditions and drawings of physical conditions which are identified in the Supplementary Conditions as provided in Item 102.3 of the General Provisions, and accepts the determination set forth in Item SC-105.1.3 of the Supplementary Conditions of the extent of the technical data contained in such reports and drawings upon which CONTRACTOR is entitled to rely.

7.2. CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports, and studies (in addition to or to supplement those referred to in paragraph 7.1 above) which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise may affect the cost, progress, performance, or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Item 102.3 of the General Provisions; and no additional examinations, investigations, explorations, tests, reports, studies, or similar information or data are or will be required by CONTRACTOR for such purposes.

7.3. CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes all responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies, or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Items 102.3, 103.1 and 104.1 of the General Provisions.

7.4. CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents.

7.5. CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

Article 8. CONTRACT DOCUMENTS.

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

8.1 this Construction Agreement;

8.2 properly authorized change orders;

8.3 any listed and numbered addenda;

8.4 Supplementary Conditions;

8.5 Drawings (Construction Plans) entitled: "Construction of: Denton Tap Road Intersection Improvements PROJECT NO. ST-19-01 Bid No. Q-1121-02.";

8.6 Specifications bearing the title: "Construction Specifications and Contract Documents for the "Construction of: Denton Tap Road Intersection Improvements PROJECT NO. ST-19-01 Bid No. Q-1121-02.";

8.7 Description of Pay Items

8.8 Specific Project Requirements;

8.9 the OWNER's Standard Construction Details;

8.9 the October 2004 Edition of the Public Works Construction Standards - North Central Texas as amended and published by the North Central Texas Council of Governments, as amended by the Owner (collectively, the "NCTCOG Specifications ");

8.10 the OWNER's written notice to proceed to the CONTRACTOR;

8.11 the Contractor's Bid Proposal;

8.12 the Performance, Payment, and Maintenance Bonds; and,

8.13 any other bid materials distributed by the Owner that relate to the Project.

These Contract Documents are incorporated by reference into this Construction Agreement as if set out here in their entirety. The Contract Documents are intended to be complementary; what is called for by one document shall be as binding as if called for by all Contract Documents. It is specifically provided, however, that in the event of any inconsistency in the Contract Documents, an RFI shall be submitted for clarification.

The Contract Documents may only be amended, modified, or supplemented as provided in Items 104.2 and 109.3 of the General Provisions.

Article 9. MISCELLANEOUS.

9.1. Terms used in this Agreement which are defined in Item 101 of the General Provisions will have the meanings indicated in the General Provisions.

9.2. No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.3. OWNER and CONTRACTOR each binds itself, its partners, successors, assignors and legal representatives to the other party hereto, its partners, successors, assignors and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

Article 10. OTHER PROVISIONS.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

This Agreement will be effective on _____, 2020.

OWNER:	**City of Coppell** **255 E. Parkway Boulevard** **Coppell, TX 75019**	CONTRACTOR:	**REBCON, INC.** **1868 W. Northwest Hwy** **Dallas, TX 75220**
BY: _____		BY: _____	
TITLE: _____		TITLE: _____	
ATTEST: _____		ATTEST: _____	
Address for giving notices:		Address for giving notices:	
P.O. Box 9478 Coppell, Texas 75019 Attn: Kent Collins, P.E., CFM Dir. of Public Works		_____ _____	
(If OWNER is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Agreement.)		(If CONTRACTOR is a corporation, attach evidence of authority to sign.)	

Certificate of Insurance

After award of contract, Contractor will provide Owner with a Certificate of Insurance, which will be executed and bound here with final documents.

Please see the Standard Specifications for Public Works Construction – North Central Texas Council of Governments Fourth Edition, Item 103.4 for insurance policies required.

- Contractor's Insurance
  - Worker's Compensation – As set forth in the Workers Compensation Act
  - Commercial General Liability - $1,000,000 Accident/Occurrence
  - Automobiles - $500,000 Combined single limit per occurrence
  - Owner's Protective Liability - $600,000 per occurrence; $1,000,000 aggregate
  - "Umbrella" Liability - $1,000,000 per occurrence with drop down coverage
  - Liability (Public) - $1,000,000 Aggregate; $1,000,000 Products & Completed Operations Aggregate

- Additional insured – The Owner shall be named as an additional insured on the Commercial General Liability (Public), Owner's Protective Liability, and Excess/Umbrella Liability Insurance Policies furnished by the Contractor.

Please see the Standard Specifications for Public Works Construction – North Central Texas Council of Governments Fourth Edition, Item 107.2 for indemnification requirements.

Instructions For Bonds

A. The surety on each bond must be a responsible surety company that is qualified to do business in Texas and satisfactory to the Owner.

B. The name and residence of each individual party to the bond shall be inserted in the body thereof, and each such party shall sign the bond with his usual signature on the line opposite the scroll seal, and if signed in Maine, Massachusetts or New Hampshire, an adhesive seal shall be affixed opposite the signature.

C. If the principals are partners, their individual names will appear in the body of the bond, with the recital that they are partners composing a firm, naming it, and all the members of the firm shall execute the bond as individuals.

D. The signature of a witness shall appear in the appropriate place, attesting the signature of each individual party to the bond.

E. If the principal or surety is a corporation, the name of the State in which incorporated shall be inserted in the appropriate place in the body of the bond, and said instrument shall be executed and attested under the corporate seal, the fact shall be stated, in which case a scroll or adhesive seal shall appear following the corporate name.

F. The official character and authority of the person or persons executing the bond for the principal, if a corporation, shall be certified by the secretary or assistant secretary according to the form attached hereto. In lieu of such certificate, records of the corporation as will show the official character and authority of the officer signing, duly certified by the secretary or assistant secretary, under the corporate seal, to be true copies.

G. The date of this bond must not be prior to the date of the contract in connection with which it is given.

PERFORMANCE BOND

STATE OF TEXAS }
COUNTY OF DALLAS }

KNOW ALL MEN BY THESE PRESENTS: That ___Robert C. Bibby__ whose address is _1868 W. Northwest Hwy., Dallas, TX 75220_, hereinafter called Principal, and____REBCON, INC._____ , a corporation organized and existing under the laws of the State of __TEXAS_____ , and fully licensed to transact business in the State of Texas as Surety, are held and firmly bound unto the CITY OF COPPELL, a municipal corporation organized and existing under the laws of the State of Texas, hereinafter called "Beneficiary", in the penal sum of _____DOLLARS ($_____) in lawful money of the United States, to be paid in Dallas County, Texas, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors jointly and severally, firmly by these presents. This Bond shall automatically be increased by the amount of any Change Order or Supplemental Agreement which increases the Contract price, but in no event shall a Change Order or Supplemental Agreement which reduces the Contract price decrease the penal sum of this Bond.

THE OBLIGATION TO PAY SAME is conditioned as follows: Whereas, the Principal entered into a certain Contract with the City of Coppell, the Beneficiary, dated the _____ of _____ , A.D. 2020, which is made a part hereof by reference, for the construction of certain public improvements that are generally described as follows:

Construction of:
Denton Tap Road Intersection Improvements
PROJECT NO. ST-19-01
Bid No. Q-1121-02

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform and fulfill all of the undertakings, covenants, terms, conditions and agreements of said Contract in accordance with the plans, specifications and Contract documents during the original term thereof and any extension thereof which may be granted by the Beneficiary, with or without notice to the Surety, and during the life of any guaranty or warranty required under this Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived; and, if the Principal shall repair and/or replace all defects due to faulty materials and workmanship that appear within a period of two (2) years from the date of final completion and final acceptance of the Work by Owner; and, if the Principal shall fully indemnify and save harmless the Beneficiary from all costs and damages which Beneficiary may suffer by reason of failure to so perform herein and shall fully reimburse and repay Beneficiary all outlay and expense which the Beneficiary may incur in making good any default or deficiency, then this obligation shall be void; otherwise, it shall remain in full force and effect.

PROVIDED FURTHER, that if any legal action be filed on this Bond, exclusive Venue shall lie in Dallas County, Texas.

AND PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the Work to be performed thereunder or the specifications accompanying the same shall in anyway affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or to the Work or to the Specifications.

This Bond is given pursuant to the provisions of Chapter 2253 of the Texas Government Code, and any other applicable statutes of the State of Texas.

The undersigned and designated agent is hereby designated by the Surety herein as the Resident Agent in Dallas County or Denton County to whom any requisite notices may be delivered and on whom service of process may be had in matters arising out of such suretyship, as provided by Article 7.19-1 of the insurance Code, Vernon's Annotated Civil Statutes of the State of Texas.

IN WITNESS WHEREOF, this instrument is executed in _____ copies, each one of which shall be deemed an original, this the _____ day of _____, 2020.

PRINCIPAL	**SURETY**
_____	_____
By: _____	By:_____
Title: _____	Title:_____
ATTEST:	**ATTEST:**
_____	_____

Resident Agent of the Surety in Dallas or Denton County, Texas, for delivery of notice and service of the process is:
NAME:

_____
ADDRESS:

_____
NOTE: Date of Performance Bond must be date of Contract.. If Resident Agent is not corporation, give person's name.

PAYMENT BOND

STATE OF TEXAS }

COUNTY OF DALLAS }

KNOW ALL MEN BY THESE PRESENTS: That ____Robert C. Bibby_____ whose address is _1868 W. Northwest Hwy., Dallas, TX 75220_ , hereinafter called Principal, and ____REBCON, INC.___ , a corporation organized and existing under the laws of the State of __TEXAS_____ , and fully licensed to transact business in the State of Texas as Surety, are held and firmly bound unto the CITY OF COPPELL, a municipal corporation organized and existing under the laws of the State of Texas, hereinafter called "Beneficiary", in the penal sum of _____DOLLARS ($_____) in lawful money of the United States, to be paid in Dallas County, Texas, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors jointly and severally, firmly by these presents. This Bond shall automatically be increased by the amount of any Change Order or Supplemental Agreement which increases the Contract price, but in no event shall a Change Order or Supplemental Agreement which reduces the Contract price decrease the penal sum of this Bond.

THE OBLIGATION TO PAY SAME is conditioned as follows: Whereas, the Principal entered into a certain Contract with the City of Coppell, dated the _____ of _____ , A.D. 2020, which is made a part hereof by reference, for the construction of certain public improvements that are generally described as follows:

Construction of:
Denton Tap Road Intersection Improvements
PROJECT NO. ST-19-01
Bid No. Q-1121-02

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties and make prompt payment to all persons, firms, subcontractors, corporations and claimants supplying labor and/or material in the prosecution of the Work provided for in said Contract and any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modification to the Surety is hereby expressly waived, then this obligation shall be void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, that if any legal action be filed on this Bond, exclusive Venue shall lie in Dallas County, Texas.

AND PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the Work to be performed thereunder or the Plans, Specifications, Drawings, etc., accompanying the same, shall in anyway affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or to the Work to be performed thereunder.

This Bond is given pursuant to the provisions of Chapter 2253 of the Texas Government Code, and any other applicable statutes of the State of Texas.

The undersigned and designated agent is hereby designated by the Surety herein as the Resident Agent in Dallas County or Denton County to whom any requisite notices may be delivered and on whom service of process may be had in matters arising out of such suretyship, as provided by Article 7.19-1 of the insurance Code, Vernon's Annotated Civil Statutes of the State of Texas.

IN WITNESS WHEREOF, this instrument is executed in _____ copies, each one of which shall be deemed an original, this the _____ day of _____, 2020.

PRINCIPAL	**SURETY**
_____	_____
By: _____	By:_____
Title: _____	Title: _____
ATTEST:	**ATTEST:**
_____	_____

The Resident Agent of the Surety in Dallas or Denton County, Texas, for delivery of notice and service of the process is:

NAME:

_____

ADDRESS:

_____

NOTE: Date of Performance Bond must be date of Contract. If Resident Agent is not a corporation, give a person's name.

MAINTENANCE BOND

STATE OF TEXAS }

COUNTY OF DALLAS }

KNOW ALL MEN BY THESE PRESENTS: THAT Robert C. Bibby as Principal, and REBCON, INC., a corporation organized under the laws of TEXAS, as sureties, do hereby expressly acknowledge themselves to be held and bound to pay unto the City of Coppell, a Municipal Corporation, Texas, the sum of _____ Dollars and _____ Cents ($_____), for the payment of which sum will and truly be made unto said City of Coppell, and its successors, said principal and sureties do hereby bind themselves, their assigns and successors jointly and severally.

THIS obligation is conditioned; however, that whereas, the said REBCON, INC. has this day entered into a written contract with the said City of Coppell to build and construct **Denton Tap Road Intersection Improvements (Project No. ST-19-01), Bid No. Q-1121-02**, which contract and the plans and specifications therein mentioned, adopted by the _____ are hereby expressly made a part thereof as through the same were written and embodied herein.

WHEREAS, under the plans, specifications, and contract, it is provided that the Contractor will maintain and keep in good repair, the work herein contracted to be done and performed, for a period of two (2) years from the date of the acceptance of said work, and to do all necessary repairs and/or reconstruction in whole or in part of said improvements that should be occasioned by settlement of foundation, defective workmanship or materials furnished in the construction or any part thereof or any of the accessories thereto constructed by the Contractor. It being understood that the purpose of this section is to cover all defective conditions arising by reason of defective material and charge the same against the said Contractor, and sureties on this obligation, and the said Contractor and sureties hereon shall be subject to the liquidation damages mentioned in said contract for each day's failure on its' part to comply with the terms of said provisions of said contract. Now, therefore, if the said Contractor shall keep and perform its' said agreement to maintain said work and keep the same in repair for the said maintenance period of two (2) years, as provided, then these presents shall be null and void, and have no further effect, but if default shall be made by the said Contractor in the performance of its' contract to so maintain and repair said work, then these presents shall have full force and effect, and said _____ shall have and receive from the said Contractor and its' principal and sureties damages in the premises, as provided; and it is further agreed that this obligation shall be a continuing one against the principal and sureties, hereon, and that successive recoveries may be and had hereon for successive branches until the full amount shall have been exhausted; and it is further understood that the obligation herein to maintain said work shall continue throughout said maintenance period, and the same shall not be changed, diminished or in any manner affected from any cause during said time.

IN WITNESS WHEREOF, the said _____ has caused these presents to be executed by _____and the said _____ has caused these presents to be executed by its Attorney in fact and the said Attorney in fact _____ , has hereunto set his hand, the _____ day of _____, 2020.

PRINCIPAL	**SURETY**
_____	_____
By: _____	By:_____
Title: _____	Title:_____
WITNESS:	**ATTEST:**
_____	_____

NOTE: Date of Maintenance Bond must not be prior to date of Contract.

SECTION 3
STANDARD SPECIFICATIONS SUPPLEMENTARY CONDITIONS

THE · CITY · OF

COPPELL

TEXAS · 1890

CITY OF COPPELL
SUPPLEMENTARY CONDITIONS
TO THE
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
GENERAL PROVISIONS

THESE SUPPLEMENTARY CONDITIONS AMEND THE STANDARD SPECIFICATIONS FOR THE PUBLIC WORKS CONSTRUCTION – NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS, FOURTH EDITION AS INDICATED BELOW. ALL PROVISIONS WHICH ARE NOT AMENDED OR SUPPLEMENTED REMAIN IN FULL FORCE AND EFFECT. ALL PROVISIONS AMENDED REMAIN IN FULL FORCE AND EFFECT AS AMENDED.

DIVISION 100: GENERAL PROVISIONS

ITEM 101. – DEFINITIONS & ABBREVIATIONS

SC-101.1

Engineer: The word "Engineer" or “ENGINEER” in these contract documents and specifications shall be understood as referring to CITY ENGINEER, City of Coppell, P.O. Box 9478, Coppell, TX 75019, Engineer of the Owner, or such other representatives as may be authorized by said Owner to act in any particular position.

Owner: The word "Owner" or “OWNER” in these contract documents and specifications refers to the CITY OF COPPELL acting through its authorized representatives.

Consulting Engineer: Wherever the word “Consulting Engineer” or "Design Engineer" is used in the Specifications and Contract Documents, it shall be understood as referring to the Design Engineer or his authorized representative, Kimley-Horn and Associates, Inc 2201 West Royal Lane, Suite 275, Irving, Texas 75063.

Working Day: Add the following sentence to the end of the “Working Day” definition: “Hours worked before 8:00 a.m. or after 5:00 p.m., all weekends and holidays are subject to overtime. Overtime request or scheduled testing must be made in writing and approved by the City of Coppell. Seventy-two hours advance-notice is required. All overtime incurred by the City for inspection services and any overtime incurred by the testing laboratory shall be paid by the CONTRACTOR. If not paid, such cost may be deducted from partial payments.”

All other terms used in these Supplementary Conditions which are defined in the General Provisions shall have the same meanings used in the General Provisions.

ITEM 103.3 – SURETY BONDS

SC-103.3.1

Add following sentence to Item 103.3.1:

"Maintenance Bond shall be required in the amount of 50% of the cost of the public improvements for a 2 year period."

ITEM 103.4 - INSURANCE

SC-103.4.6

Add the following new item:

"103.4.6 If OWNER requests in writing that other special insurance be included in the property insurance policy, CONTRACTOR shall, if possible, include such insurance, and the cost thereof will be charged to OWNER by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the site, CONTRACTOR shall in writing advise OWNER whether or not such other insurance has been procured by CONTRACTOR."

SC-103.4.7

Add the following new item:

"103.4.7 CONTRACTOR intends that any policies provided in response to Item 103.4 shall protect all of the parties' insured and provide coverage for all losses and damages caused by the perils covered thereby. Accordingly, all such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insured or additional insured, and if such waiver forms are required of any Subcontractor, CONTRACTOR will obtain the same."

SC-103.4.7.1

Add the following new item:

"103.4.7.1 Kimley-Horn and Associates, Inc. shall be included as an "Additional Insured" on all project liability insurance."

ITEM 103.6 - NOTICE TO PROCEED AND COMMENCEMENT OF WORK

SC-103.6

Add following sentence to end of Item 103.6.

“Before CONTRACTOR starts the Work at the site, a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to discuss the schedules referred to in Items 105.3, 108.1 and 109.5.1, to discuss procedures for handling Shop Drawings and other submittals and for processing Applications for Payment, and to establish a working understanding among the parties as to the Work.”

ITEM 104.2 - CHANGE OR MODIFICATION OF CONTRACT

SC-104.2.1

Amend the last sentence in Paragraph two of Item 104.2.1 to delete the following phrase: "except as provided below."

Add the following sentence to the end of paragraph two in Item 104.2.1:

"The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:”

ITEM 105.1 – CONTRACT DOCUMENTS

SC-105.1.1

Add the following language at the end of the Item 105.1.1: "If there is any conflict between the provisions of the Contract Documents and any such referenced standard specifications, manuals or codes, the provisions of the Contract Documents shall take precedence over that of any standard specifications, manuals or codes."

ITEM 105.2 - WORKMANSHIP, WARRANTIES AND GUARANTEES

SC-105.2.2

Amend the first sentence of Item 105.2.2 to change the words "one year" to "two years".

ITEM 105.4 – CONSTRUCTION STAKES

SC-105.4

Delete the first paragraph of Item 105.4 in its entirety and insert the following in lieu thereof:

"Construction stakes/surveying shall be provided by the CONTRACTOR. Monumentation has been provided for establishing vertical and horizontal control. The CONTRACTOR shall be responsible for establishing all lines and grades, and the precise location of all proposed facilities. The ENGINEER may make checks as the Work progresses to verify lines and grades established by the CONTRACTOR to determine the conformance of the completed Work as it progresses with the requirements of the construction documents. Such checking by the ENGINEER shall not relieve the CONTRACTOR of his responsibility to perform all Work in connection with Contract Drawings and Specifications and to the lines and grades given therein."

ITEM 107.3 - OWNER'S OFFICERS, EMPLOYEES OR AGENTS

SC-107.3.2

Replace Item 107.3.2 with the following new paragraph:

"107.3.2 Conflict of Interest

City Charter states that no officer of the City shall have a financial interest, direct or indirect, in any contract with the City, nor shall be financially interested, directly or indirectly, in the sale to the City of any land, or rights or interest in any land, materials, supplies or services. This prohibition does not apply when the interest is represented by ownership of stock in a corporation involved, provided such stock ownership amounts to less than one percent (1%) of the corporation stock. Any violation of this prohibition will constitute malfeasance in office. Any officer or employee of the City found guilty thereof should thereby forfeit his office or position. Any violation of this prohibition with the knowledge, expressed or implied, of the persons or corporations contracting with the City shall render the contract voidable by the City Manager or the City Council. The CONTRACTOR represents that no employee or officer of the City has an interest in the CONTRACTOR."

ITEM 107.14 - STATE AND LOCAL SALES AND USE TAXES

SC-107.14

Delete the language in Item 107.14 in its entirety and substitute the following in lieu thereof:

"Recent legislation has removed the sales tax exemption previously provided by Section 151.311 of the Tax Code covering tangible personal property purchased by a contractor for use in the performance of a contract for the improvement of City-owned realty.

It is still possible, however, for a contractor to make tax-free purchase of tangible personal property, which will be incorporated into and become part of a City construction project through the use of a "separated contract" with the City. A "separated contract" is one, which

separates charges for materials from charges for labor. Under such a contract, the contractor becomes a "seller" of those materials, which are incorporated into the project, such as bricks, lumber, concrete, paint, etc. The contractor issues a resale certificate in lieu of paying the sales tax at the time such items are purchased. The contractor then receives an exemption certificate from the city for those materials. (This procedure may not be used, however, for materials, which do not become a part of the finished product. For example, equipment rentals, form materials, etc. are not considered as becoming "incorporated" into the project).

Utilization of this "separated contract" approach eliminates the need for bidders to figure in sales tax for materials, which are to be incorporated into the project. The successful bidder's bid form will be used to develop the "separated contract" and will determine the extent of the tax exemption. Upon execution of the construction contract, the CONTRACTOR shall furnish a breakdown (per item) of:

1) materials incorporated into the project; and
2) labor, equipment, supervision and materials not incorporated into the project."

ITEM 107.19 - PROTECTION OF WORK AND OF PERSONS AND PROPERTY

SC-107.19.2.1

Add the following new Item 107.19.2.1 immediately after Item 107.19.2:

"107.19.2.1 Should CONTRACTOR cause damage to the work or property of any separate contractor at the site, or should any claim arise out of CONTRACTOR's, OWNER's, ENGINEER's, Consulting Engineer's or any other person's actions, CONTRACTOR shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold OWNER, ENGINEER and Consulting Engineer harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate contractor against OWNER, ENGINEER or Consulting Engineer to the extent based on a claim arising out of CONTRACTOR'S performance of the Work. Should a separate contractor cause damage to the work or property of CONTRACTOR or should the performance of work by any separate contractor at the site give rise to any other claim, CONTRACTOR shall not institute any action, legal or equitable, against OWNER, ENGINEER or Consulting Engineer or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from OWNER, ENGINEER or Consulting Engineer on account of any such damage or claim. If CONTRACTOR is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor and OWNER and CONTRACTOR are unable to agree as to the

extent of any adjustment in Contract Time attributable thereto, CONTRACTOR may make a claim for an extension of time in accordance with Item 108.8. An extension of the Contract Time shall be CONTRACTOR's exclusive remedy with respect to OWNER, ENGINEER and Consulting Engineer for any delay, disruption, interference or hindrance caused by any separate contractor."

ITEM 107.23 – EXISTING STRUCTURES, FACILITIES AND APPURTENANCES

SC-107.23.2.1

Add the following new Item 107.23.2.1 immediately after Item 107.23.2:

"107.23.2.1 Existing Utilities and Sewer Lines: The CONTRACTOR shall be responsible for the protection of all existing utilities or service lines crossed or exposed by the construction operations. Where existing utilities or service lines are cut, broken or damaged, the CONTRACTOR shall replace the utilities or service lines with the same type of original construction, or better, at his own cost and expense. This includes any and all irrigation systems, whether or not they are identified on the plans.

If it is necessary to change or move the property of any owner or of a public utility, such property shall not be moved or interfered with until authorized by the ENGINEER. The right is reserved to the owner of any public utility to enter upon the limits of the project for the purpose of making such changes or repairs of their property that may be made necessary by the performance of this contract."

ITEM 108.1 – PROGRESS SCHEDULE

SC-108.1

Amend the first sentence of Item 108.1 by adding the following sentence: "Refer to Specific Project Requirements for additional schedule requirements."

ITEM 108.3 - OTHER CONTRACTORS; OBLIGATION TO COOPERATE

SC-108.3

Delete the last sentence of the second paragraph of Item 108.3 and substitute the following in lieu thereof:

"In such event, CONTRACTOR shall be entitled to an extension of working time only for unavoidable delays verified by the ENGINEER, as provided in Item 108.8; however, no increase in the contract price shall be due the CONTRACTOR."

Insert the following sentence at the end of the second paragraph of Item 108.3:

"The ENGINEER shall coordinate such other work with the CONTRACTOR and schedule events to minimize delay caused to the CONTRACTOR. No additional time shall be given to the CONTRACTOR of such related work except as provided in Item 108.8."

ITEM 108.8 - DELAYS; EXTENSION OF TIME; LIQUIDATED DAMAGES

SC-108.8

Add the following at the end of the last paragraph in Item 108.8: "No extension of the contract time shall be allowed unless the CONTRACTOR can demonstrate the delay caused an adverse impact to the critical path and that loss of time can not be made up by revising the sequence of the work of the project."

DIVISION 200: SITE PROTECTION AND PREPARATION

ITEM 203 – SITE PREPARATION:

203.3.2 Add the following sentence after the second sentence: “The method of protection shall be 2 inch by 4 inch wood railing unless otherwise shown on the Plans or directed by the ENGINEER.”

ITEM 203.7 - EMBANKMENT:

203.7.3. Strike the first sentence and replace with the following: "Earth embedment and select material shall be compacted to between 95 percent and 100 percent of Standard Proctor Density as determined by ASTM D-698 at, or up to five (5) percentage points above optimum moisture content, using mechanical compaction methods, unless otherwise specified in the Plans or Specifications."

DIVISION 300: ROADWAY CONSTRUCTION

ITEM 303. – PORTLAND CEMENT CONCRETE PAVEMENT:

303.2.4 Mineral Admixtures. Delete paragraph 303.2.4 in its entirety. The use of Fly Ash as an admixture in any Class of concrete is specifically prohibited without written approval of the ENGINEER.

ITEM 303.5 - CONSTRUCTION METHODS:

Under Item 303.5.4 Joints:

Replace Item 303.5.4.2 – Expansion Joints, with the following:

"Expansion joints shall be installed perpendicularly to the surface and centerline of the pavement. Expansion Joint material shall be redwood boards, 3/4-inch in width, and extended through curbs. Expansion joints are to be installed at each end of radius at street intersections. Expansion joints shall be equally spaced between intersections with not less than one every 200 linear feet of pavement, unless otherwise specified on the Plans or directed by the ENGINEER.

Add the following to the end of the sentence in Item 303.5.4.2.3 Proximity to Existing Structures:

"or as directed by the ENGINEER".

Delete the first sentence of the first paragraph of Item 303.5.4.3 Contraction Joints, and insert the following:

"Contraction or dummy joints shall be sawed to T/4 inches in depth, and 1/4 inch in width, and installed every 20 linear feet of pavement, and extend through curb, unless otherwise directed by the ENGINEER."

Under Item 303.5.6 Finishing:

Add the following paragraph at the end of Item 303.5.6.1 Machine:

"Fog sprays powered by pressure pumps, and capable of covering the entire area of freshly placed concrete with a fine mist, shall be used if water is needed for finishing operations."

Add a new paragraph after the first paragraph of Item 303.5.6.2 Hand, which reads as follows:

"Fog sprays powered by pressure pumps, and capable of covering the entire area of freshly placed concrete with a fine mist, shall be used if water is needed for finishing operations."

DIVISION 500: UNDERGROUND CONSTRUCTION AND APPURTENANCES

ITEM 504. – <u>OPEN CUT - BACKFILL</u>:

Under Item 504.2.3.3 Type “B” Backfill:

Insert the following paragraph after the first sentence of Item 504.2.3.3.3 Additional Requirements:

“Additional Requirements for Type "B" backfill when used in streets - All trench backfill shall be compacted to between 95 percent and 100 percent of Standard Proctor Density as determined by ASTM D-698 at, or up to five (5) percentage points above, optimum moisture content, using mechanical compaction

methods unless otherwise specified in the Plans. Water jetting may be used only with specific written permission of the ENGINEER."

ITEM 504.5 - EMBEDMENT:

Under Item 504.5.3.2 Compaction:

Amend the second sentence of Item 504.5.3.2.1 Densities - Areas Not Subjected to or Influenced by Vehicular Traffic, by striking the words: "to a density comparable with adjacent undisturbed material" and replacing with "to a density between 95 percent and 100 percent Standard Proctor Density as determined by ASTM D-698 at, or up to five (5) percentage points above, optimum moisture content, unless otherwise specified in the Plans or directed by the ENGINEER."

SECTION 4
SPECIFIC PROJECT REQUIREMENTS

THE · CITY · OF

COPPELL

TEXAS · 1890

SPECIFIC PROJECT REQUIREMENTS

The construction specifications, which apply to this project are the Standard Specifications for Public Works Construction - North Central Texas Council of Governments Fourth Edition. The following Specific Project Requirements contain general and specific project requirements applicable to this project in the City of Coppell. These individual specifications control for this project. Additional amendments to the NCTCOG Standard Specifications are contained in Section 3 - Supplementary Conditions to the Standard Specifications for Construction. In the event that an item is not covered in the Project Drawings (Construction Plans) and these Specifications, then the Standard Specifications for the City of Coppell, Texas shall apply.

In addition, reference to the following shall be considered as referring to the specifications or Method of Test as set forth by these organizations and shall be considered as part of the Specifications when referenced.

A.S.A.	American Standards Association
A.S.T.M.	American Society of Testing Materials
A.A.S.H.T.O.	American Association of State Highway & Transportation Officials
A.C.I.	American Concrete Institute
A.W.S.	American Welding Society
A.W.W.A.	American Water Works Association
S.S.P.C.	Steel Structures Painting Council, Federal Specifications Treasury Department
U.L.	Underwriters Laboratories
N.E.M.A.	National Electrical Manufacturers Association
W.P.C.F.	Water Pollution Control Federation
TX.DOT	Texas Department of Transportation
C.D.G.S.	City of Dallas General Specifications
S.S.P.W.C.N.C.T.	Standard Specifications for Public Works Construction North Central Texas
T.M.U.T.C.D.	Texas Manual on Uniform Traffic Control Devices

1.1 OWNER: The "OWNER" or “City” as referred to in these Specifications is the City of Coppell, 255 Parkway Boulevard, P.O. Box 9478, Coppell, Texas 75019.

1.2 ENGINEER: The "Engineer" as referred to in these Specifications is the City Engineer, City of Coppell, Engineer of the Owner, or such other representatives as may be authorized by said Owner to act in any particular position.

1.3 CONSULTING ENGINEER: Wherever the word “Consulting Engineer” or "Design Engineer" is used in the Specifications and Contract Documents, it shall be understood as referring to the Design Engineer or his authorized representative, Kimley-Horn and Associates, Inc.

1.4 STANDARD CONSTRUCTION SPECIFICATIONS FOR THE CITY OF COPPELL: All improvements described in this Proposal and Construction Drawings shall be performed in accordance with the Project Drawings and Specifications. In the event that an item is not covered in the Project Drawings and Specifications, then the City of Coppell Standard Construction Details (Ord.#2006-1129), and Appendix ‘C’ Design Criteria and Standards in the City of Coppell Subdivision Ordinance (Ord.#94-643) shall apply.

1.5 SITE: The CONTRACTOR shall limit his work to the area shown on the Project Drawings as within the street right-of-way. Entrance onto private property shall be at the expressed approval of the ENGINEER, only.

PROJECT DESCRIPTION: This work shall consist of the construction of approximately 4,700 square yards of full-depth pavement for right and left turns lanes, traffic signal improvements, storm sewer inlet relocation, and 1,200 square yards of sidewalk construction at the Denton Tap Road intersections of Southwestern Boulevard, Bethel School Road, Sandy Lake Road, and Parkway Boulevard. Additionally, this work also includes the improvements to vehicle detection systems at various intersections throughout the City (27 intersections).

1.6 EXPLANATION OF CONTRACT TIME:

The term “Original Contract Time” as used herein will mean the number of calendar days established in Item 18 of the Instructions to Bidders (Section 1) in the Contract Documents on the date the Contract was executed. The term “calendar day” as used in this Article will mean every day shown on the calendar. Calendar days will be consecutively counted from commencement of Contract Time regardless of weather, weekends, holidays, suspensions of CONTRACTOR’s operations, delays or other events as described herein. For purposes of the calculation and the determination of the liquidated damages, the Original Contract Time will not be adjusted for any reason, cause or circumstance whatsoever, regardless of fault, save and except in the instance of a catastrophic event (i.e., war, invasion, riot, declared state of emergency, national strike, or other situations as declared by the OWNER). The parties anticipate that delays may be caused by or arise from any number of events during the course of the Contract, including, but not limited to,

work performed, disruptions, permitting issues, actions of suppliers, subcontractors or other contractors, actions by third parties, weather, weekends, holidays, or other such events, forces or factors sometimes experienced in roadway construction work. Such delays or events and their potential impacts on performance by the CONTRACTOR are specifically contemplated and acknowledged by the parties in entering into this Contract. Further, any and all costs or impacts whatsoever incurred by the CONTRACTOR in accelerating the CONTRACTOR's work to overcome or absorb such delays or events in an effort to complete the Contract prior to expiration of the Original Contract Time, regardless of whether the CONTRACTOR successfully does so or not, shall be the sole responsibility of the CONTRACTOR in every instance. In the event the project is altered by work deleted, change orders, supplemental agreements, utility conflicts, design changes or defects, extra work, right of way issues, or other situations which are not the fault of or a direct result of CONTRACTOR negligence which may impact the critical path of the project construction schedule, the OWNER may choose to negotiate the extension or reduction of the Original Contract Time with the CONTRACTOR.

In the event of a catastrophic event (i.e., war, invasion, riot, declared state of emergency, national strike, or other situations as declared by the OWNER) directly and substantially affecting the CONTRACTOR's operations on the Contract, the CONTRACTOR and the OWNER shall agree as to the number of calendar days to extend the Original Contract Time, so that such extended Original Contract Time will be used in the calculation of any liquidated damages payment. In the event the CONTRACTOR and OWNER are unable to agree to the number of calendar days to extend the Original Contract Time, the OWNER shall unilaterally determine the number of calendar days to extend the Original contract Time reasonably and necessary and due solely to such catastrophic event and the CONTRACTOR shall have no right whatsoever to contest such determination, save and except that the CONTRACTOR establishes that the number of calendar days determined by the OWNER were arbitrary or without any reasonable basis.

Should the CONTRACTOR fail to complete the Contract on or before the expiration of the Original Contract Time, as adjusted in accordance with the provisions above, the OWNER shall deduct from the monies due the CONTRACTOR the Daily Value specified in the Contract Documents for each calendar day completion exceeds the Original Contract Time. This deduction shall be the liquidated damages for the CONTRACTOR's failing to timely complete the Contract. **This shall be strictly enforced.**

Any reference to "Substantially Complete" shall be interpreted to be complete with the Contract with no work remaining on the project.

1.7 PROJECT SCHEDULE:

Within ten days of the date of the Notice of Award, CONTRACTOR shall submit to the City a detailed Project Schedule. An updated Project Schedule shall be submitted to the City monthly with each payment application including milestone

updates. Payment shall not be made until an updated schedule is received. A monthly progress meeting shall be held with the City Project Manager.

The schedule shall meet the following minimum requirements:

1. The project schedule shall be prepared using Microsoft Project, Primavera P6 or other as approved by the OWNER. Electronic files in the scheduling software native format and PDF copies shall be included with all schedule submittals.
2. The Original Project Schedule submitted prior to construction and approved by the OWNER shall become the basis for measuring progress and evaluating whether the project is on schedule (Baseline schedule for the project). Once approved by the OWNER, the Original Project Schedule shall not be changed.
3. There shall be at a minimum one schedule Activity for each bid item in the proposal. Many bid items will need to consist of multiple Activities.
4. The length of this project is such that many Activities or Sets of activities will be repeated for various stages of construction and segments of the roadway. Any repeated Activity must clearly identify the location and/or stage of construction.
5. The schedule must be based on clearly defined Activities, phases of construction and any project milestones. Schedule limits must be easily field verified.
6. All Activities must have Predecessor and Successor activities (except start and finish milestones). Independent or open-ended activities shall not be included.
7. The schedule must clearly identify relationship between Predecessor and Successor activities as “start-to-start”, “start-to-finish”, or “finish-to-finish”.
8. Negative lag times shall not be permitted.
9. Activities with a duration of ten days or greater shall be broken into sub-activities. (For example, if the activity for “Install Water Line A” has a duration of 11 days, is should be divided into sub-activities such as “Install Water Line A, Sta 0+00 to 15+00”, etc.)
10. Monthly schedule updates shall include actual start and completion dates for completed and ongoing Activities. Original Project Schedule dates must be shown for tracking purposes.
11. For activities behind schedule, a Recovery Plan must be submitted detailing how project will be brought back within schedule. This may include such measures as adding work crews, leasing additional equipment, or engaging subcontractors. Fragnets or copies of the revised schedule reflecting proposed changes shall be used to document proposed plan revisions and their schedule impacts. Any additional costs resulting from Recovery Plan measures shall be at the contractor’s sole expense.
12. Activity durations reflected in the original schedule cannot be reduced without a Recovery Plan description reflecting what additional resources or actions will implemented justifying the schedule change.

1.8 SAFETY PRECAUTIONS: The CONTRACTOR shall comply with all applicable laws including the Occupational Safety and Health Act of 1970, ordinances, rules, regulations and order of any public authority have jurisdiction for the safety of persons or property to protect them from damage, injury or loss. He shall erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

1.9 SOIL INVESTIGATION: A geotechnical investigation report has not been prepared for this project. The CONTRACTOR shall also visit the site and acquaint himself with the site conditions.

1.10 SURVEY AND FINISHED GRADES: Horizontal and vertical control is provided by the OWNER as shown on the plans. The CONTRACTOR shall be responsible for layout and staking of all grades and lines for construction utilizing qualified survey personnel. The CONTRACTOR shall preserve all stakes or markings until authorized by the ENGINEER to remove same. The CONTRACTOR shall bear the cost of the re-establishing any control or construction stakes destroyed by either him or a third party and shall assume the entire expense of rectifying work improperly constructed due to failure to maintain established points and marks.

No separate payment shall be made to the CONTRACTOR for construction staking which shall be considered incidental to the project and payments made under specific Pay Items shall be considered as full compensation for these requirements.

1.11 CONFORMITY WITH DRAWINGS: All work shall conform to the lines, grades, cross-sections, and dimensions shown on the Drawings. Any deviation from the Drawings which may be required by the exigencies of construction will be determined by the ENGINEER and authorized by him in writing.

1.12 TESTING LABORATORY SERVICE: The OWNER shall make arrangements with an independent laboratory acceptable for testing as required by the construction plans and standard specifications. The CONTRACTOR shall bear all related costs of retests, or re-inspections. The CONTRACTOR shall notify the ENGINEER in a timely manner of when and where tests or inspections are to be made so that they may be present. One copy shall be provided to the CONTRACTOR of all reports and laboratory test results. Testing by the OWNER does not alleviate the CONTRACTOR's responsibility for his own quality assurance/quality control testing. CONTRACTOR shall replace any deficient construction items.

1.13 SUSPENSION OF WORK: If the work should be stopped or suspended under any order of the court, or other public authority, the OWNER may at any time during suspension upon seven days written notice to the CONTRACTOR, terminate the

Contract. In such an event, the OWNER shall be liable only for payment for all work completed plus a reasonable cost for any expenses resulting from the termination of the Contract, but such expenses shall not exceed $5,000.

1.14 PRESERVATION OF TREES: Except where noted on the plans, permission of the ENGINEER must be obtained for removal of trees that obstruct the installation of the improvements as outlined for this project in these Contract Documents. The penalty for the removal or destruction of a tree without obtaining written permission from the ENGINEER shall be $500.00 per caliper inch payable to the OWNER. If damage is occurring or is likely to continue, tree guards shall be erected when so directed by the ENGINEER at the CONTRACTOR's expense.

1.15 COOPERATION OF CONTRACTOR: The CONTRACTOR shall have on the project at all times, as his agent, a competent Superintendent capable of reading the plans and specifications and thoroughly experienced in the type of work being performed. The Superintendent shall have full authority to execute orders or directions and to promptly supply such materials, equipment, tools, labor and incidentals as may be required. Such superintendence shall be furnished irrespective of the amount of work contracted.

The Superintendent and the CONTRACTOR shall be responsible for supervision of all work performed by the subcontractor at all times during construction.

1.16 WARNING DEVICES: The CONTRACTOR shall have the responsibility to provide and maintain all warning devices and take all precautionary measures required by law to protect persons and property while said persons or property are approaching, leaving or within the work site or any area adjacent to said work site. Compensation will be paid to the CONTRACTOR for the installation or maintenance of any warning devices, barricades, lights, signs or any other precautionary measures required by law for the protection of persons or property under pay item to “Furnish, Install and Maintain Traffic Control Devices”.

The CONTRACTOR shall assume all duties owned by the City of Coppell to the general public in connection with the general public's immediate approach to and travel through the work site and area adjacent to said work site.

Where the work is carried on, in, or adjacent to, any street, alley, sidewalk, public right-of-way or public place, the CONTRACTOR shall at his own cost and expense provide such flagmen and watchmen and furnish, erect and maintain such warning devices, barricades, lights, signs and other precautionary measures for the protection of persons or property as are required by law. The CONTRACTOR shall submit a traffic control plan to be reviewed by the City prior to the beginning of work. In preparing the traffic control plan, the CONTRACTOR shall take into account that the project will be constructed in multiple phases. The CONTRACTOR shall be responsible for placing notices on private residences prior to the beginning of each phase that shows revised traffic patterns. No lane shall be

barricaded before 9:00 a.m. or after 4:00 p.m without prior approval from Owner. The CONTRACTOR's responsibility for providing and maintaining flagmen, watchmen, warning devices, barricades, signs, and lights, and other precautionary measures shall not cease until the project shall have been fully and finally accepted by the OWNER.

If the ENGINEER discovers that the CONTRACTOR has failed to comply with the applicable federal and state law (by failing to furnish the necessary flagmen, warning devices, barricades, lights, signs or other precautionary measures for the protection of persons or property), the ENGINEER may order such additional precautionary measures as required by law to be taken to protect persons and property, and to be reimbursed by the CONTRACTOR for any expense incurred in ordering such additional precautionary measures.

In addition, the CONTRACTOR will be held responsible for all damages to the work and other public or private property due to the failure of warning devices, barricades, signs, lights, or other precautionary measures in protecting said property, and whenever evidence is found of such damage, the ENGINEER may order the damaged portion immediately removed and replaced by and at the cost and expense of the CONTRACTOR. If the damages are not corrected in a timely fashion, then the City shall have the right to repair the damage and charge the cost back to the CONTRACTOR. All of this work is considered incidental to pay item entitled, “Furnish, Install and Maintain Traffic Control Devices”.

1.17 EXISTING UTILITIES, STRUCTURES AND OTHER PROPERTY:

In regards to existing utilities, structures and other property within, crossing or adjacent to the site, the CONTRACTOR understands and accepts the following conditions:

a. Prior to any excavation, the CONTRACTOR shall determine the exact locations of all existing water, gas sewer, electric, telephone, telegraph, television, and other underground utilities and structures by potholing and marking. This includes the water and sanitary sewer services.

b. After commencing the work, the CONTRACTOR will use every precaution to avoid interferences with existing underground and surface utilities and structures, and protect them from damage.

c. Where the locations of existing underground and surface utilities and structures are indicated, these locations are generally approximate, and all items that may be encountered during the work are not necessarily indicated. The CONTRACTOR shall determine the exact locations of all items indicated, and the existence and locations of all items not indicated.

d. The CONTRACTOR shall repair or pay for all damage caused by his operations to all existing utilities, public property, and private property,

whether it is below ground or above ground, and he shall bear sole responsibility to settle the total cost of all damage suits which may arise as a result of this operations.

e. To avoid unnecessary interferences or delays, the CONTRACTOR shall coordinate all utility removals, replacements, relocations, and construction directly with the appropriate utility company.

1.18 DRAINAGE: The CONTRACTOR shall maintain adequate drainage along the project and provide for positive drainage from adjoining properties, at all times.

1.19 PROJECT MAINTENANCE: The CONTRACTOR shall maintain, and keep in good repair, the improvements covered by these plans and specifications during the life of the contract.

1.20 CLEANUP:

During Construction. The CONTRACTOR shall at all times keep the job site as free from all material, debris and rubbish as is practicable and shall remove same from any portion of the job site when it becomes objectionable or interferes with the progress of the project, and/or when requested to do so by the OWNER.

Final. Upon completion of the work, the CONTRACTOR shall remove from the site all plant, materials, tools and equipment belonging to him and leave the site with an appearance acceptable to the ENGINEER and the OWNER. The CONTRACTOR shall thoroughly clean all equipment and materials installed by him and shall deliver over such materials and equipment in a bright, clean, polished and new-appearing condition.

1.21 INSPECTION: The word "Inspection" or other forms of the word, as used in the contract documents for this project shall be understood as meaning an OWNER's agent will observe the construction on behalf of the OWNER. The agent will observe and check the construction in sufficient detail to satisfy himself that the work is proceeding in general accordance with the contract documents, but he will not be a guarantor of the CONTRACTOR's performance.

1.22 DISPOSAL OF WASTE AND SURPLUS EXCAVATION: All trees, stumps, slashings, brush or other debris removed from the site as a preliminary to the construction of the various improvements shall be removed from the property by the CONTRACTOR. Any required burning and/or disposal permits shall be the sole responsibility of the CONTRACTOR.

All excavated materials in excess of that required for backfilling shall be removed from the job site and disposed of in a satisfactory manner by the CONTRACTOR.

1.23 WATER FOR CONSTRUCTION: The CONTRACTOR shall make the necessary arrangement for securing and transporting all water required in the construction of

this project, including water required for mixing of concrete, sprinkling, testing, flushing, flooding, or jetting. The CONTRACTOR shall provide water as required at his own expense.

1.24 GUARANTEE: All work shall be guaranteed against defects resulting from the use of inferior materials, equipment or workmanship for a period of two (2) years from the date of final completion and acceptance of the project.

1.25 REFERENCE TO TxDOT STANDARDS AND SPECIFICATIONS: Portions of TxDOT standards and specifications, latest editions, shall be incorporated into this contract by specific reference in the contract plans and specifications. In the event of conflict with other documents, TxDOT standards and specifications shall govern for construction materials and methods. In the event of conflict with other documents, City of Coppell contract documents shall govern for contract procedures and measurement and payment.

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

1.1 GENERAL:

A. CONTRACTOR to submit Shop Drawings, Product Data and Samples as required by the Contract Documents and as specified in other sections of the specifications.

1.2 SHOP DRAWINGS:

A. As soon as practicable after contract award, submit to the ENGINEER, for review, the required number of bound copies of shop drawings of all items as specified in the various sections of these specifications, accompanied by letters of transmittal.

B. Shop drawings shall include: Manufacturer's catalog sheets and/or descriptive data for materials and equipment; showing dimensions, performance characteristics, and capacities and other pertinent information as required to obtain approval of the items involved.

C. No work requiring shop drawings will be executed until review and acceptance of such drawings has been obtained.

1.3 PRODUCT DATA:

A. Preparation:
   1. Clearly mark each copy to identify pertinent products or models.
   2. Show performance characteristics and capacities.
   3. Show dimensions and clearances required.

B. Manufacturers standard schematic drawings and diagrams:
   1. Modify drawings and diagrams to delete information that is not applicable to the work.
   2. Supplement standard information to provide information specifically applicable to the work.

1.4 SAMPLES: Provide samples as indicated in other parts of these specifications.

1.5 CONTRACTOR RESPONSIBILITIES:

A. Review Shop Drawings and Product Data prior to submission.

B. Determine and verify:
   1. Field measurements.
   2. Field construction criteria.
   3. Catalog numbers and similar data.

4. Conformance with specifications.

C. Coordinate each submittal with requirements of the work and of the Contract Documents.

D. Begin no work that requires submittals until return of submittals with ENGINEER's review.

E. Keep one (1) approved copy of shop drawings or product data at job site at all times.

1.6 SUBMISSION REQUIREMENTS:

A. Make submittals promptly and in such sequence as to cause no delay in the work or in the work of any other contractor.

B. Number of submittals required:
   1. For shop drawings and product data: All submittal items shall be provided electronically in PDF format unless otherwise noted.

C. Submittals shall contain:
   1. The date of submission and the dates of any previous submissions.
   2. The project title.
   3. The names of:
      a. Contractor
      b. Supplier
      c. Manufacturer
   4. Identification of the product.
   5. Field dimensions, clearly identified as such.
   6. Relation to adjacent or critical features of the work or materials.
   7. Applicable standards, such as ASTM or Federal Specification numbers.
   8. Identification of deviations from Contract Documents.
   9. Identification of revisions on re-submittals.
   10. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and a\coordination of the information within the submittal with requirements of the work and of Contract Documents.
   11. Fabrication and erection drawings lists and schedules.
   12. Basis of design and design calculations signed and sealed by a registered professional engineer.
   13. Seal and signature of a register engineer on all structural submittals.

D. REVIEW:

1. Shop drawing and product data information review will be general. Such review will not relieve the CONTRACTOR of any responsibility and work required by the Contract.
2. Satisfactory shop drawings will be so designated and all sets, except four (4), returned to the CONTRACTOR. Rejected shop drawings will be so designated and all sets except two (2) will be returned to the CONTRACTOR, with indications of the required corrections and changes.
3. Rejected shop drawings will be corrected and resubmitted to the ENGINEER for Acceptance.

1.7 RESUBMISSION REQUIREMENTS:

A. Make any corrections or changes in the submittals required by the ENGINEER and resubmit until accepted.
B. Shop Drawings and Product Data:
   1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
   2. Indicate any changes that have been made other than those requested by the ENGINEER.

1.8 ENGINEER'S RESPONSIBILITIES:

A. Review submittals with reasonable promptness.
B. Affix stamp and initials or signature, and indicate requirements for re-submittal, or acceptance of submittal.
C. Return submittals to CONTRACTOR for distribution, or for resubmission.

SECTION 5
DESCRIPTION OF PAY ITEMS

THE · CITY · OF

COPPELL

TEXAS · 1890

SECTION 5 - DESCRIPTION OF PAY ITEMS

This section includes comments concerning various pay items so that the CONTRACTOR can fully understand the scope of work contemplated and required for each item bid.

1. Construction No Pay Items:

All work necessary for the orderly completion of the project, but not specifically included as a pay item in the proposal, shall be considered subsidiary to the contract and no separate or additional payment will be made therefore. Those items shall include, but not be limited to, for the following: (a) removal of spoils; (b) water for construction; (c) construction staking and/or layout; (d) surveying to re-establish grade; (e) maintenance of streets during construction; (f) sprinkling for dust control; (g) project trailer, if needed; and/or (h) any other incidentals or appurtenances necessary to complete the work, whether directly called out within the plans or implied.

2. Construction Pay Items:

Pay items as listed in the proposal shall be measured and paid for in accordance with the applicable measurement and payment paragraphs in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments Fourth Edition, unless modified by these special provisions.

All work for this project shall be governed by the Standard Specifications for Public Works Construction – North Central Texas Council of Governments Fourth Edition, the City of Coppell Standard Construction Details (Ord. #2006-1129), and Appendix "C" Design Criteria and Standards in the City of Coppell Subdivision Ordinance (Ord. #94-643), together with any additional Supplementary Conditions, Specific Project Requirements, General Notes or Description of Pay Items included herein.

Pay Item No. 01 – Mobilization:

This pay item shall include the mobilization and demobilization efforts required for the construction of the project. The project is anticipated to be constructed in multiple phases. This pay item shall be inclusive of any and all mobilizations and demobilizations associated with the project. Mobilization shall be defined as all necessary equipment, field offices, supplies, materials, and personnel on the job site ready to begin construction. **Note: The total amount bid for Mobilization & Demobilization shall not exceed five percent (5%) of the Base Bid amount, exclusive of this pay item (Adjusted Contract Amount).**

Measurement and payment shall be made on the basis of price bid per lump sum (LS) and should be total compensation for furnishing all labor, materials, tools, and equipment necessary to complete the work. Ten percent (10%) of the amount bid shall be paid with the first pay estimate following the initial project mobilization. On all subsequent pay estimates, payment shall be prorated on the basis of the value of the adjusted contract amount completed. Prorated payment shall be as follows: When 1% of the adjusted contract amount has been earned,

50% of lump sum bid for mobilization, less retainage, will be paid. When 5% of the adjusted contract amount has been earned, 75% of the lump sum bid for mobilization, less retainage, will be paid. When 10% of the adjusted contract amount has been earned, 90% of the lump sum bid for mobilization, less retainage, will be paid. Payment for the remaining 10% of the lump sum bid for mobilization, less retainage, will be paid on the next monthly estimate following the 90% payment.

Pay Item No. 02 – Project Sign:
This pay item shall consist of the installation of a project sign in the following locations: both ends of the construction limits on Denton Tap Road during each intersection's construction (2 total project signs per intersection). Project signs are not required at intersections where only vehicle detection upgrades are being installed. Each sign shall be constructed in accordance with the details found in Section 6 of the Specifications. The City of Coppell will furnish the CONTRACTOR with the official City of Coppell logo upon request.

Measurement and payment shall be made on the basis of price bid per each (EA) and shall be total compensation for furnishing all materials, tools, equipment, labor, and any other incidentals necessary to complete the work.

Pay Item No. 03 – Project Communication:
This item shall consist of communicating all aspects of the project to adjacent property owners, residents, motorists and the City of Coppell throughout the entire term of the project. The CONTRACTOR shall attend a stakeholder meeting with all adjacent property owners prior to commencing work. This meeting shall be in addition to the preconstruction meeting with the City of Coppell. The stakeholder meeting shall consist of introductions of key CONTRACTOR personnel, presentation of CONTRACTOR's anticipated schedule, presentation of details regarding coordinating services such as driveway access, ingress and egress to properties, property signage relocation, mail delivery, etc... and any other pertinent project information.

This pay item shall also include preparing and distributing communication materials to adjacent property owners, residents, motorists and others in support of the project. This shall include, but not be limited to door hangers, meeting display boards, letters, postcards, temporary information signs or use of portable message boards in addition to the portable message boards included in the "Furnish, Install and Maintain Temporary Traffic Control Devices and Detours" pay item. CONTRACTOR will be responsible for communicating lane closures, traffic impacts, traffic switches, significant construction milestones, routine updates or any other project information as determined and directed by the City of Coppell.

Additionally, the CONTRACTOR shall provide a bi-monthly update memo including progress in the previous two weeks, detailed anticipated schedule for

the next two weeks, overall schedule of progress, anticipated closings of specific work areas, anticipated disruptions to adjacent properties, updated contact information, project photos and any other pertinent information to the project or adjacent property owners. Bi-monthly progress reports shall be delivered to the CITY ENGINEER for review on Thursdays by 3:00pm. Once approved, progress reports shall be delivered on Fridays by 3:00pm to the owner or representative of each adjacent property. Additionally, a copy of the update memo shall be emailed to the CITY ENGINEER, CITY INSPECTOR, DESIGN ENGINEER, and any others as determined by the City of Coppell.

Measurement and payment shall be made on the basis of price per lump sum (LS) and shall be total compensation for furnishing all labor, materials, and equipment necessary to complete the work of communicating the project. Payment for this item shall be paid upon substantially completing the work and successfully communicating the project milestones. Additionally, monthly pay requests will not be processed without proof of the bi-monthly updates being prepared and delivered to adjacent property owners.

Pay Item No. 04 – Pre-Project Video Survey:
This pay item shall consist of the CONTRACTOR conducting video documentation of the existing project conditions prior to beginning construction. The CONTRACTOR shall submit the pre-project video to the City of Coppell prior to submission of the first payment application. Video shall include audio narrative describing condition of existing improvements, with special attention being given to damaged/deteriorating improvements. Failure to document existing damaged improvements may result in CONTRACTOR being required to repair/replace such items at no additional pay.

Measurement and payment shall be made on the basis of price bid per each (EA) and shall be total compensation for furnishing all materials, tools, equipment, labor, and any other incidentals necessary to complete the work.

Pay Item No. 05 – Post-Project Video Survey:
This pay item shall consist of the CONTRACTOR acquiring video documentation of the project conditions at the completion of the proposed improvements. The CONTRACTOR shall submit the post-project video to the OWNER prior to submission of the final application for payment. Video shall include audio narrative describing condition of new and existing improvements, with special attention being given to the condition of private improvements on adjacent properties. Failure to document existing damaged improvements may result in CONTRACTOR being required to repair/replace such items.

Measurement and payment shall be made on the basis of price bid per each (EA) and shall be total compensation for furnishing all materials, tools, equipment, labor, and any other incidentals necessary to complete the work.

Pay Item No. 06 – Furnish, Install, Maintain and Remove Erosion Control Devices:

This pay item shall consist of furnishing, installing, maintaining and removing erosion controls throughout the duration of the project in accordance with the Texas Commission on Environmental Quality's (TCEQ) permitting procedures and requirements for construction projects that disturb one (1) or more acres. Under the Texas Pollution Discharge Elimination System (TPDES) general construction permit TXR 150000, the operator with control of construction plans and specifications (OWNER) and the operator with day-to-day operational control (CONTRACTOR) are required to obtain a permit for the discharge of storm water runoff. The CONTRACTOR shall be required to prepare and implement a single comprehensive site-specific Storm Water Pollution Prevention Plan (SWP3) for the entire construction site. The CONTRACTOR shall: (1) sign the SWP3, (2) submit an NOI for the City of Coppell & CONTRACTOR if required, and (3) post a site notice as part of the permit. The SWP3 must describe and insure the implementation of best management practices that will be used to reduce, to the maximum extent possible, the pollutants and storm water discharges associated with the construction activity and insure compliance with the terms and conditions of the permit. The SWP3 must clearly indicate which operator is responsible for satisfying each shared requirement of the SWP3. The SWP3 shall be subject to approval by the OWNER and must be retained on-site during the term of the construction. Notice must be posted if the SWP3 is retained off-site.

A Texas Registered Professional Engineer must sign and seal the Erosion Control Plan (ECP) submitted as part of the SWP3. The CONTRACTOR shall submit a Notice of Termination for City of Coppell and CONTRACTOR upon completion of the project if required.

This work shall also include the installation and maintenance of:

(a) Silt fence;
(b) Rock check dam;
(c) Stabilized construction entrance;
(d) Staged inlet protection;
(e) Scourstop, or approved equivalent;
(f) Any additional erosion control measures required by the SWP3.

Measurement and payment shall be made on the basis of the price bid per lump sum (LS) for preparation and implementation of the SWP3. This includes any necessary revisions to the Erosion Control Plan throughout the term of construction and the installation, sequencing, and maintenance of structural control measures throughout the duration of construction and along its entire stretch. Payment shall be total compensation for furnishing all labor, materials, tools, and equipment necessary to complete the work. Payment shall be evenly prorated throughout the term of construction on a monthly basis, based on amount bid and time bid.

Pay Item No. 07 – Furnish, Install and Maintain Temporary Traffic Control Devices and Detours:

This work includes furnishing, installing and maintaining the required temporary traffic control devices & detours (including temporary traffic buttons and striping, signage, temporary pavement, temporary rumble strips, temporary special shoring, and traffic barriers as needed) during each phase of construction as shown and/or indicated on the plans or as determined by the ENGINEER, in accordance with the appropriate details and specifications, including the TMUTCD. The project is anticipated to be constructed in multiple phases and locations. This pay item shall be inclusive of any and all installation and maintenance of temporary traffic control devices and detours associated with the project. Inclusive with this pay item is the requirement for adequate notification and instruction to be given to the traveling public regarding interruptions or changes to established traffic flow patterns to, from and along the work site. This work also includes the use of flagman, if necessary, to control traffic in an orderly manner as it enters, exits and/or passes through the construction area, as well as the installation and removal of all temporary pavement.

Traffic control plans and updates shall be provided to the ENGINEER for review prior to construction or modifying any traffic flow (changing lanes, road closures, changing a street to one way, etc.).

This work shall also include the construction of temporary pavement necessary for traffic shifts, construction staging, or as determined by the ENGINEER, consisting of 6” Type B HMAC on geo-grid (StrataBase SB11 or approved equal). Temporary pavement shall be constructed and maintained in these areas prior to the construction of the final pavement. Any temporary pavement repair required for proposed utility work (water line, sanitary sewer and storm drain) is included in this pay item and no separate pay shall be made. Temporary pavement repair, as required by these specifications, will not be paid for directly but shall be considered subsidiary to this pay item.

Additionally, the CONTRACTOR shall maintain the existing roadway and temporary pavement in a safe driving condition at all times during construction, throughout the reconstruction limits of the project. It shall be the sole responsibility of the CONTRACTOR to maintain the existing road and driving surface for both existing conditions and issues that may come up during construction. This shall include but is not limited to pothole repairs and crack sealing that affects driver and/or vehicle safety during construction as determined by OWNER.

Furthermore, CONTRACTOR shall coordinate with postal carriers/post master to create and execute a mailbox relocation plan to maintain continuous mail delivery throughout construction. This shall include any time, materials, temporary construction/installations, and any other items required.

Measurement and payment for this work shall be made on the basis of price bid per lump sum (LS) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete all phases of the work. Twenty-five percent (25%) of the amount bid shall be paid with the first pay estimate following the installation of the traffic control devices & detours for the first phase of construction. On all subsequent pay estimates, payment shall be prorated based on the total number of months bid. No additional payment will be made if the CONTRACTOR goes over the time bid.

Pay Item No. 08 – Benchmark Reestablishment:
Three dimensional coordinates, reported as State Plane Coordinates, shall be established using the City's monumentation system and using the City's combined scale factor. The Contractor shall coordinate with the City regarding the location of these benchmarks.

Measurement and payment for furnishing and installation of benchmarks shall be made on the basis of price bid per each (EA) and shall be total compensation for furnishing and/or operating all equipment, labor, materials and tools necessary to complete the work.

Pay Item No. 09 –Replace Existing Tree:
This work includes replacement of any trees as determined by the City in accordance with the appropriate details and specifications, including NCTCOG Item 202.1.

Measurement and payment for removal and replacement work performed herein shall be made on the basis of the price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 10 – Right of Way Preparation:
This work includes the clearing & grubbing and removal & trimming of vegetation in all areas within the project limits requiring such work. This includes work within the right-of-way and any adjacent property that is necessary to complete the work as shown on the construction plans or as determined by the ENGINEER in accordance with the appropriate details and specifications, including NCTCOG Item 203.1, 203.2 & 203.3. All vegetation within the paving limits shall be removed. This item shall also include the protection of any trees, shrubs, fences, structures, signs or other items that are to be preserved and/or relocated as shown on the plans. All trees designated to be preserved shall be protected by fencing to the limits of the canopy and no parking, driving or moving of equipment in this area will be permitted. If pruning of protected trees is required, they shall be trimmed as directed by the ENGINEER and any cuts of two inches or more in diameter shall be treated as directed by the ENGINEER. Disposal of said material will be at the CONTRACTOR's sole expense.

Any existing landscape improvements, including landscape beds and landscape timbers, shall be removed if deemed necessary for the construction of the improvements shown within the plans. Any removal of existing landscape improvements shall be coordinated with the ENGINEER and OWNER. Removal of landscape improvements shall be considered subsidiary to this pay item.

This work may also include, but not be limited to:

(a) The removal of existing pavement markings and traffic buttons;
(b) The removal of any existing gravel driveway/roadway;
(c) The removal of landscape edging;
(d) The removal of mailboxes;
(e) Any grading activities (excavation or fill) deemed necessary to prepare the proposed grades of the subgrade prior to lime and pavement, unless separate bid items are provided for excavation or embankment;
(f) The removal and salvage of any existing regulatory, school or informational signs;
(g) The removal of all trees, stumps, bushes, vegetation, roots and shrubs within the limits of work;
(h) Trimming of trees to provide a 7-foot clearance over sidewalks and an 18-foot clearance over roadways;
(i) Adjusting water vaults to finished grade as indicated on the plans.

These items of work will not be paid for directly but shall be considered subsidiary to this pay item. Any item indicated in the plans to be removed (directly called out or implied) for which there is no specific pay item shall be considered subsidiary to this pay item.

Measurement and payment shall be made on the basis of price per station (STA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 11 – Unclassified Excavation:

This work consists of all the required excavation within the limits of the right-of-way and adjacent areas to establish the roadway cross-section, grade and profile as shown on the plans. All excavation is considered unclassified and shall be performed to the lines & grades shown on the construction plans or as directed by the ENGINEER, in accordance with the appropriate specifications, details and notes, including NCTCOG Item 203.4 and the City of Coppell Standard Construction Details.

This item also includes temporary stockpiling, placement and compaction of excavated material required for this project, in accordance with the appropriate specifications, including NCTCOG Item 203.6 and 203.7. Fill shall be placed and

compacted (minimum 95% of maximum dry density) in accordance with the City of Coppell and/or NTCOG specifications.

Payment shall include the removal and proper utilization or disposal of all excavated materials (including haul off of unused material), constructing, shaping and finishing of all earthwork involved. Note: The City does not have a designated location for disposal of excess excavation material. Costs for removal, haul-off and lawful disposal shall be considered subsidiary.

This is a "Plans Quantity" item and will not be measured unless there are revisions to the scope of work. Payment for work performed and materials furnished related to the unclassified street excavation, as provided herein, shall be made on the basis of the price bid per cubic yard (CY) for unclassified excavation and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 12 – Remove & Dispose of Existing Concrete Pavement (To Include Curbs/Pavers):
This work includes the removal and disposal of existing concrete pavement (including concrete street paving, asphalt overlay, driveways, stamped concrete, pavers, median pavers, and sidewalks) at the locations and limits shown on the construction plans or as determined by the ENGINEER, in accordance with the appropriate details and specifications. Concrete to be removed shall be sawed full-depth through the existing reinforcement along even straight lines leaving a clean vertical side, as shown on the plans or as established by the ENGINEER, in accordance with NCTCOG Item 402.3. Payment shall also be for the collection and disposal of sawcut water and dust at any location to prevent these materials from entering into the storm drain system. Any existing improvements beyond these limits, which are damaged or destroyed by the construction shall be re-sawed, removed and replaced at the CONTRACTOR's expense. Once concrete improvements are removed, exposed surfaces that will interface with new concrete pavement shall be roughened to allow adequate bonding of new concrete. CONTRACTOR shall epoxy grout #4x18" dowel bars into end of existing concrete (18" o.c.). For driveways, exposed surfaces that will interface with new concrete pavement shall be roughened to allow adequate bonding of new concrete. CONTRACTOR shall epoxy grout #3x18" dowel bars into end of existing sidewalk or driveway concrete (18" o.c.). This operation shall be inspected and approved by the ENGINEER prior to placement of new concrete. Based on record drawings, the thickness of the existing concrete is 8" but may vary. All spoils shall be removed and legally disposed from the project site at the CONTRACTOR's expense.

The removal of concrete curb that is integral to any concrete pavement, which is to be removed as part of this work, shall not be paid for directly but shall be considered subsidiary to this pay item. Also, any concrete removal required for the installation or adjustment of existing utilities is included in this pay item. The removal of stamped concrete as shown on the construction plans shall not be paid

for directly but shall be considered subsidiary to this pay item. Also, any barrier free ramps designated on the plans to be removed are included in this pay item.

Measurement and payment for work performed and materials furnished related to the removal of concrete pavement, as provided herein, shall be made on the basis of the price bid per square yard (SY) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work. This item shall be measured by CONTRACTOR and by OWNER's representative prior to removal.

Pay Item No. 13 – Remove & Dispose Existing Concrete Sidewalk & Ramps
This item shall include sawcutting existing pavement for removal where indicated on the plans. Payment shall also be for the collection and disposal of sawcut water and dust at any location to prevent these materials from entering into the storm drain system. Sawing shall be for full depth of concrete. Sawing of pavement joints is subsidiary to the related pay items. For sidewalks, exposed surfaces that will interface with new concrete pavement shall be roughened to allow adequate bonding of new concrete. CONTRACTOR shall epoxy grout #3x12" dowel bars into end of existing sidewalk concrete (18" o.c.). This operation shall be inspected and approved by the ENGINEER prior to placement of new concrete. The unit price per linear foot shall include all labor, tools, equipment and materials necessary to complete the work.

These Items are for excavating, removing, and legally recycling all concrete sidewalk as delineated on the plan set. Measurement and payment for the removal of concrete pavement shall be by the square yard (SY) regardless of the thickness of the concrete and sidewalk by the square foot. The contractor's price for removal and legal recycling shall include all labor, equipment, hauling, disposal cost, and incidentals necessary to complete the work.

Pay Item No. 14 – Remove Existing Small Curb Inlet (4'-8'):
Pay Item No. 15 – Remove Existing Large Curb Inlet Major (10'-20'):
Pay Item No. 16 – Remove Existing 21" RCP Storm Drain:
Pay Item No. 17 – Remove Existing 24" RCP Storm Drain:
This work consists of removing various existing storm drain pipe, box culvert and storm drain structures as indicated in the construction plans or as directed by the ENGINEER.

The CONTRACTOR shall exercise every precaution when excavating pipe or structures indicated to be removed in the construction plans to prevent damage to existing and proposed utilities or other improvements. Any improvements damaged as a result of the CONTRACTOR's operations shall be promptly repaired to an acceptable condition (as determined by the ENGINEER) by the CONTRACTOR and at the sole expense of the CONTRACTOR. Any RCP plugs or additional improvements required to adjacent storm lines/structures shall be considered subsidiary to these items. Excavated areas shall be backfilled, compacted and tested in accordance with City of Coppell Standards.

All concrete, debris, or non-native material shall be removed from excavated areas. Removed storm drain pipe or structures shall be hauled off and lawfully disposed of. CONTRACTOR shall be responsible for any disposal fees or permits.

Measurement and payment for removal of structures shall be made on the basis of the price bid per each (EA) structure and shall be total compensation for furnishing all materials, tools, equipment, labor, proper disposal of materials and any other incidentals necessary to complete the work.

Measurement and payment shall be made on the basis of the price bid per linear foot (LF) of pipe or box and shall be total compensation for furnishing all materials, tools, equipment, labor, proper disposal of materials and any other incidentals necessary to complete the work.

Pay Item No. 18 – Remove Existing Tree:
This work includes removal of any trees labeled for removal in the construction plans or as determined by the ENGINEER in accordance with the appropriate details and specifications, including NCTCOG Item 202.1. Any tree labeled for removal in the plans shall be confirmed with the ENGINEER prior to removal. Tree removal shall include all pruning, felling, stump removal, mulching of leaves and limbs necessary to safely remove any tree approved for removal. Once work has commenced on the removal of a tree approved for removal, it shall not cease until the remnants of the tree are completely removed and lawfully removed from the project site. All debris and mulch from the removal of trees shall be disposed of in a legal manner.

Measurement and payment for removal work performed herein shall be made on the basis of the price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 19 – Remove & Relocate Existing Wayfinding Sign Onto New Foundation:
This work consists of the removal, salvaging, and re-installation of existing wayfinding signage; removal and disposal of existing sign foundation, supports, and assemblies; furnishing and installation of new foundation, supports and assemblies at the locations shown in the construction plan set and as specified by the ENGINEER. Contractor shall provide new foundations and poles to conform with appropriate details and specifications in the plans and Texas MUTCD guidelines. All sign posts and mounting hardware shall be black powder coated.

Measurement and payment for furnishing and installation of the wayfinding signage shall be made on the basis of price bid per each (EA) and shall be total

compensation for furnishing and/or operating all equipment, labor, materials and tools necessary to complete the work.

Pay Item No. 20 – 8" Reinforced Concrete Street Pavement (No. 4 Bars 18" O.C.E.W.):
Pay Item No. 21 – 6" Reinforced Concrete Driveway Pavement (No. 4 Bars 18" O.C.E.W.):
This work includes the construction of the specified thickness of reinforced concrete pavement (including integral curb, where indicated) at the locations shown on the construction plans or as determined by the ENGINEER, in accordance with the appropriate details and specifications. All concrete used for this project shall be Class "C" concrete with a minimum cement content of 6 sacks per cubic yard and minimal compressive strength of 3,600 psi at 28 days. No fly ash will be permitted. All curb within the construction plans shall be a 6" monolithic curb. No separate payment shall be made for the integral curb, it is subsidiary to this pay item. Any street headers and butt joints shall also be constructed subsidiary to this pay item. The concrete shall be doweled into the existing pavement and reinforced in accordance with the City of Coppell Standard Construction Details. These items include lime treatment of driveway subgrades to the limits of driveway construction.

The CONTRACTOR shall use a slip form paving machine and vibrate all concrete during the pour by a method approved by the ENGINEER. The CONTRACTOR is responsible for making sample concrete cylinders at a cycle determined by the ENGINEER for testing purposes. No sand level up course will be allowed under any paving. The paving shall be a baker broom finish and shall be cured with a highway white curing compound applied per the manufacturer's recommendations.

CONTRACTOR shall pay close attention to NCTCOG Item 303.5.4.3 "Contraction Joints" regarding sawing of joints. In general, joints shall be sawed into the completed pavement surface as soon after initial concrete sets as possible so that some raveling of the green concrete is observed in order for the sawing process to prevent uncontrolled shrinkage cracking. Failure to perform the work in compliance with these requirements and those in Item 303.5.4.3 will subject the slab to rejection and the CONTRACTOR will be required to replace the slab at the sole expense of the CONTRACTOR. All joints shall be placed at 15 feet intervals (maximum of 20 feet intervals) or as indicated in the construction plans.

All joints shall be sealed with silicone joint sealant prior to opening the road to traffic. CONTRACTOR shall remove debris from joints using compressed air prior to sealing joints.

Concrete street headers shall be constructed at the locations shown on the plans or as directed by the ENGINEER. Concrete street headers will not be measured or paid for separately but shall be subsidiary to this pay item.

Measurement and payment for work performed and materials furnished related to the construction of reinforced concrete pavement of the specified thickness, as provided herein, shall be made on the basis of the price bid per square yard (SY) in accordance with NCTCOG Item 303.8, and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Note: The City of Coppell does not have a designated batch plant site for this project.

Pay Item No. 22 – 8" Lime Stabilized Subgrade:
Pay Item No. 23 – Lime for Stabilized Subgrade (40/SY):
This work includes the treatment of subgrade by the pulverization, addition of lime, mixing and compacting the mixed material to the required density (minimum 95% maximum dry density) in accordance with the City of Coppell Detail 2010 and NCTCOG specifications.

The CONTRACTOR shall treat the subgrade to a depth of 8" or as directed by the ENGINEER and re-mixed 6" thick by scarifying, pulverizing and compacting the material to the required density indicated on the construction plans. A geotechnical study was NOT done for this project. Subgrade shall be stabilized with 6% minimum by weight of hydrated lime (generally 40 lbs./SY) and compacted to a density not less than 95% standard proctor density. Subgrade shall be constructed to the lines and grades as required by the construction plans, in accordance with the appropriate details and specifications.

Subgrade treatment shall be provided under all proposed concrete pavement and curbs unless noted or otherwise approved by the ENGINEER, and shall extend to a point at least one-foot behind the back of curb. After subgrade treatment and shaping is complete, CONTRACTOR shall maintain the proper moisture content in the subgrade to prevent drying and cracking, until covered by paving material.

Subgrade treatment and emulsified asphalt treatment, as required by these specifications, will not be paid for directly but shall be considered subsidiary to this pay item.

Measurement and payment for work performed and materials furnished related to the construction of lime stabilization of the specified thickness, as provided herein, shall be made on the basis of the price bid per square yard (SY) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Measurement and payment for lime material furnished related to the construction of lime stabilization of the specified thickness, as provided herein, shall be made on the basis of the price per ton (TON) and shall be total compensation for furnishing

the material and for all freight involved, unloading, storing, and handling, labor, materials, tools, equipment and other incidentals necessary to complete work.

Pay Item No. 24 – 8" Reinforced Stamped Colored Concrete Pavement (Crosswalk):
Pay Item No. 25 – 6" Reinforced Stamped Colored Concrete Pavement (Median):
This work includes the construction of reinforced stamped concrete pavement at locations shown in the plans or as determined by the ENGINEER, in accordance with the appropriate details and specifications listed in the City of Coppell Standard Construction Details (Details 2130 and 2190). Stamped concrete used within the roadway and driveways for crosswalks for this project shall be Class "C" concrete with a minimum cement content of 6 sacks per cubic yard and minimal compressive strength of 3,600 psi at 28 days in accordance to City of Coppell Standard Detail 2195. No fly ash will be permitted in either case. Subgrade shall be considered subsidiary to this item and shall match street section. Mow strip included in median paving shall be considered subsidiary to this item.

The CONTRACTOR shall vibrate all concrete during the pour by a method approved by the ENGINEER. The CONTRACTOR is responsible for making sample concrete cylinders at a cycle determined by the ENGINEER for testing purposes. No sand level up course will be allowed under any paving.

Color shall be Red Clay – Bomanite Integral Color with Bomanite Natural Gray Release (or an approved equal). Any gray stamped concrete shall be Gunmetal Gray – Bomanite Integral Color with Cobblestone Gray Release (or an approved equal). All patterns shall be Running Bond Used Brick. Approved equal shall only be considered after review of the specifications and a test section that demonstrates the ability to match color and pattern.

CONTRACTOR shall pay close attention to NCTCOG Item 303.5.4.3 "Contraction Joints" regarding sawing of joints. In general, joints shall be sawed into the completed pavement surface as soon after initial concrete sets as possible so that some raveling of the green concrete is observed in order for the sawing process to prevent uncontrolled shrinkage cracking. Failure to perform the work in compliance with these requirements and those in Item 303.5.4.3 will subject the slab to rejection and the CONTRACTOR will be required to replace the slab at the sole expense of the CONTRACTOR. All joints shall be placed at 15 feet intervals (maximum of 20 feet intervals) or as indicated in the construction plans.

All joints shall be sealed with silicone joint sealant prior to opening the road to traffic. CONTRACTOR shall remove debris from joints using compressed air prior to sealing joints. Joint sealant shall match color of concrete where appropriate or as directed by ENGINEER.

Measurement and payment for work performed and materials furnished related to the construction of reinforced stamped concrete pavement of the specified thickness, as provided herein, shall be made on the basis of the price bid per square yard (SY) in accordance with NCTCOG Item 303.8, and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 26 – 4" Reinforced Concrete Sidewalk (All Widths):
This work includes construction of concrete sidewalks at the locations shown in the construction plans or as determined by the ENGINEER, in accordance with the appropriate details and specifications, including City of Coppell Standard Detail 2170 and 2195. All concrete used for the sidewalks shall be Class "A" concrete with a minimum compressive strength of 3,000 psi at 28 days in accordance to City of Coppell Standard Detail 2195. No fly ash will be permitted.

All sidewalk construction shall be in compliance with the Texas Accessibility Act Article 9102 of the Texas Civil Statute as administered by the Texas Department of Licensing and Regulations. Any sidewalk or trail found to be in noncompliance shall be removed and brought to compliance at the CONTRACTOR's sole expense.

CONTRACTOR shall pay close attention to NCTCOG Item 303.5.4.3 "Contraction Joints" regarding sawing of joints. In general, joints shall be sawed into the completed pavement surface as soon after initial concrete sets as possible so that some raveling of the green concrete is observed in order for the sawing process to prevent uncontrolled shrinkage cracking. Failure to perform the work in compliance with these requirements and those in Item 303.5.4.3 will subject the sidewalk or trail to rejection. The CONTRACTOR will be required to replace the sidewalk or trail at the sole expense of the CONTRACTOR. All joints shall be placed in accordance with City of Coppell Standard Detail 2170.

All joints shall be sealed with silicone joint sealant. CONTRACTOR shall remove debris from joints using compressed air prior to sealing joints.

This item shall include integral curb where required on the construction plans. Integral curb shall be incidental to this item.

Measurement and payment for reinforced concrete trail and concrete sidewalk work performed and materials furnished completed and in place as provided herein shall be made on the basis of the price bid per square yard (SY) in accordance with NCTCOG Item 305.2, and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 27 – Concrete Retaining Wall Integral with Sidewalk (Cast-in-Place):
This work includes the construction of cast-in-place concrete retaining walls at the locations shown in the plans or as established by the ENGINEER, in accordance with TxDOT's Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges Item 423 and City of Coppell Standard Detail 2180.

The cast-in-place walls shall include the wall veener and cap as shown in the construction plans and all additional appurtenances and incidentals necessary.

Measurement and payment for cast-in-place concrete retaining wall work performed shall be made on the basis of the price bid per square foot (SF) of the wall. The price shall include the sidewalk or trail in front of the wall, which is a part of the base of the wall and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 28 – Concrete Median Nose:
This work shall be for the construction of median noses in accordance with the City of Coppell standard detail 2130.

Measurement and payment for work performed and materials furnished related to the construction of reinforced stamped concrete pavement of the specified thickness, as provided herein, shall be made on the basis of the price bid per square yard (SY) in accordance with NCTCOG Item 303.8, and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 29 – Barrier Free Pedestrian Ramp:
This work includes the construction of pedestrian ramps at locations shown in the construction plans or as determined by the ENGINEER, in accordance with specification, plans, and TxDOT's Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges Item 531. All concrete used for barrier free ramp construction shall be Class "A" concrete with a minimum compressive strength of 3,000 psi at 28 days. No fly ash will be permitted.

All pedestrian ramps are based on the grading details in the construction plans and Texas Department of Transportation's Design Division Standards for Pedestrian Facilities: Curb Ramps (Detail PED-18A).

All ramp construction shall be in compliance with the Texas Accessibility Act Article 9102 of the Texas Civil Statute as administered by the Texas Department of Licensing and Regulations. This includes the correct slope, correct width, correct texture, and correct color differentiation. The ENGINEER shall verify each ramp prior to final acceptance. Any ramp found to be in noncompliance shall be removed and brought to compliance at the CONTRACTOR's sole expense.

Measurement and payment for construction of barrier free ramps and materials furnished completed and in place as provided herein shall be made on the basis of the price bid per square yard (SY), and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 30 – 4" Thermoplastic Solid Marking (Y)
Pay Item No. 31 – 4" Thermoplastic Broken Marking (W)
Pay Item No. 32 – 8" Thermoplastic Solid Marking (W)
Pay Item No. 33 – 12" Thermoplastic Solid Marking (W)
Pay Item No. 34– 24" Thermoplastic Solid Marking (W)
Pay Item No. 35 – Thermoplastic Arrow (W)
Pay Item No. 36 – Thermoplastic Word (W)
This work includes the furnishing and installation of permanent thermoplastic markings, including but not limited to all turn lane markings and stop bar striping as indicated on the construction plans or as directed by the ENGINEER, in accordance with the TxDOT Standard Specifications for Construction and Maintenance of Highways Streets and Bridges Item 666 and Texas MUTCD guidelines. Surface preparation, as required by these specifications, will not be paid for directly but shall be considered subsidiary to this pay item. This work also includes the removal (and replacement, if necessary) of any existing thermoplastic striping that is not in alignment or sequence.

Measurement and payment for thermoplastic striping work performed and materials furnished completed and in place as provided herein shall be made on the basis of the price bid per linear foot (LF) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Measurement and payment for thermoplastic words and arrows work performed and materials furnished completed and in place as provided herein shall be made on the basis of the price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 37 – Type I-C 4" Raised Pavement Markers
Pay Item No. 38 – Type II-C-R 4" Raised Pavement Markers
Pay Item No. 39 – Type II-A-A 4" Raised Pavement Markers
This work includes the furnishing and installation of raised pavement markers as indicated on the construction plans or as directed by the ENGINEER, in accordance with the TxDOT Standard Specifications for Construction and Maintenance of Highways Streets and Bridges Item 672 and Texas MUTCD guidelines. Surface preparation, as required by these specifications, will not be paid for directly but shall be considered subsidiary to this pay item. This work also

includes the removal (and replacement, if necessary) of any existing thermoplastic striping that is not in alignment or sequence.

Measurement and payment for raised pavement markers work performed and materials furnished completed and in place as provided herein shall be made on the basis of the price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 40 – Street Signs:
This work consists of the furnishing and installation of standard roadway signage at the locations shown in the construction plan set and as specified by the ENGINEER. All signs shall be manufactured and mounted in accordance with City of Coppell Standard Detail 2330 and Texas MUTCD guidelines. All sign posts and mounting hardware shall be black powder coated.

Measurement and payment for furnishing and installation of the miscellaneous Street Signs shall be made on the basis of price bid per each (EA) and shall be total compensation for furnishing and/or operating all equipment, labor, materials and tools necessary to complete the work.

Pay Item No. 41 – 18" Reinforced Concrete Pipe Class III Storm Drain:
Pay Item No. 42 – 24" Reinforced Concrete Pipe Class III Storm Drain:
This work includes the construction of all RCP storm drain at the locations shown on the construction plans or as determined by the ENGINEER, in accordance with the appropriate details and specifications, including NCTCOG Item 501.6 and 508.3. All RCP storm drain shall be Class III (NCTCOG Item 501.6) as indicated on the plans. All bends shall be pre-fabricated. Ram-nek joint material shall be used for all joints, unless otherwise approved by the ENGINEER. This work shall include trench excavation, preparation and shaping of bedding, transporting of pipe, jointing, connections to existing and/or proposed improvements and structures, embedment, backfill, and temporary pavement repair, if necessary. Embedment shall be in accordance with the City of Coppell Standard Construction Detail 3020. Testing in accordance with specifications is considered subsidiary to this pay item.

Where leads, pipe or box terminate into an existing system, this work shall include construction of a concrete collar at the junction to form a watertight connection in accordance with City of Coppell Standard Detail 6085. The construction of concrete collars, as required by these specifications, and the connection to the existing storm sewer line will not be paid for directly but shall be considered subsidiary to this pay item.

This work shall also include the construction of temporary pavement repair necessary for traffic control and detours or as determined by the ENGINEER, consisting of 6" Type B HMAC on 8" Flex Base over a geo-grid (StrataBase SB11 or approved equal). Temporary pavement repair shall be constructed and

maintained in storm drain installation areas that will be open to traffic prior to the construction of the final pavement. Temporary pavement repair, as required by these specifications, will not be paid for directly but shall be considered subsidiary to this pay item.

Measurement and payment for work performed and materials furnished related to the construction of RCP storm drain (various sizes and/or classes), as provided herein, shall be made on the basis of the price bid per linear foot (LF) in accordance with NCTCOG Item 508.6, and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 43 – 5' Recessed Curb Inlet:
Pay Item No. 44 – 10' Recessed Curb Inlet:
Pay Item No. 45 – 15' Recessed Curb Inlet:
Pay Item No. 46 – 20' Recessed Curb Inlet:
This work includes the construction of non-recessed (standard) & recessed curb inlets (various lengths) at the locations indicated on the construction plans or as determined by the ENGINEER, in accordance with the appropriate details and specifications, including City of Coppell Standard Construction Details 6020 and 6030 and NCTCOG Item 702. Concrete used for the construction of inlets shall be Class "A", with a minimum cement content of 5 sacks of cement/cubic yard of concrete, and a 3,000 psi minimum compressive strength when tested at 28 days.

Measurement and payment for work performed and materials furnished related to the construction of curb inlets (various types & lengths), as provided herein, shall be made on the basis of the price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 47 – Slotted Drain System (12 in)
Pay Item No. 48 – Slotted Drain Outfall (12 in)
This work includes the installation of slotted drain and slotted drain outfall at the locations shown in the plans or as established by the ENGINEER, in accordance with TxDOT's Roadway Slotted Drain (SD) Detail and Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges Item 474.

Measurement and payment for work performed and materials furnished related to the construction of slotted drain and slotted drain outfall of the specified thickness, as provided herein, shall be made on the basis of the price bid per linear foot (LF) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 49 – Standard Fire Hydrant Assembly (New):
This pay item shall consist of the installation of new fire hydrant assemblies including connections and testing of the fire hydrants at locations indicated on the

plans and in accordance with NCTCOG Item 502.3 and City of Coppell Standard Construction Details and Specifications. The 6" PVC water line lead from water main to gate valve and the 6" gate valve required for fire hydrant installation are included in this pay item.

Fire hydrant assemblies shall be inclusive of all work necessary to install and connect the new fire hydrant to the water line. This includes all fittings, megalugs, water pipe from fire hydrant gate valve and water pipe for stack, blocking, etc. necessary to complete the construction.

Measurement and payment for work performed and materials furnished related to installing the fire hydrant and valve assembly, as provided herein, shall be made on the basis of the price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work, including curb identification markings and any barrel extensions required.

Pay Item No. 50 – Remove Existing Fire Hydrant:
This work includes the labor, equipment, and material required to remove existing fire hydrants as indicated on the construction plans. This includes the removal of fire hydrant, fittings, blocking, and piping back to fire hydrant gate valve. Existing fire hydrants shall remain in service until the activation of the proposed fire hydrants.

This work shall include plugging hydrant leads, gate valves, and any and all openings into the existing water line that are created as a result of the abandonment and/or relocation of a fire hydrant/valve assembly by use of approved M.J. ductile iron caps or plugs and blocking according to the plans, specifications and/or details governing such work. Any items or appurtenances required for the removal of the fire hydrant and closing off of the existing water line shall be considered subsidiary to this pay item.

Measurement and payment for work performed and materials furnished related to the removal of existing fire hydrants shall be made on the basis of price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment, and other incidentals necessary to complete the work.

Pay Item No. 51 – Adjust Existing Water Valve:
This work includes adjusting existing water line valve risers to proposed grade as indicated on the construction plans or as directed by the ENGINEER, in accordance with the appropriate specifications and standards. This work shall include all excavation, salvage of water line valve when possible, replacement of water line valve and cover when necessary, grade rings, and all other materials required to complete the work. Damage to existing water line valve or ring and cover during adjustments by the CONTRACTOR shall be replaced in a timely

manner in accordance with the proper standards and specifications and at the CONTRACTOR's sole expense.

Measurement and payment for this work and shall be made on the basis of price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 52 – Relocate Existing Water Service & Meter:
This work includes the relocation of various sizes and types of water services and meters in multiple locations along the project as indicated on the construction plans or as determined by the ENGINEER. This work shall be in accordance with NCTCOG Item 502.10 and the appropriate City of Coppell Standard Construction Details. The service saddle, corporation stop, service line (various sizes), setter and water meter box shall be replaced at each water service location. This work includes replacing the existing setter and meter box with new service lines, new setter and new meter box, and re-connecting to the existing service line; however, all meters shall be re-used or provided by the City of Coppell. No separate pay will be allowed for repairing damage to water meters due to construction on this project, unless approved otherwise by the ENGINEER. The cost to repair such damage shall be the sole responsibility of the CONTRACTOR. All connections to existing private service lines shall be done using a brass compression coupling. Any portion of the existing private water service line that needs to be replaced or modified shall be done under the supervision of a licensed plumber and shall meet all local, state, and federally applicable codes.

The CONTRACTOR shall be responsible for verifying that all water services and meters within the project limits are transferred to the proposed water line as indicated on the construction plans. **No service or meter shall be without water supply for more than four (4) hours.**

Measurement and payment shall be made on the basis of price per each (EA) Water Service and Meter installed, for all lengths of service line, and shall be the total compensation for furnishing all materials regardless of service length, tools, equipment, labor, and any other incidentals necessary to complete the work.

Pay Item No. 53 – Adjust Existing Sanitary Sewer Manhole Rim to Grade:
This work includes adjusting existing sanitary sewer manhole rims to proposed grade as indicated on the construction plans or as directed by the ENGINEER, in accordance with the appropriate specifications and standards. This work shall include all excavation, salvage of manhole ring and cover when possible, replacement of manhole ring and cover when necessary, grade rings, and all other materials required to complete the work. Damage to existing sanitary sewer manholes or ring and cover during adjustments by the CONTRACTOR shall be

replaced in a timely manner in accordance with the proper standards and specifications and at the CONTRACTOR's sole expense.

Measurement and payment for this work and shall be made on the basis of price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 54 – Trench Safety for Drainage Improvements:
This work includes preparing a job specific trench safety plan and installing the proper shoring and/or bracing to adequately provide a safe trench for all storm drain construction, in compliance with current regulations and requirements of the United States Department of Labor Occupational Safety and Health Administration (OSHA) and in accordance with the appropriate details and specifications, including NCTCOG Item 107.19.3. The CONTRACTOR shall have a Trench Safety Plan prepared, signed and sealed by a professional engineer and provided to the ENGINEER prior to the start of construction. The preparation of the trench safety plan, as required by these specifications, will not be paid for directly but shall be considered subsidiary to this pay item.

Measurement and payment for work performed and materials furnished related to the preparation of a trench safety plan and the installation of a trench safety systems, as provided herein, shall be made on the basis of the price bid per linear foot (LF) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 55 – Remove & Dispose of Existing Street Light Foundation:
This work includes the removal and disposal of any street light foundation indicated on the construction plans to be removed, including removing the concrete base and any hardware associated with the street light. Also, included in this pay item will be the coordination between the CONTRACTOR and franchise utility company to safely disconnect and cap any electrical lines connected to the street light.

Measurement and payment for street light foundation removal and disposal work performed herein shall be made on the basis of the price bid per each (EA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

Pay Item No. 56 – Drill Shaft (Roadway Illumination Pole) (24 in):
This work shall include the furnishing and installation of roadway light foundations as indicated in the plans. All work shall be in accordance with the appropriate details and specifications, including Item 416 in TxDOT's Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, and ONCOR Standard Details, and Inspection.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 57 – Relocate Ex Roadway Illumination Assembly onto New Foundation

This work shall include installation of Roadway Illumination Assemblies (LED) as indicated in the plans. City shall provide assemblies which include all necessary poles, arms, light fixtures, luminaires, and connections as shown in plans and shall be installed in accordance with City of Coppell standards and the manufacturer's specifications.

This work shall include furnishing, installing, energizing, and testing luminaire as indicated in the plans or specifications. Said luminaire shall be in accordance with City of Coppell standards and the manufacturer's specifications.

Measurement and Payment shall be made on the basis of the bid price per each (EA) complete pole installation of the type specified and shall be the total compensation for furnishing all labor, materials, equipment, and incidentals necessary to complete the work

Pay Item No. 58 – 2" PVC Schedule 40 Illumination Conduit (Trench):

This work shall include the furnishing and installation of 2" Schedule 40 PVC conduit (Bore, Bridge, Trench) in accordance with City of Coppell standards and specification "Underground Traffic Signal Requirements; Conduit, Ground Boxes, Concrete Cabinet Foundations, and Installation Procedures", and NCTCOG standards.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing and installing conduit; by jacking, boring, tunneling, excavating, or mounting on structure; furnishing and placing backfill; furnishing and installing mounting brackets; furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 59 –Type 'A' Ground Box:

This work shall include the furnishing and installation of new ground boxes in accordance with City of Coppell standards and specification "Underground Traffic Signal Requirements; Conduit, Ground Boxes, Concrete Cabinet Foundations, and Installation Procedures", and appropriate TxDOT standard details.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 60 – 1 Conductor #8 Gauge Bare Wire (Illumination):

This work shall include the furnishing and installation of 1C #8 gauge bare wire in multiple locations of the project in accordance with City of Coppell standards and specification "Multiple Conductor and Single Conductor Traffic Signal Cable and Wire", and NCTCOG standards.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 61 – 1 Conductor #2 Gauge Insulated Wire (Illumination):
This work shall include the furnishing and installation of 1C #6/#2 Gauge XHHW Insulated wire in multiple locations of the project in accordance with City of Coppell standards and specification "Multiple Conductor and Single Conductor Traffic Signal Cable and Wire", and NCTCOG standards.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 62 – Drill Shaft (Traffic Signal Pole) (36”):
Pay Item No. 63 – Drill Shaft (Traffic Signal Pole) (48”):
This work shall include the furnishing and installation of traffic signal pole foundations as indicated in the plans. All work shall be in accordance with the appropriate details and specifications, including Item 416 in TxDOT's 2014 Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, and ONCOR Standard Details, and Inspection.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 64 – Portable Concrete Barrier (Low Profile) (Type 1):
This work shall include the furnishing and installation of a portable concrete barrier (Low Profile, Type 1) in accordance with City of Coppell standards, TxDOT Bid Item 512, and appropriate TxDOT standard details.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 65 – 2" PVC Schedule 40 Signal Conduit (Trench):
Pay Item No. 66 – 3" PVC Schedule 40 Signal Conduit (Trench):
Pay Item No. 67 – 4" PVC Schedule 40 Signal Conduit (Trench):
Pay Item No. 68 – 4" PVC Schedule 40 Signal Conduit (Bore):
Pay Item No. 69 – 2" PVC Schedule 80 Signal Conduit (Trench):
This work shall include the furnishing and installation of 2" Schedule 40 PVC conduit (Trench), 3" Schedule 40 PVC conduit (Trench), 4" Schedule 40 PVC conduit (Trench), 4" Schedule 40 PVC conduit (Bore), and 2" Schedule 80 PVC conduit (Trench) for traffic signal cable in accordance with City of Coppell standards and specification "Underground Traffic Signal Requirements; Conduit, Ground Boxes, Concrete Cabinet Foundations, and Installation Procedures", and TxDOT Specification 618.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing and installing conduit; by jacking, boring, tunneling, excavating, or mounting on structure; furnishing and placing backfill; furnishing and installing mounting brackets; furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 70 – 1 Conductor #6 Gauge Bare Wire (Traffic Signal):
Pay Item No. 71 – 1 Conductor #6 Gauge XHHW Wire (Traffic Signal):
This work shall include the furnishing and installation of 1C #6 gauge bare wire and 1C #6 gauge insulated wire in multiple locations of the project in accordance with City of Coppell standards and specification "Multiple Conductor and Single Conductor Traffic Signal Cable and Wire", and TxDOT Specification 620.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 72 – Type 'C' Ground Box w/Apron:
This work shall include the furnishing and installation of new ground boxes in accordance with City of Coppell standards and specification "Underground Traffic Signal Requirements; Conduit, Ground Boxes, Concrete Cabinet Foundations, and Installation Procedures", and TxDOT Specification 624.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 73 – Removing Ground Box:
This work shall include the removal of ground boxes at multiple locations in accordance with City of Coppell standards and specification "Underground Traffic Signal Requirements; Conduit, Ground Boxes, Concrete Cabinet Foundations, and Installation Procedures", and TxDOT Specification 624.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 74 – Power Service and Pedestal Equipment:
This work shall include the furnishing and installation of power service and pedestal equipment in accordance with City of Coppell standards and specification "Power Service and Service Equipment and General System Wiring Procedures", and TxDOT Specification 628.

This work shall include all coordination with necessary franchise utilities to complete the work.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 75 – Installing Highway Traffic Signals:
Pay Item No. 76 – Removing Traffic Signals:
Pay Item No. 77 – Installing Highway Traffic Signals (Upgrade):
This work shall include the furnishing and installation of all equipment necessary to make the traffic signal fully operational as well as removing existing equipment that is to be replaced or relocated as part of this signal modification in accordance with TxDOT Bid Item 680 and appropriate TxDOT standard details. This work shall also include relocating opticom preemption devices.

In accordance with TxDOT Bid Item 680, a traffic signal is defined as a signalized intersection controlled by a single traffic controller.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 78 – Vehicle Signal Section (12”) (LED) (Green):
Pay Item No. 79 – Vehicle Signal Section (12”) (LED) (Green Arrow):
Pay Item No. 80 – Vehicle Signal Section (12”) (LED) (Yellow):
Pay Item No. 81 – Vehicle Signal Section (12”) (LED) (Yellow Arrow):
Pay Item No. 82 – Vehicle Signal Section (12”) (LED) (Red):
Pay Item No. 83 – Vehicle Signal Section (12”) (LED) (Red Arrow):
Pay Item No. 84 – Pedestrian Signal Section (LED) (Countdown):
This work shall include the furnishing and installation of Vehicle Signal Sections (12”) (LED) (Green, Green Arrow, Yellow, Yellow Arrow, Red, and Red Arrow) and Pedestrian Signal Heads (LED) (Countdown) in multiple locations of the project in accordance with City of Coppell standards and specification

“Polycarbonate Resin Traffic Signal Heads 12 Inch, Expandable, Adjustable Type", and TxDOT Specification 682.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 85 – Back Plates (12”) (3 Section):
Pay Item No. 86 – Back Plates (12”) (4 Section):
Pay Item No. 87 – Back Plates (12”) (5 Section):
This work shall include the furnishing and installation of Back Plates (12”) (3 Section, 4 Section, and 5 Section) in multiple locations of the project in accordance with City of Coppell standards and specification “Polycarbonate Resin Traffic Signal Heads 12 Inch, Expandable, Adjustable Type", and TxDOT Specification 682.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 88 – 3 Conductor #14 Gauge Type A Traffic Signal Cable:
Pay Item No. 89 – 5 Conductor #14 Gauge Type A Traffic Signal Cable:
Pay Item No. 90 – 7 Conductor #14 Gauge Type A Traffic Signal Cable:
Pay Item No. 91 – 10 Conductor #14 Gauge Type A Traffic Signal Cable:
Pay Item No. 92 – 20 Conductor #14 Gauge Type A Traffic Signal Cable:
Pay Item No. 93 – 2 Conductor #12 Gauge Type C Traffic Signal Cable:
This work shall include the furnishing and installation of 3C #14 gauge signal cable, 5C #14 gauge signal cable, 7C #14 gauge signal cable, 10C #14 gauge signal cable, 20C #14 gauge signal cable, and 2C #12 gauge signal cable in multiple locations of the project in accordance with City of Coppell standards and specification "Multiple Conductor and Single Conductor Traffic Signal Cable and Wire", and TxDOT Specification 684.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 94 – Traffic Signal Pole Assembly (36’ Arm):
Pay Item No. 95 – Traffic Signal Pole Assembly (44’ Arm):
Pay Item No. 96 – Traffic Signal Pole Assembly (55’ Arm):
Pay Item No. 97 – Traffic Signal Pole Assembly (60’ Arm):
Pay Item No. 98 – Traffic Signal Pole Assembly (65’ Arm):
This work shall include the furnishing and installation of traffic signal pole assemblies with a 36’ arm, traffic signal pole assemblies with a 44’ arm, traffic signal pole assemblies with a 55’ arm, and traffic signal pole assemblies with a 60’ arm, and traffic signal pole assemblies with a 65’ arm in multiple locations of

the project in accordance with TxDOT Bid Item 686 and appropriate TxDOT standard details.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work. Payment shall also include powder coating as necessary.

Pay Item No. 99 – Pedestal Pole Assembly:
This work shall include the furnishing and installation of pedestal pole assemblies in multiple locations of the project in accordance with TxDOT Bid Item 687 and appropriate TxDOT standard details.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work. Payment shall also include powder coating as necessary.

Pay Item No. 100 – Pedestrian Detector Push Button (APS):
Pay Item No. 101 – Pedestrian Detector Push Button:
Pay Item No. 102 – Pedestrian Detector Controller Unit:
This work shall include the furnishing and installation of pedestrian detector push buttons (Accessible Pedestrian Signals and non-Accessible Pedestrian Signals), and a pedestrian detector controller unit in multiple locations of the project in accordance with TxDOT Bid Item 688 and appropriate TxDOT standard details.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 103 – Tree Trimming:
This work shall include the trimming of trees in accordance with City of Coppell standards, TxDOT Bid Item 752, and appropriate TxDOT standard details, as needed for the entire project.

Measurement and Payment shall be made on the basis of the bid price per acre (AC) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 104 – VIVDS Camera Assembly:
Pay Item No. 105 – VIVDS Camera Assembly (Relocate):
This work shall include the furnishing, installation and complete setup of VIVDS camera assemblies and relocation of VIVDS camera assemblies in multiple locations of the project in accordance with City of Coppell standards and specification and TxDOT standards. VIVDS detection system must meet City of Coppell requirements.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, system configuration and set-up, equipment and incidentals necessary to complete the work.

Pay Item No. 106 – VIVDS Coaxial Communication Cable:
This work shall include the furnishing and installation of VIVDS coaxial communication cable in multiple locations of the project in accordance with City of Coppell standards and specification "Multiple Conductor and Single Conductor Traffic Signal Cable and Wire", and TxDOT Specification 6002.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 107 – Preparation of Conduit:
This work shall include the preparation of existing conduits in accordance with City of Coppell standards and specification "Underground Traffic Signal Requirements; Conduit, Ground Boxes, Concrete Cabinet Foundations, and Installation Procedures", and TxDOT Specification 6027.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 108 – CAT5E Ethernet Cable:
This work shall include the furnishing and installation of CAT5E ethernet cable for license plate readers in multiple locations of the project in accordance with City of Coppell standards and specification "Multiple Conductor and Single Conductor Traffic Signal Cable and Wire", and TxDOT Specification 6089.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 109 – Illuminated Street Name Signs:
Pay Item No. 110 – Illuminated Street Name Signs (Relocate):
This work shall include the furnishing and installation of illuminated street name signs and relocation of illuminated street name signs in accordance with this specification, and as indicated in the drawing. Signs shall be edge lit LED illuminated with an 18” tall viewing area. Signs shall be “Classic Thinline” model from Southern Manufacturing, or approved equal. Signs shall be mounted to the mast arm using an Astro-Brac® SP0140 or approved equal. A photocell shall be provided to control when the sign is illuminated. The photocell shall be set up

such that all lights are on or off at the same time. Lights shall not come on or turn off at different times.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, and equipment necessary to complete the work.

Pay Item No. 111 – Opticom Detector Cable:
This work shall include the furnishing and installation of opticom detector cable in multiple locations of the project in accordance with City of Coppell standards and specification "Multiple Conductor and Single Conductor Traffic Signal Cable and Wire", and TxDOT standards.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 112 – Restore Parkways & Disturbed Areas:
This item includes all work, materials and incidentals necessary to restore parkways, yards or other areas that are disturbed to an equal or better condition than prior to construction, in accordance with the appropriate details and specifications, including NCTCOG Items 202.2, 202.3, 202.4, 202.5, 202.6 & 202.7. Disturbed areas along the length of the project shall be fine graded and cut to receive sod. Topsoil shall be placed in low areas to bring them to grade.

Unless directed otherwise by the ENGINEER, block sod matching the species (minimum of Bermuda sod) that existed prior to construction and/or the species adjacent to the disturbed area shall be placed in all disturbed areas where improved lawn or established turf existed prior to construction. The CONTRACTOR will be required to water, fertilize, mow and otherwise maintain restored areas to establish healthy growth, even distribution of vegetation and full coverage over the entire restored area. The CONTRACTOR shall also maintain and protect these areas from damage and repair any damage that occurs, until completion and final acceptance of the project by the OWNER.

All restoration to existing landscape improvements, landscape beds, gravel rock beds, and/or any other existing improvement damaged, removed, or relocated during the course of construction are included in this pay item.

Measurement and payment for parkway and disturbed area restoration work performed and materials furnished complete and in place as provided herein shall be made on the basis of the price bid per station (STA) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work, including watering, fertilizing, mowing and maintenance of the restored areas. Payment shall be made based on the quantity shown in the bid proposal, regardless if the amount installed in order to

sod all disturbed areas exceeds the bid quantity. No more than 75% of this item will be paid until 100% turf coverage has been established in all sodded areas, to the satisfaction of the ENGINEER.

Pay Item No. 113 – VIVDS Camera Assembly (Remove):
This work shall include the removal of VIVDS camera assemblies in multiple locations of the project in accordance with City of Coppell standards and specification "Video Imaging Vehicle Detection System", and TxDOT Specification 6306.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, system configuration and set-up, equipment and incidentals necessary to complete the work.

Pay Item No. 114 – Install Iteris Vantage Vector Sensor:
Pay Item No. 115 – Install Iteris Vantage Next Sensor:
This work shall include the installation and complete setup of VIVDS camera assemblies in multiple locations of the project in accordance with City of Coppell standards and specification "Video Imaging Vehicle Detection System", and TxDOT Specification 6306.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for all labor, system configuration and set-up, equipment and incidentals necessary to complete the work.

Pay Item No. 116 – Preparation of Conduit:
This work shall include the preparation of existing conduits in accordance with City of Coppell standards and specification "Underground Traffic Signal Requirements; Conduit, Ground Boxes, Concrete Cabinet Foundations, and Installation Procedures", and TxDOT Specification 6027.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 117 – Preparation of Ground Box:
This work shall include the preparation of existing ground boxes in accordance with City of Coppell standards and specification "Underground Traffic Signal Requirements; Conduit, Ground Boxes, Concrete Cabinet Foundations, and Installation Procedures", and TxDOT Specification 6027.

Measurement and Payment shall be made on the basis of the bid price per each (EA) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. 118 – VIVDS/Radar Cable:
This work shall include the furnishing and installation of VIVDS/radar cable for detection in multiple locations of the project in accordance with City of Coppell standards and specification "Video Imaging Vehicle Detection System", and TxDOT Specification 6306. Detection cable must meet City of Coppell requirements.

Measurement and Payment shall be made on the basis of the bid price per linear foot (LF) and shall be the total compensation for furnishing all labor, materials, equipment and incidentals necessary to complete the work.

Pay Item No. X1 – Project Allowance for Water Improvements:
Projects of this type may require modifications to the contract and/or additional work which cannot be foreseen prior to construction. The cost for these modifications and/or additions will be reimbursed from this allowance if approved prior to performing the work. There is no guarantee that this allowance will be used at all. If used it may be used part or in whole at the OWNER's discretion.

A project allowance of $25,000.00 shall be given for any additional work associated with water improvements. Additional work shall be determined by the Owner. This work excludes any work listed and quantified on the bid proposal or work associated to complete bid items. As approved by OWNER, CONTRACTOR will be given additional working days for additional quantities/work.

Pay Item No. X2 – Project Allowance for Storm Improvements:
Projects of this type may require modifications to the contract and/or additional work which cannot be foreseen prior to construction. The cost for these modifications and/or additions will be reimbursed from this allowance if approved prior to performing the work. There is no guarantee that this allowance will be used at all. If used it may be used part or in whole at the OWNER's discretion.

A project allowance of $25,000.00 shall be given for any additional work associated with storm improvements. Additional work shall be determined by the Owner. This work excludes any work listed and quantified on the bid proposal or work associated to complete bid items. As approved by OWNER, CONTRACTOR will be given additional working days for additional quantities/work.

Pay Item No. X3 – Project Allowance for Paving Improvements:
Projects of this type may require modifications to the contract and/or additional work which cannot be foreseen prior to construction. The cost for these modifications and/or additions will be reimbursed from this allowance if approved prior to performing the work. There is no guarantee that this allowance will be used at all. If used it may be used part or in whole at the OWNER's discretion.

A project allowance of $25,000.00 shall be given for any additional work associated with paving improvements. Additional work shall be determined by the Owner. This work excludes any work listed and quantified on the bid proposal or work associated to complete bid items. As approved by OWNER, CONTRACTOR will be given additional working days for additional quantities/work.

Pay Item No. X4 – Project Allowance for Landscaping Improvements:
Projects of this type may require modifications to the contract and/or additional work which cannot be foreseen prior to construction. The cost for these modifications and/or additions will be reimbursed from this allowance if approved prior to performing the work. There is no guarantee that this allowance will be used at all. If used it may be used part or in whole at the OWNER's discretion.

A project allowance of $40,000.00 shall be given for any additional work associated with landscaping/irrigation improvements. Additional work shall be determined by the Owner. This work excludes any work listed and quantified on the bid proposal or work associated to complete bid items. As approved by OWNER, CONTRACTOR will be given additional working days for additional quantities/work.

Pay Item No. X5 – Project Allowance for Irrigation System Repairs
Projects of this type may require modifications to the contract and/or additional work which cannot be foreseen prior to construction. The cost for these modifications and/or additions will be reimbursed from this allowance if approved prior to performing the work. There is no guarantee that this allowance will be used at all. If used it may be used part or in whole at the OWNER's discretion.

This work includes repairing, replacing reconstructed and/or modifying any existing irrigation system or system component within the limits of the work area that is damaged or whose function/operation is adversely impacted by the construction of the proposed improvements, in a manner satisfactory to the adjacent property owners to whom they belong, and the ENGINEER. This work includes repairing or replacing any damaged pipes, sprinkler heads or other system components (i.e., valves, controllers, valve boxes, etc.), as well as adding additional lines and/or heads necessary to properly irrigate landscape or turf areas that are adjusted, modified, or reconfigured as a result of this project. <u>All irrigation work must be performed by a licensed irrigator (CONTRACTOR must submit documentation/qualifications to OWNER prior to work being performed).</u>

All existing irrigation systems will be assumed to be in good condition and fully operational unless the CONTRACTOR has inspected, noted and documented some specific damage to a system that exists, prior to construction beginning. CONTRACTOR shall contact adjacent property owners and/or system owners/operators prior to construction to determine the limits of all existing irrigation systems, the location of sprinkler heads and other system components, and to

identify and document any existing damage. CONTRACTOR will be required to submit an affidavit to the ENGINEER documenting meeting with property owners/irrigation system owners/operators, documentation of condition/operational status of each system and description of any deficiencies in systems (i.e. entire system not working, zone not working, broken heads, leaks, etc.). CONTRACTOR will be required to fix any pre-existing problems with irrigation systems within the limits of the work area not documented prior to construction.

CONTRACTOR shall be responsible for ensuring irrigation systems within the limits of the work area remain operational throughout construction. All repairs should be completed as soon as possible after the damage is discovered. Any damage to existing grass, trees or landscaping resulting from a lack of water during construction because of damage to irrigation systems or irrigation systems that become inoperable will be the sole responsibility of the CONTRACTOR to replace. The exact number and location of sprinkler heads, valves, controllers, etc. on this project is unknown. The CONTRACTOR is, therefore, advised to visit the project site for themselves and make their own determination of where existing irrigation systems may be located and to what extent those systems and system components may be damaged or impacted during construction.

A project allowance of $10,000.00 shall be given for any additional work associated with irrigation system repairs. Additional work shall be determined by the Owner. This work excludes any work listed and quantified on the bid proposal or work associated to complete bid items. As approved by OWNER, CONTRACTOR will be given additional working days for additional quantities/work.

Pay Item No. A4 – 8” Flexible Base (Type A) (Grade 1 or 2)
This work includes the installation of flexible base over a geo-grid (StrataBase SB11 or approved equal) at the locations shown in the plans or as established by the ENGINEER, in accordance with TxDOT’s Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges Item 247.

Measurement and payment for work performed and materials furnished related to the construction of flexible base over a geogrid (StrataBase SB11 or approved equal) of the specified thickness, as provided herein, shall be made on the basis of the price bid per square yard (SY) and shall be total compensation for furnishing and/or operating all labor, materials, tools, equipment and other incidentals necessary to complete the work.

SECTION 6
TECHNICAL SPECIFICATIONS

THE · CITY · OF

COPPELL

TEXAS · 1890

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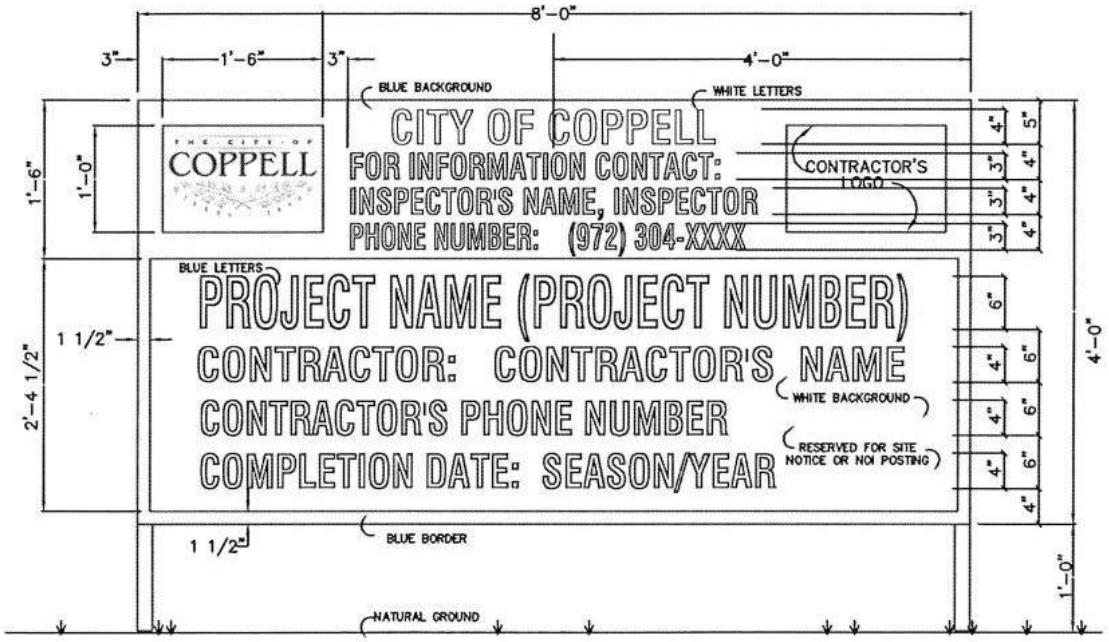
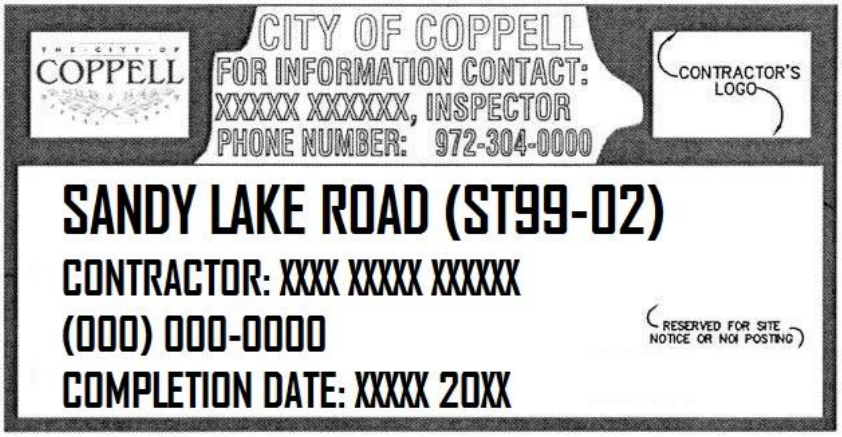
CITY OF COPPELL
PROJECT SIGN



NOTES:
1) LETTERING SHOULD BE BOLD TYPE
2) SIGN PANEL WILL BE 3/4" EXTERIOR PLYWOOD PAINTED AS SHOWN ON DETAIL
3) FRAME WILL BE 2"X4" STOCK– REINFORCED BEHIND SIGN PANEL AT APPROX. 2' CENTERS
4) ALL PAINT TO BE "OUTDOOR TYPE"
5) COPPELL LOGO TO BE PROVIDED BY THE CITY

EXAMPLE:



Item 247
Flexible Base

1. DESCRIPTION

Construct a foundation course composed of flexible base.

2. MATERIALS

Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications. Notify the Engineer of the proposed material sources and of changes to material sources. The Engineer may sample and test project materials at any time before compaction throughout the duration of the project to assure specification compliance. Use Tex-100-E material definitions.

2.1. **Aggregate**. Furnish aggregate of the type and grade shown on the plans and meeting the requirements of Table 1. Each source must meet Table 1 requirements for liquid limit, plasticity index, and wet ball mill for the grade specified. Do not use additives, such as but not limited to lime, cement, or fly ash to modify aggregates to meet the requirements of Table 1 unless shown on the plans.

Table 1
Material Requirements

Property	Test Method	Grade 1–2	Grade 3	Grade 4[2]	Grade 5
Sampling	Tex-400-A				
Master gradation sieve size (cumulative % retained)	Tex-110-E				
2-1/2"		0	0	As shown on the plans	0
1-3/4"		0–10	0–10		0–5
7/8"		10–35	–		10–35
3/8"		30–65	–		35–65
#4		45–75	45–75		45–75
#40		65–90	50–85		70–90
Liquid Limit, % Max	Tex-104-E	40	40	As shown on the plans	35
Plasticity Index, Max[1]	Tex-106-E	10	12	As shown on the plans	10
Plasticity index, Min[1]		As shown on the plans	As shown on the plans	As shown on the plans	As shown on the plans
Wet ball mill, % Max	Tex-116-E	40	–	As shown on the plans	40
Wet ball mill, % Max increase passing the #40 sieve		20	–	As shown on the plans	20
Min compressive strength, psi	Tex-117-E			As shown on the plans	
lateral pressure 0 psi		35	–		–
lateral pressure 3 psi		–	–		90
lateral pressure 15 psi		175	–		175

1. Determine plastic index in accordance with Tex-107-E (linear shrinkage) when liquid limit is unattainable as defined in Tex-104-E.
2. Grade 4 may be further designated as Grade 4A, Grade 4B, etc.

2.1.1. **Material Tolerances**. The Engineer may accept material if no more than 1 of the 5 most recent gradation tests has an individual sieve outside the specified limits of the gradation.

When target grading is required by the plans, no single failing test may exceed the master grading by more than 5 percentage points on sieves No. 4 and larger or 3 percentage points on sieves smaller than No. 4.

The Engineer may accept material if no more than 1 of the 5 most recent plasticity index tests is outside the specified limit. No single failing test may exceed the allowable limit by more than 2 points.

2.1.2. **Material Types**. Do not use fillers or binders unless approved. Furnish the type specified on the plans in accordance with the following:

2.1.2.1. **Type A**. Crushed stone produced and graded from oversize quarried aggregate that originates from a single, naturally occurring source. Do not use gravel or multiple sources.

2.1.2.2. **Type B**. Crushed or uncrushed gravel. Blending of 2 or more sources is allowed.

2.1.2.3. **Type C**. Crushed gravel with a minimum of 60% of the particles retained on a No. 4 sieve with 2 or more crushed faces as determined by Tex-460-A, Part I. Blending of 2 or more sources is allowed.

2.1.2.4. **Type D**. Type A material or crushed concrete. Crushed concrete containing gravel will be considered Type D material. Crushed concrete must meet the requirements in Section 247.2.1.3.2., "Recycled Material (Including Crushed Concrete) Requirements," and be managed in a way to provide for uniform quality. The Engineer may require separate dedicated stockpiles in order to verify compliance.

2.1.2.5. **Type E**. Caliche, iron ore or as otherwise shown on the plans.

2.1.3. **Recycled Material**. Reclaimed asphalt pavement (RAP) and other recycled materials may be used when shown on the plans. Request approval to blend 2 or more sources of recycled materials.

2.1.3.1. **Limits on Percentage**. Do not exceed 20% RAP by weight, when RAP is allowed, unless otherwise shown on the plans. The percentage limitations for other recycled materials will be as shown on the plans.

2.1.3.2. **Recycled Material (Including Crushed Concrete) Requirements**.

2.1.3.2.1. **Contractor-Furnished Recycled Materials**. Provide recycled materials, other than RAP, that have a maximum sulfate content of 3,000 ppm when tested in accordance with Tex-145-E. When the Contractor furnishes the recycled materials, including crushed concrete, the final product will be subject to the requirements of Table 1 for the grade specified. Certify compliance with DMS-11000, "Evaluating and Using Nonhazardous Recyclable Materials Guidelines," for Contractor furnished recycled materials. In addition, recycled materials must be free from reinforcing steel and other objectionable material and have at most 1.5% deleterious material when tested in accordance with Tex-413-A. For RAP, do not exceed a maximum percent loss from decantation of 5.0% when tested in accordance with Tex-406-A. Test RAP without removing the asphalt.

2.1.3.2.2. **Department-Furnished Required Recycled Materials**. When the Department furnishes and requires the use of recycled materials, unless otherwise shown on the plans:

- Department-required recycled material will not be subject to the requirements in Table 1,
- Contractor-furnished materials are subject to the requirements in Table 1 and this Item,
- the final product, blended, will be subject to the requirements in Table 1, and
- for final product, unblended (100% Department-furnished required recycled material), the liquid limit, plasticity index, wet ball mill, and compressive strength is waived.

Crush Department-furnished RAP so that 100% passes the 2 in. sieve. The Contractor is responsible for uniformly blending to meet the percentage required.

2.1.3.2.3. **Department-Furnished and Allowed Recycled Materials**. When the Department furnishes and allows the use of recycled materials or allows the Contractor to furnish recycled materials, the final blended product is subject to the requirements of Table 1 and the plans.

2.1.3.3. **Recycled Material Sources**. Department-owned recycled material is available to the Contractor only when shown on the plans. Return unused Department-owned recycled materials to the Department stockpile location designated by the Engineer unless otherwise shown on the plans.

The use of Contractor-owned recycled materials is allowed when shown on the plans. Contractor-owned surplus recycled materials remain the property of the Contractor. Remove Contractor-owned recycled materials from the project and dispose of them in accordance with federal, state, and local regulations before project acceptance. Do not intermingle Contractor-owned recycled material with Department-owned recycled material unless approved.

2.2. **Water**. Furnish water free of industrial wastes and other objectionable matter.

2.3. **Material Sources**. Expose the vertical faces of all strata of material proposed for use when non-commercial sources are used. Secure and process the material by successive vertical cuts extending through all exposed strata, when directed.

3. EQUIPMENT

Provide machinery, tools, and equipment necessary for proper execution of the work.

3.1. Provide rollers in accordance with Item 210, "Rolling." Provide proof rollers in accordance with Item 216, "Proof Rolling," when required.

3.2. When ride quality measurement is required, provide a high speed or lightweight inertial profiler certified at the Texas A&M Transportation Institute. Provide equipment certification documentation. Display a current decal on the equipment indicating the certification expiration date.

4. CONSTRUCTION

Construct each layer uniformly, free of loose or segregated areas, and with the required density and moisture content. Provide a smooth surface that conforms to the typical sections, lines, and grades shown on the plans or as directed.

Stockpile base material temporarily at an approved location before delivery to the roadway. Build stockpiles in layers no greater than 2 ft. thick. Stockpiles must have a total height between 10 and 16 ft. unless otherwise approved. After construction and acceptance of the stockpile, loading from the stockpile for delivery is allowed. Load by making successive vertical cuts through the entire depth of the stockpile.

Do not add or remove material from temporary stockpiles that require sampling and testing before delivery unless otherwise approved. Charges for additional sampling and testing required as a result of adding or removing material will be deducted from the Contractor's estimates.

Haul approved flexible base in clean trucks. Deliver the required quantity to each 100-ft. station or designated stockpile site as shown on the plans. Prepare stockpile sites as directed. When delivery is to the 100-ft. station, manipulate in accordance with the applicable Items.

4.1. **Preparation of Subgrade or Existing Base**. Remove or scarify existing asphalt concrete pavement in accordance with Item 105, "Removing Treated and Untreated Base and Asphalt Pavement," when shown on the plans or as directed. Shape the subgrade or existing base to conform to the typical sections shown on the plans or as directed.

When new base is required to be mixed with existing base, deliver, place, and spread the new flexible base in the required amount per station. Manipulate and thoroughly mix the new base with existing material to provide a uniform mixture to the specified depth before shaping.

Proof roll the roadbed in accordance with Item 216, “Proof Rolling,” before pulverizing or scarifying when shown on the plans or directed. Correct soft spots as directed.

4.2. **Placing**. Spread and shape flexible base into a uniform layer with an approved spreader the same day as delivered unless otherwise approved. Construct layers to the thickness shown on the plans. Maintain the shape of the course. Control dust by sprinkling, as directed. Correct or replace segregated areas as directed, at no additional expense to the Department.

Place successive base courses and finish courses using the same construction methods required for the first course.

4.3. **Compaction**. Compact using density control unless otherwise shown on the plans. Multiple lifts are permitted when shown on the plans or approved. Bring each layer to the moisture content directed. When necessary, sprinkle the material in accordance with Item 204, “Sprinkling.”

Begin rolling longitudinally at the sides and proceed towards the center, overlapping on successive trips by at least 1/2 the width of the roller unit. Begin rolling at the low side and progress toward the high side on superelevated curves. Offset alternate trips of the roller. Operate rollers at a speed between 2 and 6 mph as directed.

Rework, recompact, and refinish material that fails to meet or that loses required moisture, density, stability, or finish requirements before the next course is placed or the project is accepted. Continue work until specification requirements are met. Perform the work at no additional expense to the Department.

Before final acceptance, the Engineer will select the locations of tests and measure the flexible base depth in accordance with Tex-140-E. Correct areas deficient by more than 1/2 in. in thickness by scarifying, adding material as required, reshaping, recompacting, and refinishing at the Contractor’s expense.

4.3.1. **Ordinary Compaction**. Roll with approved compaction equipment as directed. Correct irregularities, depressions, and weak spots immediately by scarifying the areas affected, adding or removing approved material as required, reshaping, and recompacting.

4.3.2. **Density Control**. Compact to at least 100% of the maximum dry density determined by Tex-113-E, unless otherwise shown on the plans. Maintain moisture during compaction within ±2 percentage points of the optimum moisture content as determined by Tex-113-E. Measure the moisture content of the material in accordance with Tex-115-E or Tex-103-E during compaction daily and report the results the same day to the Engineer, unless otherwise shown on the plans or directed. Do not achieve density by drying the material after compaction.

The Engineer will determine roadway density and moisture content of completed sections in accordance with Tex-115-E. The Engineer may accept the section if no more than 1 of the 5 most recent density tests is below the specified density and the failing test is no more than 3 pcf below the specified density.

4.4. **Finishing**. After completing compaction, clip, skin, or tight-blade the surface with a maintainer or subgrade trimmer to a depth of approximately 1/4 in. Remove loosened material and dispose of it at an approved location. Seal the clipped surface immediately by rolling with a pneumatic tire roller until a smooth surface is attained. Add small increments of water as needed during rolling. Shape and maintain the course and surface in conformity with the typical sections, lines, and grades as shown on the plans or as directed.

Correct grade deviations greater than 1/4 in. in 16 feet measured longitudinally or greater than 1/4 in. over the entire width of the cross-section in areas where surfacing is to be placed. Correct by loosening and adding, or removing material. Reshape and re-compact in accordance with Section 247.4.3., “Compaction.”

4.5. **Curing**. Cure the finished section until the moisture content is at least 2 percentage points below optimum or as directed before applying the next successive course or prime coat.

4.6. **Ride Quality**. This section applies to the final travel lanes that receive a 1 or 2 course surface treatment for the final surface, unless otherwise shown on the plans. Measure ride quality of the base course after placement of the prime coat and before placement of the surface treatment, unless otherwise approved. Use a certified profiler operator from the Department's MPL. When requested, furnish the Engineer documentation for the person certified to operate the profiler.

Provide all profile measurements to the Engineer in electronic data files within 3 days after placement of the prime coat using the format specified in Tex-1001-S. The Engineer will use Department software to evaluate longitudinal profiles to determine areas requiring corrective action. Correct 0.1-mi.sections having an average international roughness index (IRI) value greater than 100.0 in. per mile to an IRI value of 100.0 in. per mile or less for each wheel path, unless otherwise shown on the plans.

Re-profile and correct sections that fail to maintain ride quality until placement of the next course, as directed. Correct re-profiled sections until specification requirements are met, as approved. Perform this work at no additional expense to the Department.

5. MEASUREMENT

Flexible base will be measured as follows:

- **Flexible Base (Complete In Place)**. The ton, square yard, or any cubic yard method.
- **Flexible Base (Roadway Delivery)**. The ton or any cubic yard method.
- **Flexible Base (Stockpile Delivery)**. The ton, cubic yard in vehicle, or cubic yard in stockpile.

Measurement by the cubic yard in final position and square yard is a plans quantity measurement. The quantity to be paid for is the quantity shown in the proposal unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

Measurement is further defined for payment as follows.

5.1. **Cubic Yard in Vehicle**. By the cubic yard in vehicles of uniform capacity at the point of delivery.

5.2. **Cubic Yard in Stockpile**. By the cubic yard in the final stockpile position by the method of average end areas.

5.3. **Cubic Yard in Final Position**. By the cubic yard in the completed and accepted final position. The volume of base course is computed in place by the method of average end areas between the original subgrade or existing base surfaces and the lines, grades, and slopes of the accepted base course as shown on the plans.

5.4. **Square Yard**. By the square yard of surface area in the completed and accepted final position. The surface area of the base course is based on the width of flexible base as shown on the plans.

5.5. **Ton**. By the ton of dry weight in vehicles as delivered. The dry weight is determined by deducting the weight of the moisture in the material at the time of weighing from the gross weight of the material. The Engineer will determine the moisture content in the material in accordance with Tex-103-E from samples taken at the time of weighing.

When material is measured in trucks, the weight of the material will be determined on certified scales, or the Contractor must provide a set of standard platform truck scales at a location approved by the Engineer. Scales must conform to the requirements of Item 520, "Weighing and Measuring Equipment."

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for the types of work shown below. No additional payment

will be made for thickness or width exceeding that shown on the typical section or provided on the plans for cubic yard in the final position or square yard measurement.

Sprinkling and rolling, except proof rolling, will not be paid for directly but will be subsidiary to this Item unless otherwise shown on the plans. When proof rolling is shown on the plans or directed, it will be paid for in accordance with Item 216, “Proof Rolling.”

Where subgrade is constructed under this Contract, correction of soft spots in the subgrade will be at the Contractor’s expense. Where subgrade is not constructed under this Contract, correction of soft spots in the subgrade will be paid in accordance with pertinent Items or Article 4.4., “Changes in the Work.”

6.1. **Flexible Base (Complete In Place)**. Payment will be made for the type and grade specified. For cubic yard measurement, “In Vehicle,” “In Stockpile,” or “In Final Position” will be specified. For square yard measurement, a depth will be specified. This price is full compensation for furnishing materials, temporary stockpiling, assistance provided in stockpile sampling and operations to level stockpiles for measurement, loading, hauling, delivery of materials, spreading, blading, mixing, shaping, placing, compacting, reworking, finishing, correcting locations where thickness is deficient, curing, furnishing scales and labor for weighing and measuring, and equipment, labor, tools, and incidentals.

6.2. **Flexible Base (Roadway Delivery)**. Payment will be made for the type and grade specified. For cubic yard measurement, “In Vehicle,” “In Stockpile,” or “In Final Position” will be specified. The unit price bid will not include processing at the roadway. This price is full compensation for furnishing materials, temporary stockpiling, assistance provided in stockpile sampling and operations to level stockpiles for measurement, loading, hauling, delivery of materials, furnishing scales and labor for weighing and measuring, and equipment, labor, tools, and incidentals.

6.3. **Flexible Base (Stockpile Delivery)**. Payment will be made for the type and grade specified. For cubic yard measurement, “In Vehicle” or “In Stockpile” will be specified. The unit price bid will not include processing at the roadway. This price is full compensation for furnishing and disposing of materials, preparing the stockpile area, temporary or permanent stockpiling, assistance provided in stockpile sampling and operations to level stockpiles for measurement, loading, hauling, delivery of materials to the stockpile, furnishing scales and labor for weighing and measuring, and equipment, labor, tools, and incidentals.

Item 416
Drilled Shaft Foundations

1. DESCRIPTION

Construct foundations consisting of reinforced or non-reinforced concrete drilled shafts.

2. MATERIALS

Use materials that meet the requirements of the following Items.

- Item 421, "Hydraulic Cement Concrete,"
- Item 440, "Reinforcement for Concrete," and
- Item 448, "Structural Field Welding."

Use concrete for drilled shafts that meets the requirements of Table 1 unless otherwise shown on the plans.

Table 1
Concrete for Drilled Shafts

Drilled Shaft Type	Concrete
Non-reinforced	Class A
Reinforced	Class C
Slurry and underwater concrete placement	Class SS

Use coarse aggregate Grade 4, 5, or 6 for drilled shaft concrete in reinforced drilled shafts. Grade 2 or 3 may be used if the shaft is dry and reinforcing steel has a 5 in. minimum clear spacing.

Use a water-reducing, retarding admixture in accordance with DMS-4640, "Chemical Admixtures for Concrete," in all concrete when using casing that will be pulled or when placing shafts underwater or under slurry.

Use concrete with slump that meets the requirements of Table 2 as determined by Tex-415-A.

Table 2
Slump Requirements

Placement Type	Minimum Acceptable Placement Slump, in.	Recommended Design and Placement Slump, in.	Maximum Acceptable Placement Slump, in.
Dry	5-1/2	6-1/2	7-1/2
Underwater and under slurry	7	8	9

Perform a slump loss test in accordance with Tex-430-A before beginning work when casing is to be pulled or concrete is to be placed underwater or under slurry. Provide concrete that will maintain a slump of at least 4 in. throughout the entire anticipated time of concrete placement. Time of concrete placement is described in Section 416.3.6., "Concrete," and Section 416.3.7., "Additional Requirements for Slurry Displacement or Underwater Concrete Placement Methods." Note the temperature of the concrete mix at the beginning of the slump loss test. Place the concrete if its temperature at the time of placement into the drilled shaft is no more than 10°F higher than the slump loss test temperature. Use ice or other concrete cooling ingredients to lower concrete temperature, or run additional slump loss tests at the higher temperatures. Slump loss testing will be waived if anticipated time of concrete placement is less than 90 minutes.

Use mineral drilling slurry that meets the requirements of Table 3, as determined by Tex-130-E. Determine pH of slurry by Tex-128-E or pH paper strips.

Table 3
Mineral Slurry Requirements

Before Introduction into the Excavation			Sampled from the Bottom of the Excavation before Concreting		
Specific Gravity	Sand Content	pH	Specific Gravity	Viscosity (sec.)	Sand Content
≤ 1.10	≤ 1%	8–11	≤ 1.15	≤ 45	≤ 4%

Use mineral slurry consisting of processed bentonite or attapulgite clays mixed with clean fresh water. Do not use partially hydrolyzed polyacrylamide (PHPA) polymeric slurry or any blended mineral-polymer slurry.

If approved, water may be used as the drilling fluid. In this case, all of the provisions of Table 3 must be met except that the maximum specific gravity is not to exceed 1.12.

Sample slurry from the bottom of the hole, before placing concrete, and test it in accordance with Tex-130-E. Use a pump or air lift to remove slurry that does not meet the requirements of Table 3 while adding fresh clean slurry to the top of the hole to maintain the slurry level. Continue this operation until the slurry sampled from the bottom of the hole meets the requirements.

3. CONSTRUCTION

Submit Drilled Shaft installation plan for review no later than one month before drilled shaft construction. Include the following in the plan:

- Name and experience record of the drilled shaft superintendent who will be in charge of drilled shaft operations for this project.
- List of proposed equipment to be used, including cranes, drills, augers, bailing buckets, final cleaning equipment, desanding equipment, slurry pumps, core sampling equipment, tremies or concrete pumps, casing, etc.
- Details of overall construction operation sequence and the sequence of shaft construction in bents or groups.
- Details of shaft excavation methods.
- When the use of slurry is anticipated, details of the slurry mix design and its suitability for the subsurface conditions at the construction site, mixing and storage methods, maintenance methods and disposal procedures.
- Details of methods to clean the shaft excavation.
- Details of reinforcement placement, including support and centralization methods.
- Details of concrete placement, including proposed operational procedures for free fall, tremie or pumping methods.
- Details of casing installation and removal methods.

The installation plan will be reviewed for conformance with the plans, specifications and special provisions. The Contractor will be notified within 14 days of receipt of the installation plan of any additional information required and/or changes necessary to meet the contract requirements. All procedural approvals given will be subject to trial in the field and will not relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the plans and specifications.

Place the shaft to within the following tolerances:

- Vertical plumbness—1 in. per 10 feet of depth.
- Center of shaft located under column—1 in. of horizontal plan position.
- Center of shaft located under footing—3 in. of horizontal plan position.

Complete the embankment at bridge ends before installing drilled shafts that pass through the fill. Refer to Item 423, “Retaining Walls,” for provisions for drilled shafts passing through the structural volume of retaining walls.

3.1. **Excavation**. The plans indicate the expected depths and elevations for encountering satisfactory bearing material. Excavate as required for the shafts through all materials encountered to the dimensions and elevations shown on the plans or required by the site conditions. Removal of man-made obstructions not shown on the plans will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method." Adjust the bottom of the shaft or alter the foundation if satisfactory founding material is not encountered at plan elevation, as approved to satisfactorily comply with design requirements. Blasting is not allowed for excavations.

Stop drilling if caving conditions are encountered, and adopt a construction method that stabilizes the shaft walls.

Do not excavate a shaft within 2 shaft diameters (clear) of an open shaft excavation, or one in which concrete has been placed in the preceding 24 hr.

Dispose of material excavated from shafts and not incorporated into the finished project in accordance with the plans and with federal, state, and local laws.

Provide suitable access, lighting, and equipment for proper inspection of the completed excavation and checking the dimensions and alignment of shafts excavation.

3.2. **Core Holes**. Take cores to determine the character of the supporting materials if directed. Use a method that will result in recovery of an intact sample adequate for judging the character of the founding material. Such cores should be at least 5 ft. deeper than the proposed founding grade or a depth equal to the diameter of the shaft, whichever is greater. Take these cores when the excavation is complete.

3.3. **Casing**. Use casing when necessary to prevent caving of the material, to exclude ground water, when slurry is used for hole stabilization, or when required as part of the Contractor's Safety Plan. Provide casing with an outside diameter not less than the specified diameter of the shaft. The portion of shaft below the casing may be as much as 2 in. smaller than the specified shaft diameter. No extra compensation will be made for concrete required to fill an oversized casing or oversized excavation. Use casing strong enough to withstand handling stresses and pressures of concrete and of the surrounding earth or water, and that is watertight, smooth, clean, and free of accumulations of hardened concrete.

Use construction methods that result in a minimal amount of disturbed soil being trapped outside the casing. This does not apply to temporary undersized casings used to protect workers inside shafts or to drilled shafts designed for point bearing only.

Leave casing in place only if authorized or shown on the plans. Extract casing only after placing the concrete to an appropriate level. Maintain sufficient concrete in the casing at all times to counteract soil and water pressure. Rotate or move the casing up or down a few inches if necessary before and during concrete placement to facilitate extraction of the casing.

3.4. **Requirements for Slurry Displacement Method**. When soil conditions warrant, use the slurry displacement method to construct drilled shafts unless otherwise shown on the plans. Use this method to support the sides of the excavation with processed mineral slurry that is then displaced by concrete to form a continuous concrete shaft.

Install surface casing to a minimum of 10 ft. below existing ground before introducing slurry. Do not use casing other than surface casing. Do not use surface casing longer than 20 ft. without approval. Do not extract the surface casing until after placing the concrete.

Pre-mix slurry in a reservoir with enough capacity to fill the excavation and for recovery of the slurry during concrete placement. Do not mix slurry in the shaft excavation or other hole. Allow adequate time for hydration of the slurry before introduction into the excavation.

Maintain a head of slurry in the shaft excavation at or near ground level or higher, as necessary, to counteract ground water pressure during and after drilling.

Use an air lift or proper size cleanout bucket, just before placing reinforcing steel, to remove any material that may have fallen from the sides of the excavation or accumulated on the bottom after the completion of drilling. Use a cleanout bucket if material is too large to be picked up with an air lift.

Re-process the hole with the auger as directed if concrete placement is not started within 4 hr. of the completion of the shaft excavation. Then clean the bottom with an air lift or cleanout bucket, and check the slurry at the bottom of the hole for compliance with the slurry requirements of Article 416.2., "Materials."

Agitate the congealed slurry to liquefaction if the slurry forms a gel before concrete placement, and whenever directed.

Recover and dispose of all slurry as approved, and in accordance with all federal, state, and local laws. Do not discharge slurry into or in close proximity to streams or other bodies of water.

3.5. **Reinforcing Steel**. Completely assemble the cage of reinforcing steel, and place it as a unit immediately before concrete placement. The cage consists of longitudinal bars and lateral reinforcement (spiral reinforcement, lateral ties, or horizontal bands). Connect individual segments with couplers or by lapping steel as approved if overhead obstacles prevent placement of the cage as a single unit.

Extend the reinforcing steel cage as follows if the shaft is lengthened beyond plan length unless directed otherwise.

- Extend the cage to the bottom for shafts supporting structures other than bridges.
- Extend the cage to 25 ft. or to the bottom, whichever is shorter, for bridge shafts with plan lengths less than 25 ft.
- Do not extend the cage for bridge shafts with plan lengths at least 25 ft. that are lengthened less than 33% of plan length.
- Extend the cage as directed for bridge shafts with plan lengths at least 25 ft. that are lengthened more than 33% of plan length.

If the cage does not reach the bottom of the shaft, it may be suspended, or a portion of the longitudinal steel may be extended to support the cage on the bottom of the shaft. Bars used to extend or support the cage may be lap spliced or welded by a qualified welder. Place the extension at the bottom of the shaft.

Tie spiral reinforcement to the longitudinal bars at a spacing no more than 24 in., or as required for a stable cage. Ensure lateral reinforcement is not welded to longitudinal bars unless otherwise shown on the plans.

Center the reinforcing steel cage in the excavation using approved "roller" type centering devices unless otherwise approved. Use concrete or plastic chairs to keep the reinforcing cage off of the bottom of the hole. Use centering devices starting at 1.5 ft. off from the bottom of the cage and spaced vertically at intervals not exceeding 10 ft. Use a minimum of 3 centering devices per level at a spacing not to exceed 30 in. Flat or crescent-shaped centralizers ("sleds") are not allowed.

Support or hold down the cage to control vertical displacement during concrete placement or extraction of the casing. Use support that is concentric with the cage to prevent racking and distortion of the steel.

Check the elevation of the top of the steel cage before and after concrete placement or after casing extraction when casing is used. Downward movement of the steel up to 6 in. per 20 feet of shaft length and upward movement of the steel up to 6 in. total are acceptable.

Maintain the minimum length of steel required for lap with column steel. Use dowel bars if the proper lap length is provided both into the shaft and into the column. Locate and tie all dowel bars into the cage before placing concrete or insert dowel bars into fresh, workable concrete.

Locate and tie anchor bolts when required before placement of concrete. Use templates or other devices to assure accurate placement of anchor bolts.

3.6. **Concrete**. Perform all work in accordance with Item 420, "Concrete Substructures." Provide concrete with maximum placement temperatures as specified in Table 4. Provide thermal analysis to show and temperature recording devices to verify maximum core temperature requirements are met as specified in Section 420.4.7.14., "Mass Placements," as directed.

Table 4
Maximum Concrete Placing Temperature

Shaft Size	Mix Design Options 1–5	Mix Design Options 6–8
Diameter < 5 ft.	95°F	95°F
5 ft.≤ Diameter ≤ 7 ft.	95°F	85°F
7 ft. < Diameter	85°F	75°F

Form portions of drilled shaft that project above natural ground.

Remove loose material and accumulated seep water from the bottom of the excavation before placing concrete. Place concrete using underwater placement methods if water cannot be removed.

Place concrete as soon as possible after all excavation is complete and reinforcing steel is placed. Provide workable concrete that does not require vibrating or rodding. Vibrate formed portions of drilled shafts.

Place concrete continuously for the entire length of the shaft. Limit free fall of concrete to 25 ft. for dry shafts of 24 in. or smaller diameter. Use a suitable tube or tremie to prevent segregation of materials. Use a tube or tremie in sections to provide proper discharge and permit raising as the placement progresses. For dry shafts over 24 in. diameter, concrete can be allowed to free fall an unlimited distance if it does not strike the reinforcing cage or sides of the hole during placement. Provide a hopper with a minimum 3-ft.long drop-tube at the top of the shaft to direct concrete vertically down the center of the shaft when free fall is used. Do not use a shovel or other means to simply deflect the concrete discharge from the truck.

Maintain a sufficient head of concrete for cased shafts at all times above the bottom of the casing to overcome hydrostatic pressure. Extract casing at a slow, uniform rate with the pull in line with the axis of the shaft. Monitor the concrete level in the casing during extraction. Stop the extraction and add concrete to the casing as required to ensure a completely full hole upon casing removal. The elapsed time from the mixing of the first concrete placed into the cased portion of the shaft until the completion of extraction of the casing must not exceed the time for which the concrete maintains a slump of over 4 in. in accordance with Article 416.2., "Materials." Modify the concrete mix, the construction procedures, or both for subsequent shafts if the elapsed time is exceeded.

Cure the top surface and treat any construction joint area in accordance with Item 420, "Concrete Substructures."

3.7. **Additional Requirements for Slurry Displacement or Underwater Concrete Placement Methods**. Place concrete on the same day the shaft is excavated and as soon as possible after all excavation is complete and reinforcing steel is placed. Use an air lift or cleanout bucket of the proper size to clean the bottom of the excavation before placing the reinforcing steel cage and concrete. Place concrete through a closed tremie or pump it to the bottom of the excavation. The minimum tremie diameter will be at least 6 times the maximum size of aggregate used in the concrete mix but not less than 10 in. Initially seal the tremie or pump line to positively separate the concrete from the slurry or water. Place concrete continuously from the beginning of placement until the shaft is completed. Keep the tremie full of concrete and well submerged in the previously placed concrete at all times if using a tremie. Raise the tremie as necessary to maintain the free flow of concrete and the stability of any casing used. Keep the discharge tube submerged in the previously placed concrete at all times if using a pump. Place additional concrete to ensure the removal of any contaminated concrete at the top of the shaft. Allow the top portion of concrete to flush completely from the hole at the completion of the pour until there is no evidence of slurry or water contamination. Do not attempt to remove this concrete with shovels, pumps, or other means. Level the top of shaft with hand tools as necessary.

Use a sump or other approved method to channel displaced fluid and concrete away from the shaft excavation. Recover slurry and dispose of it as approved. Do not discharge displaced fluids into or near

streams or other bodies of water. Provide a collar or other means of capturing slurry and the top portion of concrete flushed from the shaft for pours over water.

Remove the tube, reseal it at the bottom, penetrate with the tube into the concrete already placed by at least 5 ft., and recharge it before continuing if concrete placement is interrupted due to withdrawal of the submerged end of the tremie or pump discharge tube before completion. If this condition exists, notify the Engineer and note the elevation and circumstances related to the loss of seal on the drilled shaft log.

The elapsed time from the mixing of the first concrete placed until the completion of concrete placement, including extraction of the casing, must not exceed the time for which the concrete maintains a slump of over 4 in. in accordance with Article 416.2., "Materials." Modify the concrete mix, the construction procedures, or both for subsequent shafts if the elapsed time is exceeded.

3.8. **Test Load**. Load test shafts, if required, in accordance with Item 405, "Foundation Load Test."

3.9. **Trial Shaft**. When required on the plans, construct trial shafts to the depth and diameter specified on the plans. Trial shafts include: drilling the hole, placement of the rebar cage (unless otherwise stated), and placement of the concrete. When trial shafts are required, delay start of production shafts until successful completion of trial shafts.

4. MEASUREMENT

4.1. **Drilled Shaft**. Drilled shaft foundations will be measured by the foot to the bottom of the shaft.

4.1.1. **Interior Bents and Piers**. Shafts will be measured from a point approximately 6 in. below the finished earthwork elevation at the center of each shaft, unless specific elevations or dimensions are indicated on the plans or unless otherwise directed to meet unusual conditions. The bent height shown on the plans is for estimating purposes only and does not control the top-of-shaft measurement.

4.1.2. **Abutment Bents and Retaining Walls**. Shafts will be measured from the bottom of footing or cap elevation.

4.1.3. **Other Non-Bridge Structures**. Shafts, including trial shafts, will be measured from the top of the shaft.

4.2. **Core Hole**. Core holes will be measured by each core hole drilled.

5. PAYMENT

The unit prices bid for the various classifications of drilled shafts will be full compensation for excavation; furnishing, placing, and removing casing; furnishing, processing, and recovering slurry; furnishing, and placing reinforcing steel; pumping; furnishing and placing concrete, including additional concrete required to fill an oversize casing or oversize excavation; conducting slump loss tests; backfilling; disposing of cuttings and slurry; and materials, tools, equipment, labor, and incidentals.

When the bottom of a drilled shaft is placed at an elevation below plan grade, no direct payment will be made for extra reinforcement placed to support the cage. The extra reinforcement will be considered subsidiary to the price bid per foot of shaft. No extra payment will be made for casings left in place.

No payment will be made for "Drilled Shaft" until the concrete has been placed.

5.1. **Drilled Shaft**. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Drilled Shaft," "Drilled Shaft (Non-reinforced)," "Drilled Shaft (Sign Mounts)," "Drilled Shaft (High Mast Pole)," "Drilled Shaft (Roadway Illumination Pole)," or "Drilled Shaft (Traffic Signal Pole)" of the specified diameter, subject to the limitations for overruns authorized by the Engineer given in Section 416.5.1.1., "Overrun."

5.1.1. **Overrun**. Payment for individual completed shaft lengths up to and including 5 ft. in excess of the maximum plan length shaft, as defined in Section 416.5.1.2., "Maximum Plan Length Shaft," will be made at the unit price bid per foot of the specified diameter.

Payment for the portion of individual completed shaft length in excess of 5 ft. and up to and including 15 ft. more than the maximum plan length shaft, as defined in this Item, will be made at a unit price equal to 115% of the unit price bid per foot of the specified diameter.

Payment for the portion of individual completed shaft length in excess of 15 ft. more than the maximum plan length shaft, as defined in Section 416.5.1.2., "Maximum Plan Length Shaft," will be made at a unit price equal to 125% of the unit price bid per foot of the specified diameter.

5.1.2. **Maximum Plan Length Shaft**. Payment described above is subject to the following provisions for extra depth drilling:

- For bridge structures, the maximum plan length shaft is the maximum length shaft, regardless of diameter, for any drilled shaft on that specific bridge.
- For retaining walls, the maximum plan length shaft is the maximum length shaft, regardless of diameter, for any drilled shaft on that specific retaining wall.
- For overhead sign structures, the maximum plan length shaft is the maximum length shaft, regardless of diameter, for any overhead sign structures included in the Contract.
- For high mast illumination poles, the maximum plan length shaft is the maximum length shaft, regardless of diameter, for any high mast illumination pole included in the Contract.
- For roadway illumination poles, the maximum plan length shaft is the maximum length shaft, regardless of diameter, for any roadway illumination pole included in the Contract.
- For traffic signal poles, the maximum plan length shaft is the maximum length shaft, regardless of diameter, for any traffic signal pole included in the Contract.

5.2. **Core Hole**. Core holes will be paid at $200 each.

Item 423
Retaining Walls

1. DESCRIPTION

Furnish, construct, and install retaining walls.

2. MATERIALS

2.1. **General**. Furnish materials in accordance with the following:

- Item 420, "Concrete Substructures,"
- Item 421, "Hydraulic Cement Concrete,"
- Item 440, "Reinforcement for Concrete,"
- Item 445, "Galvanizing,"
- Item 458, "Waterproofing Membranes for Structures," and
- Item 556, "Pipe Underdrains."

Use concrete for retaining walls that conforms to the requirements of Table 1 unless otherwise shown on the plans.

Table 1
Concrete for Retaining Walls

Application	Concrete
Cast-in-place, non-reinforced	Class A
Cast-in-place, reinforced	Class C
Precast	Class H, f'_c = 4,000 psi

Furnish concrete for machine-made concrete block units in accordance with ASTM C90, Class 1, Type II, except the minimum 28-day compressive strength must be 4,000 psi with maximum moisture absorption of 7%.

Provide Type 1 filter fabric in accordance with DMS-6200, "Filter Fabric." Provide filter fabric rated as UV-resistant when used as part of the exposed facing for a temporary wall.

Joint fillers, pads, waterstops, and other incidental materials must be as shown on the plans or approved by the Engineer.

Epoxy coat all steel used in concrete panels and coping including connectors, dowels, stirrups, and reinforcing steel when the plans call for epoxy coating of steel earth reinforcements.

2.2. **Definitions**. This Item uses the following terms:

- **Permanent Wall**. A retaining wall with a design service life of 75 years. All walls are presumed to be permanent walls unless otherwise specified on the plans.
- **Temporary Wall**. A retaining wall so designated by description, with a design service life of 3 years.
- **Mechanically Stabilized Earth (MSE) Wall**. A wall consisting of a volume of select backfill with tensile earth reinforcement elements distributed throughout. Permanent MSE walls use a precast concrete panel as a facing element. Temporary MSE walls use welded wire fabric with filter fabric backing as a facing element.
- **Concrete Block Wall**. A retaining wall that uses machine-made, precast concrete block units as facing elements. The walls may use a volume of select fill with tensile earth reinforcements distributed throughout, or may use only the facing unit and unit fill weight for support.

2.3. **Fabrication**.

2.3.1. **Cast-in-Place**. Meet Item 420, "Concrete Substructures."

2.3.2. **Formed Precast**. Meet Item 424, "Precast Concrete Structural Members (Fabrication)."

2.3.3. **Machine-Made Precast**. Furnish machine-made concrete block units in accordance with ASTM C90, sampled and tested in accordance with ASTM C140. Furnish units with molded dimensions within 1/8 in. of specified dimensions, except height must be within 1/16 in.

2.4. **Backfill**.

2.4.1. **Non-Select**. Furnish non-select backfill for walls other than temporary and permanent MSE and concrete block walls as indicated on the plans. Non-select fill will meet Item 132, "Embankment," of the type specified on the plans. Provide material with a maximum plasticity index of 30 if no type is specified as determined by Tex-106-E.

2.4.2. **Select**. Select backfill is required in specific areas of permanent and temporary MSE and concrete block-type retaining walls. Provide select backfill that is free from organic or otherwise deleterious materials and that conforms to the gradation limits shown in Table 2 as determined by Tex-401-A.

Provide backfill that does not contain shale, caliche, or other soft, poor-durability coarse aggregate particles. Reclaimed Asphalt Pavement (RAP) is not allowed. Crushed Concrete or manufactured sand is allowed for temporary walls with a service life of 3 years or less. Test each source of backfill for durability/soundness using Tex-411-A, 5-cycle magnesium sulfate soundness. Backfill material with a maximum 5-cycle soundness loss exceeding 25% will be rejected. Alternately, Tex-461-A, Micro-Deval abrasion may be used if the corresponding results show loss is not greater than 20%, otherwise Tex-411-A governs aggregate verification.

Type AS, BS, and DS particles larger than 1/4 in. must be angular or completely crushed. Provide mechanically crushed gravel or stone backfill. Gravel from each aggregate source will have a minimum of 95% two or more mechanically induced crushed faces, as Tex-460-A, Part I determines. Rounded rock or rounded gravel is not allowed. Natural sand meeting the requirements of this Section is permitted for use.

Table 2
Select Backfill Gradation Limits

Type	Sieve Size	Percent Retained
AS	3"	0
	1/2"	50–100
	#4	See Note
	#40	85–100
	#200	95–100
BS	3"	0
	#4	See Note
	#40	40–100
	#200	85–100
CS	3"	0
	#4	See Note
	#200	75–100
DS	3"	0
	3/8"	85–100
	#200	95–100

Note—Use No. 4 sieve for determination of rock backfill as described in this main paragraph, "Backfill."

When the backfill gradation results in 85% or more material retained on the No. 4 sieve, the backfill will be considered rock backfill. All Type DS backfill is considered rock backfill.

In addition to the requirements for Type CS select fill, the fraction finer than the No. 200 sieve must have a Plasticity Index (PI) in accordance with Tex-106-E not greater than 6.

Furnish Type BS backfill for permanent walls; Type CS backfill for temporary walls; and Type DS backfill for areas of walls subject to inundation unless otherwise shown on the plans, or below the 100-year flood elevation as noted on the plans.

Furnish backfill meeting the requirements of this Section but with a maximum particle size of 3/4 in. when nonmetallic or epoxy coated earth reinforcements are used.

2.4.3. **Drainage Aggregate**. Use drainage aggregate to fill the void within concrete block units and in the zone 1 ft. behind the units. Provide drainage aggregate that is free from organic or otherwise deleterious materials and that conforms to the gradation limits in Table 3 as Tex-110-E determines.

Table 3
Drainage Aggregate Gradation Limits

Sieve Size	Percent Retained
1"	0
3/4"	25–50
1/2"	50–100
#4	75–100

2.4.4. **Cement-Stabilized Backfill**. Use cement-stabilized backfill when required or as approved. Stabilize Type CS backfill with 5% hydraulic cement by dry weight of the backfill material. Use a stationary plant to thoroughly mix the backfill material, cement, and water. Place and compact the backfill within 2 hours of mixing. Provide special drainage provisions when cement-stabilized backfill is used, as shown on the plans.

2.4.5. **Electrochemical**. Provide backfill meeting the following additional requirements for permanent retaining wall systems using galvanized metallic earth reinforcements:

- The pH is between 5.5 and 10.0 as Tex-128-E determines.
- Resistivity is more than 3,000 ohm-cm as Tex-129-E determines.
- Material with resistivity between 1,500 and 3,000 ohm-cm may be used if the chloride content is less than 100 ppm and the sulfate content is less than 200 ppm as Tex-620-J determines.

Perform electrochemical testing on the raw, unstabilized backfill material when cement-stabilized backfill is used.

2.5. **Earth Reinforcements**. Furnish earth reinforcements that meet the design requirements. Galvanize or epoxy coat all steel elements for permanent walls in contact with soil. Epoxy coat in accordance with Item 440, “Reinforcement for Concrete,” except provide a minimum 18-mil coating thickness. Epoxy coat the reinforcing only when shown on the plans or as approved. Use connection hardware that is likewise nonmetallic or epoxy coated when using nonmetallic or epoxy coated earth reinforcements.

3. CONSTRUCTION

3.1. **General**. Construct retaining walls in accordance with details shown on the plans, on the approved working drawings, and to the pertinent requirements of the following Items:

- Item 110, “Excavation”
- Item 132, “Embankment”
- Item 400, “Excavation and Backfill for Structures”
- Item 420, “Concrete Substructures”
- Item 458, “Waterproofing Membranes for Structures”
- Item 556, “Pipe Underdrains”

Construct required piling or drilled shafts in accordance with the pertinent specification.

3.2. **Options**. When optional design details are shown on the plans, the Contractor is required to use the same facing design within an area of continuous retaining walls.

Provide drawings for review indicating the proposed design arrangement when proposing the use of 2 or more systems.

3.3. **Working Drawings**. When proprietary wall systems are used for permanent or temporary walls, submit casting drawings, construction drawings, and design calculations bearing the seal of a licensed professional engineer for review and approval following the Department's *Guide to Electronic Shop Drawing Submittal* process. Upon completion of construction, submit a set of reproducible as-built drawings.

3.3.1. **Casting Drawings**. Include all information necessary for casting wall elements, including railing and coping when prefabricated. Show shape and dimensions of panels; size, quantity, and details of the reinforcing steel; quantity, type, size, and details of connection and lifting hardware; and additional necessary details.

3.3.2. **Construction Drawings**. Include a numbered panel layout showing horizontal and vertical alignment of the walls as well as the existing and proposed groundlines. Include all information needed to erect the walls, including the proposed leveling pad elevations; the type and details of the soil reinforcing system (if applicable); the details and manufacturer of all pads, fillers, and filter fabric; the limits and dimensions of structural backfill; details necessary to incorporate coping, railing, inlets, drainage, and electrical conduit; and additional necessary details.

Leveling pad elevations may vary from the elevations shown on the plans. Provide at least 1 ft. of cover from the top of the leveling pad to finish grade unless a different minimum cover or a specified minimum leveling pad elevation is shown.

3.3.3. **Design Calculations**. Include calculations covering the range of heights and loading conditions on the project. Calculations for both internal and external stability as described on the plans will be required. Include a summary of all design parameters used; material types, strength values, and assumed allowables; loads and loading combinations; and factor-of-safety parameters.

3.4. **Permanent MSE Walls**. Grade the foundation for the structure level to a width equal or exceeding the length of the reinforcing system. Perform proof rolling on retaining wall foundation area to identify any loose, soft, or unsuitable materials in accordance with Item 216, "Proof Rolling." Material not meeting a maximum rut depth of 1 in. per pass of pneumatic tire roller should continue to be rolled or removed and replaced with suitable material. Pneumatic tire rolling will be waived for portions of wall with a reinforcement length of 8'; for these conditions proof rolling will be required with a smooth-wheeled vibratory roller or other approved roller.

Place drilled shafts and piling located within the MSE volume before construction of the wall. Place any required pipe underdrain before construction of the wall. Complete MSE wall construction before construction of abutment caps and abutment wing walls. Completion of walls and abutment should be in conjunction with project phasing or to allow for completion of walls that meets the proper placement and compaction at abutments.

Place the concrete leveling pad as shown on the construction drawings. Provide a wood float finish, and wait a minimum of 24 hr. before beginning panel erection. No curing or strength testing of the leveling pad concrete is required.

Shim the first row of panels as necessary to achieve correct alignment. Use plastic shims or other material that will not deteriorate. Remove and replace the leveling pad or provide a grout level-up as directed if the required shim height exceeds 1 in.

Place filter fabric behind the wall along the joint between the leveling pad and the panels. Grout areas where filter fabric spans more than 6 in. at leveling pad steps.

Place and compact fill material over the leveling pad to an elevation even with or above the surrounding ground after backfilling the first row of panels. Do not allow water to accumulate and stand at the base of the wall.

Place filter fabric behind all wall joints and at the intersection of retaining walls with other structures, including riprap. Cover joints at least 6 in. on each side and use adhesive to hold the filter fabric in place.

Exercise care while lifting, setting, and aligning panels to prevent damage to the panels. Discontinue any operation that results in chipping, spalling, or cracking of panels. Remove and replace damaged panels, or repair as approved by the Engineer.

Provide external bracing for the initial row of panels. Use wooden wedges, clamps, or other means necessary to maintain position and stability of panels during placement and compaction of backfill. Remove wooden wedges as soon as the panel or coping above the wedged element is erected and backfilled. Remove all wedges after completing the wall.

Review plumbness and position of each row of panels before placing the subsequent row. Remove and rebuild any portion of the wall that is out of tolerance. Modify panel batter and bracing, and backfill material, placement, and compaction methods as required to maintain wall tolerances.

Construct walls to a local vertical and horizontal alignment tolerance of 3/4 in. when measured along a 10-ft. straightedge relative to vertical and horizontal wall control line. Construct walls to an overall vertical tolerance (plumbness from top to bottom) of 1/2 in. per 10 ft. of wall height. Construct walls so the maximum offset at any panel joint is between 3/8 in. and 3/4 in. and no joint is open to the extent the filter fabric is visible from the front of the wall.

Place backfill to closely follow the erection of each row of panels. Place the select and embankment backfill to the same elevation where possible, and operate the compaction equipment over the interface. Do not create a continuous, distinct, vertical joint between the select and embankment backfill. Complete the embankment after construction of the retaining wall.

Maintain the stability of the interface area between the existing ground and the select fill when building a wall against existing ground. Remove and recompact any material that loosens, caves, or fails.

Compact backfill to provide at least 95% of density determined in accordance with Tex-114-E. Field density determination will be made in accordance with Tex-115-E.

Sprinkle backfill as required to ensure adequate uniformly distributed moisture in each lift before and during compaction. Place fill in lifts of 8 in. or less (loose measurement). Place fill in a manner that avoids segregation of the fill. Decrease the lift thickness if necessary to obtain the required compaction. Use hand-operated or walk-behind compaction equipment in the 3 ft. wide strip adjacent to the wall panels. Do not displace panels or distort or damage the reinforcement system during compaction. Modify backfill material, placement, and compaction methods as necessary to meet density requirements while maintaining wall tolerances.

Place rock backfill or material the Engineer determines too coarse for density testing in accordance with Section 132.3.4.1., “Ordinary Compaction.”

Place and compact the backfill to the reinforcement level, at each earth reinforcement level, before placing the reinforcement. Place earth reinforcements perpendicular to the face of the wall. Remove slack in connections before placing backfill. Pre-tension each layer of reinforcement to remove slack before placing backfill for systems using nonmetallic earth reinforcements. Use devices capable of mechanically applying and holding the required force. Do not operate tracked equipment directly on any reinforcement.

Cover the rock backfill with filter fabric before placing the 2 ft. of backfill immediately below the pavement structure or top of wall when rock backfill is used. Overlap the fabric at least 18 in. at splices, and extend it past the edge of the rock backfill at least 18 in. Use backfill that contains sufficient fines to fill the voids in a

compacted state above the filter fabric. Place a horizontal layer of filter fabric as noted above when transitioning from rock backfill to finer grained backfill anywhere within the wall volume.

Prevent surface water or rainwater from damaging the retaining walls during construction. Shape the backfill to prevent water from ponding or flowing on the backfill or against the wall face. Remove and replace any portion of the retaining wall damaged or moved out of tolerance by erosion, sloughing, or saturation of the retaining wall or embankment backfill.

3.5. **Temporary MSE Walls**. Provide a facing system rigid enough to maintain a smooth and straight wall face both during and after construction.

Grade and compact the foundation for the structure as described in Section 423.3.4., "Permanent MSE Walls."

Place earth reinforcement and facing system in accordance with the approved working drawings. Backfill the 2-ft. zone immediately behind the facing with clean, coarse rock meeting the requirements of Coarse Aggregate Grade 1, 2, or 3 of Item 421, "Hydraulic Cement Concrete," or of Type DS backfill as described in Section 423.2.4.2., "Select." Cement-stabilized backfill as described in Section 423.2.4.4., "Cement-Stabilized Backfill," may be used in place of the coarse rock.

Place and compact backfill in accordance with Section 423.3.4., "Permanent MSE Walls."

Construct walls to a vertical and horizontal alignment tolerance of 3 in. when measured along a 10-ft. straightedge. Construct walls to an overall vertical tolerance (plumbness from top to bottom) of 2 in. per 10 ft. of wall height. Place adjacent facing elements so the maximum out-of-plane offset at any facing element joint is less than 1 in. Place facing elements and filter fabric with no gaps in the facing or fabric.

Prevent surface water or rainwater from damaging the retaining walls during and after construction. Place temporary berms or curbs, shape the backfill, or use other approved methods to prevent water from flowing against or over the wall face. Remove and replace any portion of the wall damaged or moved out of tolerance by erosion, sloughing, or saturation of the retaining wall or embankment backfill.

3.6. **Concrete Block Retaining Walls**. The concrete block units may be sampled and tested by the Engineer before shipment or upon delivery to the construction site. Display for approval, samples of block units indicating the color, texture, and finish. Store, transport, and handle all block units carefully to prevent cracking or damage.

Grade and compact the foundation for the structure, and place the leveling pad as described in Section 423.3.4., "Permanent MSE Walls."

Place the concrete block facing units in accordance with the approved working drawings. Fill the voids within the units and fill the 1-ft. zone immediately behind the facing with drainage aggregate as described in Section 423.2.4.3., "Drainage Aggregate." Systems tested without unit fill may omit the fill as indicated on the approved drawings. Systems with approved filter fabric details may omit the drainage aggregate in the 1-ft. zone immediately behind the facing.

Place reinforcements and backfill for walls using earth reinforcements in accordance with the requirements of Section 423.3.4., "Permanent MSE Walls." Pay particular attention to the connection details of the earth reinforcements to the concrete block units.

Construct walls to a vertical and horizontal alignment tolerance of 1-1/2 in. when measured along a 10-ft. straightedge. Construct walls to an overall vertical tolerance (deviation from the vertical or battered control line, top to bottom) of 1 in. per 10 feet of wall height. Place adjacent facing elements so the maximum out-of-plane offset at any facing element joint is less than 1 in. Place facing elements with maximum 1/4-in. gaps between block units.

Prevent surface water or rainwater from damaging the retaining walls during construction. Shape the backfill to prevent water from ponding or flowing on the backfill or against the wall face. Remove and replace all portions of the retaining wall damaged or moved out of tolerance by erosion, sloughing, or saturation of the retaining wall or embankment backfill.

4. MEASUREMENT

This Item will be measured by the square foot of the front surface area of the wall. Unless otherwise shown on the plans, the area will be measured from 1 ft. below finished grade of the ground line on the face of the exterior wall to the top of the wall including any coping required (not including railing).

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Retaining Walls" of the type or special surface finish specified. This price is full compensation for excavation in back of retaining walls and for footings; furnishing and placing footings, leveling pads, copings, and traffic railing foundations; furnishing, placing, and compacting backfill (except in embankment areas), including cement for stabilization; proof rolling; furnishing and placing concrete, reinforcing steel, waterproofing material, filter material and drain pipe, joint material, water stop, and filter fabric when required; fabricating, curing, and finishing all panels; furnishing and placing earth reinforcement, anchorage systems, and fasteners; wall erection; and equipment, labor, tools, and incidentals.

Retaining wall backfill areas that are also in embankment areas will be considered part of the quantities measured and paid for under Item 132, "Embankment."

When drilled shafts are required, they will be measured and paid for as specified in Item 416, "Drilled Shaft Foundations." When piling is required, it will be measured and paid for as specified on the plans for piling of the appropriate type.

Item 474
Linear Drains

1. DESCRIPTION

Furnish and install linear drains of the sizes and descriptions shown on the plans as cast-in-place trench drain, precast trench drain, or slotted drain.

2. MATERIALS

Provide materials conforming to the pertinent requirements of the following Items:

2.1. **Cast-in-Place Trench Drain**. Provide a trench with a slope as shown on the plans. Furnish forms capable of maintaining proper alignment during the concrete placement. Ensure connections to structures do not restrict the hydraulic flow of the trench drain. Use Class C Concrete conforming to Item 421, "Hydraulic Cement Concrete."

Provide grates and frames conforming to the requirements of DMS-4370.6 (B), "Grates and Frames." Removable grates with minimum width of 12 in. and length of 36 in. are permissible. Grates with lessor dimensions will not be removable.

Provide shop drawings sealed by a licensed professional engineer stating the trench drain system meets loading requirements. Submit documents showing design loadings if using a proprietary system.

Furnish documentation in accordance with Section 471.2.3., "Documentation."

2.2. **Precast Trench Drains**. Furnish precast trench drains for the Department from pre-approved manufacturers in accordance with DMS-4370, "Precast Trench Drain." The Department's MPL is a list of approved manufacturers and their products. Unapproved precast trench drains will not be accepted.

Furnish materials conforming to the following where required.

- Item 420, "Concrete Substructures"
- Item 421, "Hydraulic Cement Concrete" (Use Class C concrete unless otherwise shown on the plans.), and
- Item 440, "Reinforcement for Concrete."

2.3. **Slotted Drains**. Fabricate and furnish materials in accordance with Item 460, "Corrugated Metal Pipe." Furnish galvanized steel or aluminized steel (AASHTO M 36, Type 2) pipe with a minimum thickness of 16 gauge.

Slotted drains consist of a drain guide assembly attached to a longitudinal opening in a corrugated metal pipe. Unless otherwise specified on the plans, fabricate slotted drains with bearing bars and crossbar spacers meeting the requirements of ASTM A 36, welded to the longitudinal opening in the corrugated metal pipe. Galvanize the drain guide assembly after fabrication in accordance with Item 445, "Galvanizing." Clean and repair welded areas and heat-affected zones in accordance with Section 445.3.5, "Repairs."

2.4. **Slotted Drain Outfalls**. Slotted drain outfalls consist of the corrugated metal pipe that connects the slotted drain to the main drainage line.

2.5. **Backfill**. Provide cement-stabilized backfill in accordance with Item 400, "Excavation and Backfill for Structures," or high-slump, low-strength concrete with a minimum of 180 lb. of cement per cubic yard.

3. CONSTRUCTION OF CAST IN PLACE TRENCH DRAINS

Perform excavation in accordance with Item 400, “Excavation and Backfill for Structures.” Construct trench with a slope as shown on the plans. Submit shop drawings that provide enough detail to ensure seamless installation of the trench drain adjacent to the proposed or existing pavement structure.

If using a proprietary system, provide shop drawings that contain the manufacturer’s installation guidelines and any sequential order of construction. Construct the trench drain with a maximum allowable tolerance of ±1/16 in. for dimensional accuracy and rail co-planarity. Provide a smooth finish on the surface of the trench that will convey runoff. Make connections to new or existing structures as shown on the plans or as directed.

Remove trench drain forms and dispose of properly. Install grates with retaining pins on each of the 4 corners. Remove all construction debris from the trench drain.

4. CONSTRUCTION OF PRECAST TRENCH DRAINS

Place precast trench drains in concrete pavement or encased in a concrete grade beam and subgrade designed to support H-20 wheel loading.

Perform excavation in accordance with Item 400, “Excavation and Backfill for Structures.” Construct trench with a slope as shown on the plans. Use interconnecting end profiles on adjoining channels to maintain channel alignment within ±1/16 in. Use non-sloping sections where shown on the plans or as directed.

Assemble and install precast trench drains in accordance with approved shop drawings and manufacturer’s recommendations at the locations directed on the plans. Provide shop drawings containing the manufacturer’s installation guidelines.

Encase precast trench drains, not cast in concrete pavement, in concrete grade beams, as shown on the plans and suitable to support the trench drain and retain the trench grate from pull out. Ensure the grade and alignment of the installed grates matches the grade and alignment of the surrounding pavement.

Do not provide removable trench drain grates at any location where wheeled vehicles may drive over them including roadway lanes, shoulders, and driveways.

Remove all construction debris from the trench drain.

5. CONSTRUCTION OF SLOTTED DRAINS

Install slotted drains and slotted drain outfalls in accordance with details on the plans and the requirements of Item 460, “Corrugated Metal Pipe.” Excavate and backfill in accordance with Item 400, “Excavation and Backfill for Structures.” Backfill trenches as shown on the plans or as directed. Furnish slotted drains in 20-ft. lengths, minimizing the number of joints required.

6. MEASUREMENT

This Item will be measured by the foot, between the ends of the linear drain along the pavement surface as installed, complete and in place. Where inlets are included in lines of linear drain, that length of drain tying into the structure wall will be included for measurements, but no other portion of the structure length or width will be included.

7. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Cast-in-Place Trench Drain,” “Precast Trench Drain

(in Concrete Pavement)," "Precast Trench Drain (without Concrete Pavement)," or "Slotted Drain" of the size specified.

This price will be full compensation for structure excavation, installing the trench drain, concrete, reinforcing steel, reinforcement anchors, other connecting devices, furnishing all materials (including forms, rails, anchorages, support bars, and grates), tools, labor, equipment, and incidentals.

Item 512
Portable Traffic Barrier

1. DESCRIPTION

Furnish, install, move, and remove portable traffic barrier.

2. MATERIALS

2.1. **Furnished by the Contractor.**

2.1.1. **Concrete.** Furnish barrier of the class of concrete shown and using materials that meet the pertinent requirements of the following Items:

- Item 420, "Concrete Substructures"
- Item 421, "Hydraulic Cement Concrete"
- Item 424, "Precast Concrete Structural Members (Fabrication)"
- Item 440, "Reinforcement for Concrete"
- Item 442, "Metal for Structures"

2.1.2. **Steel.** Barrier sections will be furnished when shown on the plans. Barrier sections must meet the crash testing requirements of NCHRP 350 or MASH TL-3 or TL-4 specifications as per test matrix for Longitudinal Barriers.

2.1.3. **Concrete and Steel.** When barrier is to be furnished and retained by the Contractor, products from nonapproved sources or previously used products may be provided if the Contractor submits written certification that the barrier sections and materials substantially conform to the requirements of this Item. The Engineer may approve the use of the product if:

- the barrier sections substantially meet typical cross-section dimension requirements,
- there is no evidence of structural damage such as major spalls or cracks,
- the general condition of both the barrier sections and their connectors is acceptable,
- the barrier is new, and
- the barrier is being reused.

2.2. **Furnished by the Department.** Department-furnished barrier sections will be at a stockpile location or an existing traffic barrier installation shown on the plans.

3. CONSTRUCTION

Notify the Engineer of the location of the casting site and the date on which the work will begin. Multi-project fabrication plants as defined in Item 424, "Precast Concrete Structural Members (Fabrication)," that produce concrete traffic barrier, except temporary barrier furnished and retained by the Contractor, must be qualified in accordance with DMS-7350, "Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Traffic Barrier." See the Department's MPL for approved fabricators. Construct barrier in accordance with Item 420, "Concrete Substructures," to the dimensions and cross-sections shown on the plans. Provide forms and cure concrete in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)."

Provide a rough texture to the bottom surface of Single Slope or F-Shape barriers and to the top of Low Profile barriers similar to a wood float finish.

Remove formwork after the concrete has reached sufficient strength to prevent physical damage to the member. Move barrier sections to a storage area and place them on blocking to prevent damage when they have attained sufficient strength to permit handling without causing visible damage.

Produce precast barrier to the tolerances given in Table 1 unless otherwise shown on the plans.

Table 1
Precast Barrier Tolerances

Dimension	Tolerance
Length	±1 in.
Insert Placement	±1/2 in.
Horizontal Alignment	±1/8 in. per 10 feet of length
Deviation of Ends:	
Horizontal Skew	±1/4 in.
Vertical Batter	±1/8 in. per foot of depth

Install the barrier sections in accordance with the details shown on the plans or as directed.

After use, stockpile barrier sections and connection hardware that are to be retained by the Department at the location shown on the plans or as otherwise directed. Obtain assembly and installation information for the portable steel traffic barrier from the manufacturer, and provide the Engineer with an installation and repair manual specific to the portable steel traffic barrier.

Repair or replace all traffic barrier or connecting hardware damaged by the Contractor's operations at the Contractor's expense.

Repair or replace any pavement damaged in the process of installing, moving, or removing barrier sections at the Contractor's expense.

4. MEASUREMENT

This Item will be measured by the foot based on the nominal lengths of the barrier sections.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price as follows:

- For concrete barrier only, bid for "Portable Traffic Barrier" of the work category (Furnish and Install, Designated Source, Move, Stockpile, or Remove), shape (e.g., Single Slope, F-Shape, or Low Profile) and Type (1, 2, 3, etc.) of barrier sections specified. This price includes equipment, labor, tools, and incidentals.
- For concrete and steel barrier, bid for "Portable Traffic Barrier" of the work category (Furnish and Install, Designated Source, Move, Stockpile, or Remove), shape (e.g., Single Slope, F-Shape, or Low Profile) and Type (1, 2, 3, etc.) of barrier sections specified or "Steel". This price includes equipment, labor, tools, and incidentals.

5.1. **Furnish and Install**. This price is full compensation for furnishing and installing barrier sections and connection hardware.

5.2. **Designated Source**. This price is full compensation for delivering and installing Department-furnished barrier sections and connection hardware from a designated source.

5.3. **Move**. This price is full compensation for moving barrier section installations on the project from one location to another (including disassembly and reassembly costs), moving barrier sections from an installation on the project to a temporary storage area (including disassembly costs), and moving barrier sections from a temporary storage area to an installation site on the project (including assembly costs).

5.4. **Stockpile**. This price is full compensation for removing barrier sections and connection hardware from the project and delivering to the Department stockpile area shown on the plans or as directed.

5.5. **Remove**. This price is full compensation for removing barrier and connection hardware from the project and retained by the Contractor.

Item 531
Sidewalks

1. DESCRIPTION

Construct hydraulic cement concrete sidewalks.

2. MATERIALS

Furnish materials conforming to the following:

- Item 360, “Concrete Pavement”
- Item 420, “Concrete Substructures”
- Item 421, “Hydraulic Cement Concrete”
- Item 440, “Reinforcement for Concrete”

Use Class A concrete unless otherwise shown on the plans. Use Grade 8 course aggregate for extruded Class A concrete. Use other grades if approved.

3. CONSTRUCTION

Shape and compact subgrade, foundation, or pavement surface to the line, grade, and cross-section shown on the plans. Lightly sprinkle subgrade or foundation material immediately before concrete placement. Hand-tamp and sprinkle foundation when placement is directly on subgrade or foundation materials. Remove and dispose of existing concrete in accordance with Item 104, “Removing Concrete.” Provide a clean surface for concrete placement directly on the surface material or pavement.

Mix and place concrete in accordance with the pertinent Items. Hand-finishing is allowed for any method of construction. Finish exposed surfaces to a uniform transverse broom finish surface. Curb ramps must include a detectable warning surface and conform to details shown on the plans. Install joints as shown on the plans. Ensure that abrupt changes in sidewalk elevation do not exceed 1/4 in., sidewalk cross slope does not exceed 2%, curb ramp grade does not exceed 8.3%, and flares adjacent to the ramp do not exceed 10% slope. Ensure that the sidewalk depth and reinforcement are not less than the driveway cross-sectional details shown on the plans where a sidewalk crosses a concrete driveway.

Provide finished work with a well-compacted mass, a surface free from voids and honeycomb, and the required true-to-line shape and grade. Cure for at least 72 hr. in accordance with Item 420, “Concrete Substructures.”

3.1. **Conventionally Formed Concrete**. Provide pre-molded or board expansion joints of the thickness shown on the plans for sidewalk section lengths greater than 8 ft. but less than 40 ft., unless otherwise directed. Terminate workday production at an expansion joint.

3.2. **Extruded or Slipformed Concrete**. Provide any additional surface finishing immediately after extrusion or slipforming as required on the plans. Construct joints at locations as shown on the plans or as directed.

4. MEASUREMENT

Sidewalks will be measured by the square yard of surface area. Curb ramps will be measured by the square yard of surface area or by each. A curb ramp consists of the ramp, landing, adjacent flares or side curb, and detectable warning surface as shown on the plans.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Concrete Sidewalks" of the depth specified and "Curb Ramps" of the type specified. This price is full compensation for surface preparation of sidewalk foundation; materials; removal and disposal of existing concrete; excavation, hauling and disposal of excavated material; drilling and doweling into existing concrete curb, sidewalk, and pavement; repair of adjacent street or pavement structure damaged by these operations; and equipment, labor, materials, tools, and incidentals.

Sidewalks that cross and connect to concrete driveways or turnouts will be measured and paid for in accordance with Item 530, "Intersections, Driveways, and Turnouts."

Item 618
Conduit

1. DESCRIPTION

Furnish and install conduit.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 400, "Excavation and Backfill for Structures"
- Item 476, "Jacking, Boring, or Tunneling Pipe or Box"

When specified on the plans, provide:

- rigid metal conduit (RMC);
- intermediate metal conduit (IMC);
- electrical metallic tubing (EMT);
- polyvinyl chloride (PVC) conduit;
- high density polyethylene (HDPE) conduit;
- liquidtight flexible metal conduit (LFMC); or
- liquidtight flexible nonmetallic conduit (LFNC).

Furnish conduit from new materials in accordance with DMS-11030, "Conduit."

Provide prequalified conduit from the Department's MPL. When required by the Engineer, notify the Department in writing of selected materials from the MPL intended for use on each project.

Provide other types of conduit not on the MPL that comply with the details shown on the plans and the NEC. Fabricate fittings such as junction boxes and expansion joints from a material similar to the connecting conduit, unless otherwise shown on the plans. Use watertight fittings. Do not use set screw and pressure-cast fittings. Steel compression fittings are permissible. When using HDPE conduit, provide fittings that are UL-listed as electrical conduit connectors or thermally fused using an electrically heated wound wire resistance welding method.

Use red 3-in. 4-mil polyethylene underground warning tape that continuously states "Caution Buried Electrical Line Below."

3. CONSTRUCTION

Perform work in accordance with the details shown on the plans and the requirements of this Item.

Use established industry and utility safety practices when installing conduit located near underground utilities. Consult with the appropriate utility company before beginning work.

Install conduit a minimum of 18 in. deep below finished grade unless otherwise shown on the plans. Meet the requirements of the NEC when installing conduit. Secure and support conduit placed for concrete encasement in such a manner that the alignment will not be disturbed during placement of the concrete. Cap ends of conduit and close box openings before concrete is placed.

Ream conduit to remove burrs and sharp edges. Use a standard conduit cutting die with a 3/4-in. taper per foot when conduit is threaded in the field. Fasten conduit placed on structures with conduit straps or hangers as shown on the plans or as directed. Fasten conduit within 3 ft. of each box or fitting and at other locations shown on the plans or as directed. Use metal conduit clamps that are galvanized malleable or stainless steel unless otherwise shown on the plans. Use 2-hole type clamps for 2-in. diameter or larger conduit.

Fit PVC and HDPE conduit terminations with bushings or bell ends. Fit metal conduit terminations with a grounding type bushing, except conduit used for duct cable casing that does not terminate in a ground box and is not exposed at any point. Conduit terminating in threaded bossed fittings does not need a bushing. Before installation of conductors or final acceptance, pull a properly sized mandrel or piston through the conduit to ensure that it is free from obstruction. Cap or plug empty conduit placed for future use.

Perform trench excavation and backfilling as shown on the plans or as directed, and in accordance with Item 400, “Excavation and Backfill for Structures.” Excavation and backfilling will be subsidiary to the installation of the conduit.

Jack and bore as shown on the plans or as directed, and in accordance with Item 476, “Jacking, Boring, or Tunneling Pipe or Box.”

Place warning tape approximately 10 in. above trenched conduit. Where existing surfacing is removed for placing conduit, repair by backfilling with material equal in composition and density to the surrounding areas and by replacing any removed surfacing, such as asphalt pavement or concrete riprap, with like material to equivalent condition. Mark conduit locations as directed.

4. MEASUREMENT

This Item will be measured by the foot of conduit.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., “Plans Quantity Measurement.” Additional measurements or calculations will be made if adjustments of quantities are required.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Conduit” of the type and size specified and the installation method specified as applicable. This price is full compensation for furnishing and installing conduit; hanging, strapping, jacking, boring, tunneling, trenching, and furnishing and placing backfill; encasing in steel or concrete; replacing pavement structure, sod, riprap, curbs, or other surface; marking location of conduit (when required); furnishing and installing fittings, junction boxes, and expansion joints; and materials, equipment, labor, tools, and incidentals.

Flexible conduit will not be paid for directly but will be subsidiary to pertinent Items. Unless otherwise shown on the plans, no payment will be allowed under this Item for conduit used on electrical services or in foundations.

Item 620
Electrical Conductors

1. DESCRIPTION

Furnish and install electrical conductors, except conductors specifically covered by other Items.

2. MATERIALS

Provide new materials that comply with the details shown on the plans and the requirements of this Item. Use stranded insulated conductors that are rated for 600 volts; approved for wet locations; and marked in accordance with UL, NEC, and CSA requirements. Furnish electrical conductors in accordance with DMS-11040, "Electrical Conductors."

Provide prequalified electrical conductors from the Department's MPL. When required by the Engineer, notify the Department in writing of selected materials from the MPL intended for use on each project.

Ensure all grounding conductors size 8 AWG and larger are stranded, except for the grounding electrode conductor at the electrical service, which will be a solid conductor.

Use white insulation for grounded (neutral) conductors, except grounded conductors size 4 AWG and larger may be black with white tape marking at every accessible location. Do not use white insulation or marking for any other conductor except control wiring specifically shown on the plans.

Ensure insulated grounding conductors are green except insulated grounding conductors size 4 AWG and larger may be black with green tape marking at every accessible location. Do not use green insulation or marking for any other conductor except control wiring specifically shown on the plans.

3. CONSTRUCTION

Perform work in accordance with the details shown on the plans and the requirements of this Item.

Splice conductors only in junction boxes, ground boxes, and transformer bases, and in poles and structures at the handholes. Splice as shown on the plans. Do not exceed the manufacturer's recommended pulling tension. Use lubricant as recommended by the manufacturer. Install conductors in accordance with the NEC.

Make insulation resistance tests on the conductors before making final connections, and ensure each continuous run of insulated conductor has a minimum DC resistance of 5 megohms when tested at 1,000 volts DC. The Engineer may require verification testing of all or part of the conductor system. The Engineer will witness these verification tests. Replace conductors exhibiting an insulation resistance of less than 5 megohms at no additional cost to the Department.

4. MEASUREMENT

This Item will be measured by the foot of each single conductor.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Electrical Conductors" of the types and sizes specified. This price is full compensation for furnishing, installing, and testing electrical conductors; furnishing and installing breakaway connectors; and for materials, equipment, labor, tools, and incidentals, except:

- conductors used in connecting the components of electrical services will be paid for under Item 628, "Electrical Services";
- conductors inside roadway illumination assemblies will be paid for under Item 610, "Roadway Illumination Assemblies";
- conductors inside of traffic signal pole assemblies will be paid for under this Item; and
- conductors used for internal wiring of equipment will not be paid for directly but will be subsidiary to pertinent Items.

Item 624
Ground Boxes

1. DESCRIPTION

- **Installation**. Construct, furnish, and install ground boxes complete with lids.
- **Removal**. Remove existing ground boxes.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following items:

- Item 420, "Concrete Substructures"
- Item 421, "Hydraulic Cement Concrete"
- Item 432, "Riprap"
- Item 440, "Reinforcement for Concrete"
- Item 618, "Conduit"
- Item 620, "Electrical Conductors"

Provide fabricated precast polymer concrete ground boxes in accordance with DMS-11070, "Ground Boxes." Provide prequalified ground boxes from the Department's MPL. When required by the Engineer, notify the Department in writing of selected materials from the MPL intended for use on each project.

Provide other precast or cast-in-place ground boxes that comply with the details shown on the plans.

3. CONSTRUCTION

Perform work in accordance with the details shown on the plans and the requirements of this Item.

Use established industry and utility safety practices when installing or removing ground boxes located near underground utilities. Consult with the appropriate utility company before beginning work.

3.1. **Installation**. Fabricate and install ground boxes in accordance with the details, dimensions, and requirements shown on the plans. Install ground box to approved line and grade.

Construct precast and cast-in-place concrete ground boxes in accordance with Item 420, "Concrete Substructures," and Item 440, "Reinforcement for Concrete."

Construct concrete aprons as shown on the plans and in accordance with Item 432, "Riprap," and Item 440, "Reinforcement for Concrete."

3.2. **Removal**. Remove existing ground boxes and concrete aprons to at least 6 in. below the conduit level. Uncover conduit to a sufficient distance so that 90 degree bends can be removed and conduit reconnected. Clean the conduit in accordance with Item 618, "Conduit." Replace conduit within 5 ft. of the ground box. Remove old conductors and install new conductors as shown on the plans. Backfill area with material equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

4. MEASUREMENT

This Item will be measured by each ground box installed complete in place or each ground box removed.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Ground Box" of the types and sizes specified and for "Remove Ground Box."

5.1. **Installation**. This price is full compensation for excavating and backfilling; constructing, furnishing, and installing ground boxes and concrete aprons; and material, equipment, labor, tools, and incidentals. All wiring connections required inside the ground box will be considered subsidiary to this bid item. Conduit will be paid for under Item 618, "Conduit." Electrical conductors will be paid for under Item 620, "Electrical Conductors."

5.2. **Removal**. This price is full compensation for removing and disassembling ground boxes and concrete aprons; excavating, backfilling, and surface placement; removing old conductors; disposal of unsalvageable materials; and materials, equipment, labor, tools, and incidentals. Cleaning of conduit is subsidiary to this Item. Conduit replaced within 5 ft. of the ground box will be subsidiary to this Item. Additional conduit will be paid for under Item 618, "Conduit." Installation of conductors will be paid for under Item 620, "Electrical Conductors."

Item 628
Electrical Services

1. DESCRIPTION

- Installation. Furnish and install electrical services.
- Relocation. Relocate existing electrical services.
- Removal. Remove existing electrical services.

2. MATERIALS

Provide materials that comply with the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 441, "Steel Structures"
- Item 445, "Galvanizing"
- Item 449, "Anchor Bolts"
- Item 618, "Conduit"
- Item 620, "Electrical Conductors"
- Item 627, "Treated Timber Poles"
- Item 656, "Foundations for Traffic Control Devices"

For the installation of electrical services, use new materials that meet the requirements of the NEC, UL, CSA, and NEMA, and are in accordance with DMS-11080, "Electrical Services."

Provide prequalified electrical services prequalified from the Department's MPL. When required by the Engineer, notify the Department in writing of selected materials from the MPL intended for use on each project.

3. CONSTRUCTION

Perform work in accordance with the details shown on the plans and the requirements of this Item. Use established industry and utility safety practices when installing, relocating, or removing electrical services located near overhead or underground utilities. Consult with the appropriate utility company before beginning work.

3.1. **Installation**. Furnish and install electrical service equipment. Ensure components of the electrical service meet the requirements of the Electrical Detail Standards. Follow NEC and local utility company requirements when installing the electrical equipment. Coordinate the utility companies' work for providing service.

3.2. **Relocation**. Coordinate relocation with the appropriate utility company before beginning work. Remove existing electrical service according to "Removal" under this Item. Reinstall existing electrical service according to "Installation" of this Item. Replace or add circuit breakers as noted on the plans.

3.3. **Removal**. Coordinate removal with the appropriate utility company before beginning work. Before the removal of the electrical service, disconnect and isolate any existing electrical service equipment in accordance with the utility company's requirements.

Remove existing electrical service support a minimum of 2 ft. below finish grade unless otherwise shown on the plans. Repair the remaining hole by backfilling with material equal in composition and density to the surrounding area. Replace any surfacing such as asphalt pavement or concrete riprap with like material to equivalent condition.

Disconnect conductors and remove them from the conduit. Cut off all protruding conduit 6 in. below finished grade. Abandoned conduit need not be removed unless shown on the plans.

Reconnect conductors and conduit to be reused when shown on the plans. Make all splices in ground boxes unless otherwise shown on the plans.

Accept ownership of unsalvageable materials, and dispose of them in accordance with federal, state, and local regulations.

4. MEASUREMENT

This Item will be measured by each electrical service installed, relocated, or removed.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Electrical Services" of the types specified, "Relocate Electrical Services," or "Remove Electrical Services."

5.1. **Installation**. This price is full compensation for paying all fees, permits, and other costs; making arrangements with the utility company for all work and materials provided by the utility company; furnishing, installing, and connecting all components including poles, service supports, foundations, anchor bolts, riprap, enclosures, switches, breakers, service conduit (from the service equipment including the elbow below ground), fittings, service conductors (from the service equipment including the elbow below ground), brackets, bolts, hangers, hardware; and materials, equipment, labor, tools, and incidentals.

Costs for utility-owned power line extensions, connection charges, meter charges, consumption charges, and other charges will be paid for by the Department. The Department will reimburse the Contractor the amount billed by the utility plus an additional 5% of the invoice cost will be paid for labor, equipment, administrative costs, superintendence, and profit.

5.2. **Relocation**. This price is full compensation for disconnecting and isolating the existing electrical service; relocating the service supports; new service support foundation; backfilling holes; paying all fees, permits, and other costs; making arrangements with the utility company for all work and materials provided by the utility company; removing, disconnecting, installing, and connecting all components including poles, service supports, foundations, anchor bolts, riprap, enclosures, switches, breakers, service conduit (from the service equipment including the elbow below ground), fittings, service conductors (from the service equipment including the elbow below ground), brackets, bolts, hangers, hardware; and materials, equipment, labor, tools, and incidentals.

Costs for utility-owned power line extensions, connection charges, meter charges, consumption charges, and other charges will be paid for by the Department. The Department will reimburse the Contractor the amount billed by the utility plus an additional 5% of the invoice cost will be paid for labor, equipment, administrative costs, superintendence, and profit.

5.3. **Removal**. This price is full compensation for coordinating with the utility company to disconnect and isolate the electrical service; removing the service supports; backfilling holes; and materials, equipment, labor, tools, and incidentals.

Item 680
Highway Traffic Signals

1. DESCRIPTION

- **Installation**. Install highway traffic signals.
- **Removal**. Remove, store, and salvage traffic signals.

2. MATERIALS

Ensure electrical materials and construction methods conform to the current NEC and additional local utility requirements.

Furnish new materials. Ensure all materials and construction methods conform to the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 610, "Roadway Illumination Assemblies"
- Item 625, "Zinc-Coated Steel Wire Strand"
- Item 627, "Treated Timber Poles"
- Item 636, "Signs"
- Item 656, "Foundations for Traffic Control Devices"

Provide controller assemblies that meet the requirements of DMS-11170, "Fully Actuated, Solid-State Traffic Signal Controller Assembly," and the details shown on the plans.

Provide prequalified controller assemblies from the Department's MPL.

Provide flasher assemblies that meet the requirements of DMS-11160, "Flasher Controller Assembly," and the details shown on the plans.

Provide prequalified flasher assemblies from the Department's MPL.

Sampling and testing of traffic signal controller assemblies will be done in accordance with Tex-1170-T.

3. CONSTRUCTION

3.1. **Installation**. Install traffic signal controller foundations in accordance with Item 656, "Foundations for Traffic Control Devices."

3.1.1. **Electrical Requirements**.

3.1.1.1. **Electrical Services**. Make arrangements for electrical services and install and supply materials not provided by the utility company as shown on the plans. Install 120-volt, single-phase, 60-Hz AC electrical service unless otherwise shown on the plans.

3.1.1.2. **Conduit**. Install conduit and fittings of the sizes and types shown on the plans. Conduit of larger diameter size than that shown on the plans may be used with no additional compensation, providing the same diameter size is used for the entire length of the conduit run. Extend conduit in concrete foundations 2 to 3 in. above the concrete. Seal the ends of each conduit with silicone caulking, or other approved sealant, after all cables and conductors are installed.

3.1.1.3. **Wiring**. Furnish stranded No. 12 AWG XHHW conductors. Install above-ground cables and conductors in rigid metal conduit, except for span wire suspended cables and conductors, drip loops, and electrical wiring inside signal poles unless otherwise shown on the plans. Make power entrances to ground-mounted controllers through underground conduit. Wire each signal installation to operate as shown on the plans.

Attach ends of wires to properly sized self-insulated solderless terminals. Attach terminals to the wires with a ratchet-type compression crimping tool properly sized to the wire. Place pre-numbered identification tags of plastic or tape around each wire adjacent to wire ends in the controller and signal pole terminal blocks.

Splices will not be permitted except as shown on the plans, unless each individual splice is approved in writing. Make all allowed splices watertight.

3.1.1.4. **Grounding and Bonding**. Ground and bond conductors in accordance with the NEC. Ensure the resistance from the grounded point of any equipment to the nearest ground rod is less than 1 ohm.

Install a continuous bare or green insulated copper wire (equipment ground) throughout the electrical system that is the same size as the neutral conductor, but a minimum No. 8 AWG. Connect the equipment ground to all metal conduit, signal poles, controller housing, electrical service ground, ground rods, and all other metal enclosures and raceways.

Provide copper wire bonding jumpers that are a minimum No. 8 AWG.

3.1.2. **Controller Assemblies**. Construct controller foundations in accordance with Item 656, “Foundations for Traffic Control Devices.” Immediately before mounting the controller assembly on the foundation, apply a bead of silicone caulk to seal the cabinet base. Seal any space between conduit entering the controller and the foundation with silicone caulk.

Deliver the keys for the controller cabinets to the Engineer when the Contract is complete.

Place the instruction manual and wiring diagrams for all equipment in the controller cabinet, inside the controller cabinet.

3.1.3. **Timber Poles**. Furnish ANSI Class 2 timber poles other than for electrical services in accordance with details shown on the plans.

3.1.4. **Preservation of Sod, Shrubbery, and Trees**. Replace sod, shrubbery, and trees damaged during the Contract.

3.1.5. **Removal and Replacement of Curbs and Walks**. Obtain approval before cutting into or removing walks or curbs not shown on the plans to be removed or replaced. Restore any curbs or walks removed equivalent to original condition after work is completed, to the satisfaction of the Engineer.

3.1.6. **Intersection Illumination**. Install luminaires on signal poles as shown on the plans.

3.1.7. **Signal Timing Plan**. The traffic signal timing plan will be provided by the Department or local entity.

3.1.8. **Test Period**. Operate completed traffic signal installations continuously for at least 30 days in a satisfactory manner. If any Contractor-furnished equipment fails during the 30-day test period, repair or replace that equipment. This repair or replacement, except lamp replacement, will start a new 30-day test period.

Replace materials that are damaged or have failed before acceptance. Replace failed or damaged existing signal system components when caused by the Contractor. The Department will relieve the Contractor of maintenance responsibilities upon passing a 30-day performance test of the signal system and acceptance of the Contract.

3.2. **Removal**. Remove existing electrical services, pedestal poles, strain poles, mast arm pole assemblies, luminaires, signal heads, vehicle detector equipment, controllers, cables, and other accessories. Remove materials so damage does not occur. Remove and store items designated for reuse or salvage at locations shown on the plans or as directed.

Remove abandoned concrete foundations, including steel, to a point 2 ft. below final grade. Backfill holes with material equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

Accept ownership and dispose of unsalvageable materials in accordance with federal, state, and local regulations.

4. MEASUREMENT

This Item will be measured as each traffic signal installed or removed. A traffic signal is a signalized intersection controlled by a single traffic signal controller.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Installation of Highway Traffic Signals" of the type (isolated, system, or flashing beacon) specified, or "Removing Traffic Signals."

5.1. **Installation**. This price is full compensation for furnishing, installing, and testing the completed installation, controller and associated equipment, controller foundations, luminaires, signs mounted on signal equipment, damping plates, timber poles, mounting hardware and steel wire strand; preservation and replacement of damaged sod, shrubbery and trees; removal and replacement of curbs and walks; and materials, equipment, labor, tools, and incidentals. The Department will pay for electrical energy consumed by the traffic signal.

New drilled shaft foundations for traffic signal poles will be paid for under Item 416, "Drilled Shaft Foundations." New conduit will be paid for under Item 618, "Conduit." New electrical conductors will be paid for under Item 620, "Electrical Conductors." New ground boxes will be paid for under Item 624, "Ground Boxes." New electrical services will be paid for under Item 628, "Electrical Services." New vehicle and pedestrian signal heads will be paid for under Item 682, "Vehicle and Pedestrian Signal Heads." New traffic signal cables will be paid for under Item 684, "Traffic Signal Cables." New traffic signal pole assemblies will be paid for under Item 686, "Traffic Signal Pole Assemblies (Steel)." New traffic signal detectors will be paid for under Item 688, "Pedestrian Detectors and Vehicle Loop Detectors."

5.2. **Removal**. This price is full compensation for removing the various traffic signal components; removing the foundations; disposal of unsalvageable materials; hauling; and materials, equipment, labor, tools, and incidentals.

Item 682
Vehicle and Pedestrian Signal Heads

1. DESCRIPTION

Furnish and install vehicle and pedestrian signal heads.

2. MATERIALS

Furnish only new materials.

2.1. **Definitions**.

- **Back Plate**. A thin strip of material extending outward from all sides of a signal head.
- **LED Optical Unit**. The LED lens and associated supporting parts in a signal section.
- **Louver**. A device mounted to the visor restricting signal face visibility.
- **Signal Section**. One housing case, housing door, visor, and optical unit.
- **Signal Face**. One section or an assembly of 2 or more sections facing one direction.
- **Signal Head**. A unidirectional face or a multidirectional assembly of faces, including back plates and louvers when required, attached at a common location on a support.

2.2. **General**. Provide vehicle signal heads in accordance with DMS-11121, "Twelve-Inch LED Traffic Signal Lamp Unit." Provide prequalified vehicle signal heads from the Department's MPL.

Provide pedestrian signal heads in accordance with DMS-11131, "Pedestrian LED Countdown Signal Modules." Provide prequalified pedestrian signal heads from the Department's MPL.

Supply either aluminum or polycarbonate signal head components of the same material and manufacturer for any one project.

Use galvanized steel, stainless steel, or dichromate sealed aluminum bolts, nuts, washers, lock washers, screws, and other assembly hardware. When dissimilar metals are used, ensure the metals are selected or insulated to prevent corrosion.

Use closed-cell silicone or closed-cell neoprene gaskets.

3. CONSTRUCTION

3.1. **Assembly**. Assemble individual signal sections in multi-section faces in accordance with the manufacturer's recommendations to form a rigid signal face. Assemble and mount signal heads as shown on the plans. Install louvers and back plates in accordance with the manufacturer's recommendations. Close any openings in an assembled signal head with a plug of the same material and color as the head.

Remove only the existing lens, reflector, and incandescent lamp when installing a retrofit replacement LED traffic signal or pedestrian signal lamp unit into an existing signal housing; fit the new unit securely in the housing door; and connect the new housing unit to the existing electrical wiring or terminal block by means of simple connectors.

3.2. **Wiring**. Wire each optical unit to the terminal block located in that signal section by means of solderless wire connectors or binding screws and spade lugs. Wire all sections of a multi-section signal face to the section terminal blocks in which the traffic signal cable is terminated. Maintain the color coding on leads from the

individual optical units throughout the signal head, except for the traffic signal cable. Use solderless wire connectors or binding screws and spade lugs for connections to terminal blocks. Use binding screws and spade lugs for field wiring.

4. MEASUREMENT

This Item will be measured by each vehicle signal section, pedestrian signal section, back plate, or louver.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Pedestrian Signal Section," "Vehicle Signal Section," "Back Plate," or "Louver," of the types and sizes specified. This price is full compensation for furnishing, assembling, and installing the signal sections, back plates and louvers, and lenses and optics; mounting attachments; and materials, equipment, labor, tools, and incidentals.

Item 684
Traffic Signal Cables

1. DESCRIPTION

Furnish and install traffic signal cables.

2. MATERIALS

Provide polyethylene-jacketed multi-conductor cables in accordance with details shown on the plans. Individual conductors must be copper with polyethylene insulation rated for 600 volts. Furnish new materials. Provide traffic signal cables in accordance with DMS-11110, "Traffic Signal Cable."

2.1. **Type A Cables**. Use Type A cables meeting the requirements of IMSA 20-1 for underground conduit installation or aerial cable supported by a messenger.

2.2. **Type B Cables**. Use Type B cables meeting the requirements of IMSA 20-3 as the integral messenger cable for aerial installations.

2.3. **Type C Cables**. Use Type C cables meeting the requirements of IMSA 50-2 for loop detector lead-in installations consisting of 2 conductor shielded cable.

2.4. **Types A and B Cable Materials**. Provide the following materials for Type A and B cables:

- Use the size and number of conductors shown on the plans. Unless otherwise shown on the plans, use conductors consisting of 7 copper strands.
- Ensure color coding of conductors and sequence for cables are in compliance with Table 1. Base color is the insulation color. Tracer color is the colored stripe that is part of or firmly adhered to the insulation surface for the full length of the conductor.
- Ensure 2-conductor cable is of the round twisted type with fillers used where necessary to form a round cable.
- For cables with more than 2 conductors, ensure individual conductors are laid up symmetrically in layers with fillers used when necessary, to produce a uniform assembly of conductors with a firm, compact cylindrical core.
- Ensure fillers are a non-metallic, moisture-resistant, non-wicking material.
- Supply conductor assemblies covered with a wrapping of a moisture-resistant tape applied to overlap at least 10% of the tape width.
- Ensure the taped conductor assembly is covered with a tightly fitting black polyethylene jacket that is smooth and free from holes, splits, blisters, and any other imperfections.
- Supply cables that clearly show the name of the manufacturer and the IMSA specification number applied at approximate 2-ft. intervals to the outer surface of the jacket by indent printing.

Table 1
Conductor Color and Sequence for Cables

Conductor No.	Base Color	Tracer Color
1	Black	
2	White	
3	Red	
4	Green	
5	Orange	
6	Blue	
7	White	Black
8	Red	Black
9	Green	Black
10	Orange	Black
11	Blue	Black
12	Black	White
13	Red	White
14	Green	White
15	Blue	White
16	Black	Red
17	White	Red
18	Orange	Red
19	Blue	Red
20	Red	Green
21	Orange	Green

2.5. **Additional Requirements for Type B Cable Materials**. Additional material requirements particular to Type B cable are as follows:

- Ensure cables consisting of 5 or more conductors have a 0.25-in. nominal diameter messenger. For the messenger, use Class A galvanized Extra High Strength Steel Strand with 3 or 7 wires.
- A solid strand messenger with 0.134-in. diameter may be used for cables with less than 5 conductors.
- To provide corrosion protection, ensure the messenger strand is coated and the interstices are flooded with a rubber asphalt compound or equivalent.
- Ensure the integral messenger and conductors are enclosed in the jacket forming a cross-section similar to a figure 8.

2.6. **Type C Cable Materials**. Use the following materials for Type C cables:

- Unless otherwise shown on the plans, use No. 14 AWG insulated conductors with concentric stranding with black insulation on 1 of the 2 conductors and clear insulation on the other conductor. Ensure conductors have a minimum of 2 twists per foot within the cable.
- Use cables that have 100% shield coverage using aluminum bonded to a Mylar film. Ensure the drain wire is stranded tinned copper, 2 AWG sizes less than the conductor, and in continuous contact with the aluminum side of the shield material.
- Ensure the jacket is black polyethylene.
- Use cables that legibly show the name of the manufacturer and the IMSA specification number applied at approximate 2-ft. intervals on a tape under the outer jacket.

2.7. **Sampling**. The Engineer may take samples from each roll of each size of cable for establishing conformity to IMSA. The samples will be at least 3 ft. long. Replace any cable failing to meet IMSA requirements.

3. CONSTRUCTION

For each cable run in underground conduit, coil an extra 5 ft. of cable in each ground box.

Splices are not permitted in Type A and B cables unless shown on the plans, or approved in writing. Ensure splices are watertight.

Make splices between Type C cable and loop detector wires only in the ground box near the loop the cable is servicing. Use non-corrosive solder for splices. Ground the drain wire of Type C cable to earth ground only at the controller or detector cabinet. Ensure the resistance from the drain wire to the ground rod is less than 1 ohm.

Test the cables after installation and before any connection to the cables. Cables testing less than 50 megohms insulation resistance at 500 volts will be rejected.

4. MEASUREMENT

This Item will be measured by the foot of traffic signal cables.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Traffic Signal Cables" of the types and sizes specified. This price is full compensation for furnishing and installing materials, and for equipment, labor, tools, and incidentals, except as shown below.

Cables inside traffic signal pole assemblies will be paid for under this Item.

Cables used for inside signal heads and controllers or coils in ground boxes, pole bases, and on span wires will not be paid for directly but will be subsidiary to pertinent Items.

Item 686
Traffic Signal Pole Assemblies (Steel)

1. DESCRIPTION

- **Installation**. Fabricate, furnish, and install steel traffic signal pole assemblies.
- **Relocation**. Remove and relocate existing steel traffic signal pole assemblies.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 416, "Drilled Shaft Foundations"
- Item 421, "Hydraulic Cement Concrete"
- Item 441, "Steel Structures"
- Item 442, "Metal for Structures"
- Item 445, "Galvanizing"
- Item 449, "Anchor Bolts"

Furnish alloy steel or medium-strength mild steel anchor bolts in accordance with Section 449.2.1., "Bolts and Nuts," unless otherwise shown on the plans.

3. CONSTRUCTION

3.1. **Standard Design**. Fabricate poles assemblies in accordance with this Item to the designs shown on the plans. Alternate designs are not acceptable. Deviations that affect the basic structural behavior of the pole are considered to be alternate designs. For deviations that do not affect the basic structural behavior of the pole, electronically submit shop drawings in accordance with Item 441, "Steel Structures," to the Bridge Division for approval.

3.2. **Fabrication**. Fabricate and weld in accordance with Item 441, "Steel Structures," AWS D1.1, *Structural Welding Code—Steel*; and the requirements of this Item. Fabrication tolerances are given in Table 1.

Table 1
Fabrication Tolerances

Part	Dimension	Tolerance (in.)
Pole and mast arm shaft	Length	±1
	Thickness	+0.12, –0.02
	Difference between flats or diameter	±3/16
	Straightness	1/8 in 10 ft.
	Attachment locations	±1
Base and mast arm mounting plates	Overall	±3/16
	Thickness	+1/4, –0
	Deviations from flat	3/16 in 24 in.
	Spacing between holes	±1/8
	Bolt hole size	±1/16
Anchor bolts	Length	±1/2
	Threaded Length	±1/2
	Galvanized Length	–1/4
Assembled shafts	Angular Orientation	1/16 in 12 in.[1]
	Centering	±3/16
	Twist	3°in 50 ft.

1. 1/8 in 12 in. between mounting plates and between mounting plates and base plates.

Fabrication plants that produce steel traffic signal pole assemblies must be approved in accordance with DMS-7380, "Steel Non-Bridge Member Fabrication Plant Qualification." The Department maintains an MPL of approved traffic signal pole assembly fabrication plants.

Provide properly fitting components. Provide round or octagonal shafts for poles and mast arms tapered as shown on the plans. Fabricate mast arms straight in the unloaded condition unless otherwise shown on the plans. The Department will accept bolted slip joints overlapping by at least 1.5 diameters in mast arms 40 ft. and longer.

Provide circumferential welds only at the ends of the shafts. Provide no more than 2 longitudinal seam welds in shaft sections. Grind or smooth the exterior of longitudinal seam welds to the same appearance as other shaft surfaces. Ensure 100% penetration within 6 in. of circumferential base welds and 60% minimum penetration at other locations along the longitudinal seam welds. Use a welding technique that minimizes acid entrapment during later galvanizing. Hot-dip galvanize all fabricated parts in accordance with Item 445, "Galvanizing."

Treat welds with Ultrasonic Impact Treatment when shown on the plans after galvanization and with the dead load (actual or simulated) applied. Repair damaged galvanizing in accordance with Section 445.3.5., "Repairs."

Connect the luminaire arm to the pole with simplex fittings. Ensure the fittings have no defects affecting strength or appearance.

Permanently mark, at a visible location when erected, pole base plates and mast arm mounting plates with the design wind speed.

Permanently mark, at a visible location when erected, pole base plates and fixed mast arm mounting plates with the fabrication plant's insignia or trademark. Place the mark on the pole base plate adjacent to the hand-hole access compartment.

Deliver each traffic signal pole assembly with fittings and hardware either installed or packaged with its associated components. Ship all components with a weatherproof tag identifying the manufacturer, Contract number, date, and destination of shipment.

3.3. **Installation**. Locate traffic signal pole assemblies as shown on the plans unless otherwise directed to secure a more desirable location or avoid conflict with utilities. Stake the traffic signal pole assembly locations for verification by the Engineer.

Use established industry and utility safety practices when working near overhead or underground utilities. Consult with the appropriate utility before beginning work.

Construct foundations for new traffic signal pole assemblies in accordance with Item 416, "Drilled Shaft Foundations," and the details shown on the plans. Orient anchor bolts as shown on the plans.

Erect structures after foundation concrete has attained its design strength as required on the plans and Item 421, "Hydraulic Cement Concrete." Coat anchor bolt threads and tighten anchor bolts in accordance with Item 449, "Anchor Bolts."

After the traffic signal pole assembly is plumb and all nuts are tight, tack weld each anchor bolt nut in 2 places to its washer. Tack weld each washer to the base plate in 2 places. Never weld components to the bolt. Tack weld in accordance with Item 441, "Steel Structures." After tack welding, repair galvanizing damage on bolts, nuts, and washers in accordance with Section 445.3.5., "Repairs."

Do not grout between the base plate and the foundation.

3.4. **Relocation**. Disconnect and isolate traffic signal cables before removing the pole. Remove existing traffic signal pole assemblies as directed. Ensure the poles or attached components suffer no undue stress or damage. Signs, signal heads, mounting brackets, luminaires, etc., may be left on the poles. Repair or replace damaged components as directed.

Remove abandoned concrete foundations, including steel, to a point 2 ft. below final grade unless otherwise shown on the plans. Cut off and remove steel protruding from the remaining concrete. Backfill the hole with materials equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

Move existing pole assemblies to locations shown on the plans, or as directed. Construct foundations for relocated traffic signal pole assemblies in accordance with Item 416, "Drilled Shaft Foundations," and the details shown on the plans. Install existing pole assemblies on new foundations in accordance with Section 686.3.3., "Installation."

Accept ownership of unsalvageable materials and dispose of in accordance with federal, state, and local regulations.

4. MEASUREMENT

This Item will be measured by each traffic signal pole assembly installed or relocated.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Install Traffic Signal Pole Assemblies (Steel)" of the types and sizes specified or "Relocate Traffic Signal Pole Assemblies (Steel)" of the types specified.

New drilled shaft foundations will be paid for under Item 416, "Drilled Shaft Foundations."

5.1. **Installation**. This price is full compensation for furnishing, fabricating, galvanizing, assembling, and erecting the pole upon a foundation; furnishing and erecting required mast arms and luminaire arms; furnishing and placing anchor bolts, nuts, washers, and templates; and materials, equipment, labor, tools, and incidentals.

5.2. **Relocation**. This price is full compensation for removing traffic signal pole assemblies; removing existing foundations; backfilling and surface placement; storing the components to be reused or salvaged; furnishing, fabricating, and installing required new components including anchor bolts, nuts, washers, and templates; placing and securing traffic signal pole assemblies on new foundations; furnishing and placing conduit, ground rods, and wiring; disposal of unsalvageable materials; loading and hauling; and materials, equipment, labor, tools, and incidentals.

Item 687
Pedestal Pole Assemblies

1. DESCRIPTION

- **Installation**. Furnish and install pedestal pole assemblies for vehicle and pedestrian signals.
- **Relocation**. Remove and relocate existing pedestal pole assemblies.
- **Removal**. Remove existing pedestal pole assemblies.

2. MATERIALS

Furnish new materials in accordance with the following Items and with details shown on the plans:

- Item 445, "Galvanizing"
- Item 449, "Anchor Bolts"
- Item 656, "Foundations for Traffic Control Devices"

2.1. **Pedestal Pole Base**. Provide prequalified pedestal pole bases from the Department's MPL in accordance with DMS-11140, "Pedestal Pole Base."

2.2. **Pedestal Pole**. Provide 4-in. diameter schedule 40 steel pipe or tubing, aluminum pipe (alloy 6061 T6), or rigid metal conduit. Do not use aluminum conduit. Galvanize pedestal pole assemblies in accordance with Item 445, "Galvanizing," unless otherwise shown on the plans.

2.3. **Pedestrian Push Button Pole Assembly**. Provide diameter as shown on the plans, schedule 40 steel pipe or tubing, aluminum pipe (alloy 6061-T6), or rigid metal conduit. Do not use aluminum conduit. Galvanize pedestrian push button post in accordance with Item 445, "Galvanizing," unless otherwise shown on the plans.

3. CONSTRUCTION

Install foundations in accordance with Item 656, "Foundations for Traffic Control Devices."

3.1. **Pedestal Pole Base**. Ground the base with connectors to the 1/2-13 NC female threaded hole. Fabricate the base for 4 L bend anchor bolts arranged in a square pattern with a 12-3/4 in. bolt circle. Provide mild steel anchor bolts in accordance with Item 449, "Anchor Bolts," for each base. Provide three 1/16-in. thick and three 1/8-in. thick U-shaped galvanizing steel shims for each base. Size shims to fit around the anchor bolts.

3.2. **Installation**. Install pedestal pole assemblies and pedestrian push button post assemblies as shown on the plans, or as directed. Pedestal pole assemblies include foundation, pole shaft, base, anchor bolts, anchor bolt nuts, anchor bolt template, shims, and miscellaneous components. Watertight breakaway electrical disconnects are required for pedestal pole assemblies used in conjunction with vehicle and pedestrian heads and components. Pedestrian push button post assemblies include foundation, pole, and post cap.

Use established industry and utility safety practices to erect assemblies near overhead or underground utilities. Consult with the appropriate utility company before beginning such work.

Repair damaged galvanizing in accordance with Section 445.3.5., "Repairs."

3.3. **Relocation**. Disconnect and isolate the electrical power supply before removal of the assembly. Remove existing assembly as directed. Salvage existing components such as signs, heads, buttons, pole, and base unless otherwise directed. Repair or replace lost or damaged components as directed.

Install foundations in accordance with Item 656, "Foundations for Traffic Control Devices."

Relocate existing assembly to the location shown on the plans or as directed. Install existing assembly at new foundations in accordance with Section 687.3.2., "Installation." Remove existing foundations in accordance with Section 687.3.4., "Removal." Accept ownership of unsalvageable materials, as determined by the Engineer, and dispose of in accordance with federal, state, and local regulations.

Repair galvanizing for any damaged steel part or any steel part welded after galvanizing in accordance with Item 445, "Galvanizing."

3.4. **Removal**. Disconnect and isolate electrical power supplies before removal of the assembly. Remove existing sign panel, beacons, pole, and base from existing assembly. Store items to be reused or salvaged without damaging them. Store sign panels above the ground in a vertical position at locations shown on the plans or as directed. Accept ownership of unsalvageable materials and dispose of in accordance with federal, state, and local regulations.

Disconnect and remove conductors from abandoned circuits. Remove abandoned conduit and ducts to a point 6 in. below final grade. Destroy existing transformer bases to prevent reuse. Remove abandoned foundations to 2 ft. below the finished grade unless otherwise shown on the plans. Cut off and remove steel protruding from the remaining concrete. Backfill the remaining hole with material equal in composition and density to the surrounding area. Replace any surfacing with like material to equivalent condition.

3.5. **Painted Finish**. When required, paint pedestal pole and pedestrian push button post assemblies in accordance with details shown on the plans.

4. MEASUREMENT

This Item will be measured by each pedestal pole assembly or each pedestrian push button post assembly installed, relocated, or removed.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Install Pedestal Pole Assembly," "Install Pedestrian Push Button Post Assembly," "Relocate Pedestal Pole Assembly," "Relocate Pedestrian Push Button Post Assembly," "Remove Pedestal Pole Assembly" or "Remove Pedestrian Push Button Post Assembly."

New signal heads will be paid for under Item 682, "Vehicle and Pedestrian Signal Heads."

5.1 **Installation**. This price is full compensation for furnishing and installing the shaft; base, shims, anchor bolts, and foundation; and materials, equipment, labor, tools, and incidentals.

5.2 **Relocation**. This price is full compensation for removing the pedestal pole or pedestrian push button assemblies; removing existing foundations; installing new foundations; furnishing, fabricating, and installing any new components as required and replacing the assembly on its new foundations with all manipulations and electrical work; controller; salvaging; disposal of unsalvageable material; loading and hauling; and equipment, material, labor, tools, and incidentals.

5.3 **Removal**. This price is full compensation for removing the various pedestal pole assemblies components; removing the foundations; storing the components to be reused or salvaged; disposal of unsalvageable material; backfilling and surface placement; loading and hauling; and equipment, materials, tools, labor, and incidentals.

Item 688
Pedestrian Detectors and Vehicle Loop Detectors

1. DESCRIPTION

Furnish and install traffic signal detectors.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and the pertinent requirments of the following Items:

- Item 618, "Conduit"
- Item 624, "Ground Boxes"
- Item 682, "Vehicle and Pedestrian Signal Heads"
- Item 684, "Traffic Signal Cables"

2.1. **Pedestrian Detectors**. Supply housing or an adapter (saddle) that conforms to the pole shape, fitting flush to ensure a rigid installation. Supply adapters of the same material and construction as the housing. Supply push-button switches that have single-pole, single-throw contacts and screw-type terminals and have a design life of at least 1 million operations.

Ensure the internal components provide a push-button with normal open contacts, and include all electrical and mechanical parts required for operation. Ensure the push-button assembly is weather-tight and tamperproof, is designed to prevent an electrical shock under any weather condition, and has provisions for grounding in accordance with the NEC.

2.1.1. **Standard Pedestrian Detectors**. Provide a 2-piece cast aluminum housing unit consisting of a base housing and a removable cover. Provide threaded holes for 0.5-in conduit in the housing for any necessary conduit attachment.

Ensure the manufacturer's name or trademark is located on the housing.

2.1.2. **Accessible Pedestrian Signals (APS)**. Provide accessible pedestrian detectors in accordance with DMS-11132, "Accessible Pedestrian Signals (APS)."

2.2. **Vehicle Loop Detectors**. Use stranded copper No. 14 AWG XHHW cross-linked-thermosetting-polyethylene-insulated conductor rated for 600 volts AC for vehicle detector loop wire unless otherwise shown on the plans. Ensure each length of wire shows the name or trademark of the manufacturer, insulation voltage rating, wire gauge, and insulation type at approximate 2-ft. intervals on the insulation surface.

When shown on the plans, use flexible vinyl or polyethylene tubing with 0.184 in. minimum inside diameter, 0.031 in. minimum wall thickness, 0.26 in. maximum outside diameter, and a smooth bore. Use tubing that does not adhere to the loop wire in any way and is capable of resisting deterioration from oils, solvents, and temperatures up to 212°F. Use tubing that is abrasion-resistant and remains flexible from –22°F to 212°F. Use orange or red tubing unless otherwise shown on the plans.

Use sealant for the vehicle detector loops in accordance with DMS-6340, "Vehicle Loop Wire Sealant."

3. CONSTRUCTION

3.1. **Pedestrian Detectors**.

3.1.1. **Push-Button Unit**. Meet the requirements of the TMUTCD when installing push-buttons. Wire the push-button according to manufacturer's installation instructions. Close unused housing openings with a weather-tight closure painted to match the housing. Verify that each button is communicating and fully functional.

Do not use terminal connections or splice wire leads except at approved locations. All allowed splices must be watertight.

Attach wires to terminal posts with solderless terminals unless otherwise advised by manufacturer's recommendations. Attach terminals to the wires with a ratchet-type compression crimping tool properly sized to the wire.

Mount a pedestrian push button sign near each push button as shown on the plans.

For installations where APS buttons are placed less than 10 ft. apart from one another, program the appropriate speech walk message (include the name of the appropriate street in the message) for these buttons. When 2 APS buttons are installed on the same pole ensure that the APS buttons are insulated to eliminate vibrations from traveling to the other button.

3.1.2. **Controller Unit**. If a controller unit is required by the plans, integrate the pedestrian controller unit into the traffic signal controller cabinet assembly.

3.2. **Vehicle Loop Detectors**. Provide the loop location, configuration, wire color, and number of turns shown on the plans. Loops may be adjusted by the Engineer to fit field conditions.

3.2.1. **Saw-Cuts**. Cut the pavement with a concrete saw to form neat lines. Do not exceed 1 in. depth on concrete bridge slab saw-cuts. Cut all other saw-cuts deep enough to provide a minimum of 1 in. depth of sealant over the wire. Make a separate saw-cut from each loop to the edge of the pavement unless otherwise shown on the plans. Ensure the cut is clean and dry when the wire and sealant are placed.

3.2.2. **Conduit**. Place conduit between the pavement and ground box as shown on the plans.

3.2.3. **Loop Wire Color**. Use the following color code unless otherwise shown on the plans. Use white for the first loop on the right followed by black, orange, green, brown, and blue. Use the same color for all loops in the same lane. Loops installed in multi-lanes will have the same color code in the order the loops are installed. When facing the same direction that traffic flows, the color code will read from right to left for all lanes carrying traffic in that direction. If traffic moves in 2 directions, the color code will be repeated for the other direction of traffic.

3.2.4. **Loop Wire Installation**. When shown on the plans, place the loop wire in a flexible vinyl or polyethylene tubing in accordance with Article 688.2., "Materials." The loop wire color requirements do not apply to wires in tubing.

Twist the wire from the loop to the ground box a minimum of 5 turns per foot. When only one pair of wires is in a saw-cut, it need not be twisted while in the saw-cut. Do not splice loop wire in the loop or in the run to the ground box.

Hold the loop wire in place every 2 ft. with strips of rubber, neoprene flexible tubing, or polyethylene foam sealant approximately 1 in. long. Leave these strips in place and fill the slot with loop sealant.

Splice the loop lead-in cable and loop detector wires only in the ground box near the loop it is serving. Use non-corrosive solder for splices and ensure the splice is watertight. Ground the drain wire of the loop lead-in

cable to earth ground only at the controller or detector cabinet. Ensure the resistance from the drain wire to the ground rod is less than 1 ohm.

4. MEASUREMENT

This Item will be measured by the foot of saw-cut containing loop wire and each pedestrian push-button and controller unit.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Vehicle Loop Detectors" of the type specified, "Pedestrian Detector Push-button Units" of the type specified or "Pedestrian Detector Controller Unit." This price is full compensation for furnishing, installing, and testing the detectors, detector controller units, including detector configuration devices or software (when applicable); saw-cutting, excavation, backfill, sealant, and sealant placement; pavement repair associated with saw-cutting; and materials, equipment, labor, tools, and incidentals, except as follows.

The conduit and loop wire from the edge of pavement to the ground box used for the vehicle loop detectors will not be measured or paid for directly but will be subsidiary to this Item.

New ground boxes will be paid for under Item 624, "Ground Boxes." New loop lead-in cable will be paid for under Item 684, "Traffic Signal Cables."

Item 752
Tree and Brush Removal

1. DESCRIPTION

Remove and dispose of trees, brush, shrubs, and vines. Trim trees and shrubs. Remove stumps.

2. MATERIALS

Furnish commercially available pruning paint.

3. EQUIPMENT

Provide equipment necessary to complete the work.

4. WORK METHODS

Perform tree and brush removal and trimming from right of way line to right of way line or other widths and locations shown on the plans. Ensure trees, shrubs, and other landscape features that are to remain are not damaged. Dispose of debris within 48 hr. of cutting, off the right of way, in accordance with federal, state, and local regulations unless otherwise approved. When approved, chip debris and spread in a thin layer on the right of way.

4.1. **Tree Removal**. Remove trees of various diameters as shown on the plans, or as directed. Remove tree stumps to at least 12 in. below the surrounding terrain unless otherwise shown on the plans, or as directed. Backfill holes with acceptable material and compact flush with surrounding area.

4.2. **Tree Trimming**. Remove dead tree limbs. Remove tree limbs to the limits shown on the plans. Prune trees in accordance with Class IV National Arborist Association Pruning Standards for shade trees. Make cuts as close as possible to the trunk or parent limb without cutting into the branch collar or leaving a protruding stub. Remove suckers to the height of the lowest main branch.

When removing limbs 2 in. in diameter or larger:

- Undercut 1/3 way through the limb 8 to 12 in. from the main stem.
- Remove limb 4 to 6 in. outside the first cut.
- Remove stub with an even flush cut so that a trace (collar) protrudes approximately 1/2 in.
- Do not allow limb to fall free if it can damage other limbs or items.
- Treat exposed cuts on oak trees with wound dressing within 20 min. of the cut.

Disinfect tools with 70% methyl alcohol, benzalkonium chloride, chlorine solution, or other approved disinfectant when trimming oak trees and when shown on the plans before cutting, and sterilize/sanitize again before cutting another tree. Avoid pruning between February 15 and June 15, the period for maximum insect and fungal activity.

4.3. **Brush Removal**. Remove brush including, but not limited to, bushes, small trees, and vines growing within the right of way by cutting parallel to and within 1 in. of the ground and to the limits shown on the plans. Remove brush from under bridges, around culverts, and in channels to the limits shown on the plans.

4.4. **Channel Work**. Trim trees and remove brush to the limits shown on the plans, including areas under bridges.

4.5. **Stump Removal**. Remove tree stumps at least 12 in. below the surrounding terrain unless otherwise shown on the plans, or as directed. Backfill holes with acceptable material and compact flush with surrounding area.

5. MEASUREMENT

This Item will be measured as follows:

5.1. **Tree Removal**. By each tree of the diameter specified. The diameter will be measured 3 ft. above the ground. Trees less than 4 in. in diameter are considered brush. Trees with multiple trunks at the point of measurement will be measured separately and paid for according to the specified diameter. Removal of the stump is subidiary to Tree Removal.

5.2. **Tree Trimming and Brush Removal**. By the centerline mile of the dimension specified. “Centerline mile” is defined as the continuous measurement along the center of the right of way.

5.3. **Tree Trimming and Brush Removal for Channels**. By the acre.

5.4. **Stump Removal**. By each stump removed. This item is for stumps where others previously removed the tree.

6. PAYMENT

The work performed in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Tree Removal” of the diameter specified, “Tree Trimming” of the dimension specified, “Brush Removal,” “Tree Trimming and Brush Removal,” and “Stump Removal.” This price is full compensation for removal, trimming, disposal, equipment, traffic control, labor, and incidentals.

When not shown on the plans as a separate pay item, payment for tree trimming and brush removal in channels will be included in payment by the centerline mile. When shown on the plans as a separate pay item, tree trimming and brush removal in channels will be paid for at the unit price bid for “Tree Trimming and Brush Removal (Channels).”

The limits shown on the plans are the limits for pay purposes unless otherwise modified in accordance with Article 4.4., “Changes in the Work.”

Special Specification 6002
Video Imaging Vehicle Detection System

1. DESCRIPTION

Install a Video Imaging Vehicle Detection System (VIVDS) that monitors vehicles on a roadway via processing of video images and provides detector outputs to a traffic controller or similar device.

A VIVDS configuration for a single intersection will consist of variable focal length cameras, VIVDS card rack processor system, and all associated equipment required to setup and operate in a field environment, including a video monitor and laptop (if required), connectors, and camera mounting hardware.

The system is composed of these principal items: the cameras, the field communications link between the camera and the VIVDS processor unit, and the VIVDS processor unit along with a PC, video monitor, or associated equipment required to setup the VIVDS and central control software to communicate to the VIVDS processor.

The VIVDS Card Rack Processor must be either NEMA TS 2 TYPE 1 or TYPE 2. TYPE 2 must have RS 485 SDLC.

2. DEFINITIONS

2.1. **VIVDS Processor Unit**. The electronic unit that converts the video image provided by the cameras, generates vehicle detections for defined zones, and collects vehicular data as specified.

2.2. **VIVDS Processor System**. One or more VIVDS processor modular units required to handle the number of camera inputs.

2.3. **Central Control**. A remotely located control center, which communicates with the VIVDS. The VIVDS operator at the central control has the ability to monitor the operation and modify detector placement and configuration parameters. The equipment that constitutes central control is comprised of a workstation microcomputer along with the associated peripherals as described in this Special Specification.

2.4. **Field Setup Computer**. A portable microcomputer used to set up and monitor the operation of the VIVDS processor unit. If required to interface with the VIVDS processor unit, the field setup computer with the associated peripherals described in this Special Specification and a video monitor, also described in this Special Specification, must be supplied as part of the VIVDS.

2.5. **Field Communications Link**. The communications connection between the camera and the VIVDS processor unit. The primary communications link media may be coaxial cable or fiber optic cable.

2.6. **Remote Communications Link**. The communications connection between the VIVDS processor unit and the central control.

2.7. **Camera Assembly**. The complete camera or optical device assembly used to collect the visual image. The camera assembly consists of a charged coupled device (CCD) camera, environmental enclosure, sun shield, temperature control mechanism, and all necessary mounting hardware.

2.8. **Occlusion**. The phenomenon when a vehicle passes through the detection zone but the view from the sensor is obstructed by another vehicle. This type of occlusion results in the vehicle not being detected by the sensor or when a vehicle in one lane passes through the detection zone of an adjacent lane. This type of occlusion can result in the same vehicle being counted in more than one lane.

2.9. **Detection Zone**. The detection zone is a line or area selected through the VIVDS processor unit that when occupied by a vehicle, sends a vehicle detection to the traffic controller or freeway management system.

2.10. **Detection Accuracy**. The measure of the basic operation of a detection system (shows detection when a vehicle is in the detection zone and shows no detection when there is not a vehicle in the detection zone).

2.11. **Live Video**. Video being viewed or processed at 30 frames per second.

2.12. **Lux**. The measure of light intensity at which a camera may operate. A unit of illumination equal to one lumen per square meter or to the illumination of a surface uniformly one meter distant from a point source of one candle.

2.13. **Video Monitor**. As a minimum must be a 9-in. black and white monitor with BNC connectors for video in and out.

3. FUNCTIONAL CAPABILITIES

The system software must be able to detect either approaching or departing vehicles in multiple traffic lanes. A minimum of 4 detector outputs per video processor module card and each card must have a minimum of 24 detection zones. Each zone and output must be user definable through interactive graphics by placing lines or boxes in an image on a video or VGA monitor. The user must be able to redefine previously defined detection zones.

The VIVDS must provide real time vehicle detection (within 112 milliseconds (ms) of vehicle arrival).

The VIVDS processor unit must be capable of simultaneously processing information from various video sources, including CCTV video image sensors and video tape players. The video sources may be, but are not required to be, synchronized or line-locked. The video must be processed at a rate of 30 times per second by the VIVDS processor unit.

The system must be able to detect the presence of vehicles in a minimum of 12 detection zones within the combined field of view of all cameras (a minimum of 12 detection zones per camera input to the VIVDS processor unit).

Provide detection zones that are sensitive to the direction of vehicle travel. The direction to be detected by each detection zone must be user programmable.

The VIVDS processor unit must compensate for minor camera movement (up to 2% of the field of view at 400 ft.) without falsely detecting vehicles. The camera movement must be measured on the unprocessed video input to the VIVDS processor unit.

The camera must operate while directly connected to VIVDS Processor Unit.

Once the detector configuration has been downloaded or saved into the VIVDS processor unit, the video detection system must operate with the monitoring equipment (monitor or laptop) disconnected or online.

When the monitoring equipment is directly connected to the VIVDS processor unit, it must be possible to view vehicle detections in real time as they occur on the field setup computer's color VGA display or the video monitor.

4. VEHICLE DETECTION

4.1. **Detection Zone Placement**. The video detection system must provide flexible detection zone placement anywhere within the combined field of view of the image sensors. Preferred presence detector configurations must be lines or boxes placed across lanes of traffic or lines placed in line with lanes of traffic. A single detector must be able to replace one or more conventional detector loops. Detection zones must be able to

be fully overlapped. In addition, detection zones must have the capability of implementing “AND” and “OR” logical functions including presence, extension and delay timing. These logical functions may be excluded if provisions are made to bring each detector separately into the controller and the controller can provide these functions.

4.2. **Detection Zone Programming**. Placement of detection zones must be by means of a graphical interface using the video image of the roadway. The monitor must show images of the detection zones superimposed on the video image of traffic while the VIVDS processor is running.

The detection zones must be created by using the mouse or keypad to draw detection zones on the monitor. The detection zones must be capable of being sized, shaped and overlapped to provide optimal road coverage and detection. It must be possible to upload detector configurations to the VIVDS processor unit and to retrieve the detector configuration that is currently running in the VIVDS processor unit.

The mouse or keypad must be used to edit previously defined detector configurations so as to fine tune the detection zone placement size and shape. Once a detection configuration has been created, the system must provide a graphic display of the new configuration on its monitor. While this fine-tuning is being done, the detection must continue to operate from the detector configuration that is currently called.

When a vehicle occupies a detection zone, the detection zone on the live video must indicate the presence of a vehicle, thereby verifying proper operation of the detection system. With the absence of video, the card must have an LED that will indicate proper operation of the detection zones.

Provide detection zones that are sensitive to the direction of vehicle travel. The direction to be detected by each detection zone must be user programmable. The vehicle detection zone should not activate if a vehicle traveling any direction other than the one specified for detection occupies the detection zone. Cross-street and wrong way traffic should not cause a detection.

4.3. **Design Field of View**. The video detection system must reliably detect vehicle presence in the design field of view. The design field of view must be defined as the sensor view when the image sensor is mounted 24 ft. or higher above the roadway, when the camera is adjacent (within 15 ft.) to the edge of the nearest vehicle travel lane, and when the length of the detection area is not greater than 10 times the mounting height of the image sensor. Within this design field of view, the VIVDS processor unit must be capable of setting up a single detection zone for point detection (equivalent to the operation of a 6 ft. × 6 ft. inductive loop). A single camera, placed at the proper mounting height with the proper lens, must be able to monitor up to and including 5 traffic lanes simultaneously.

4.4. **Detection Performance**. Detection accuracy of the video detection system must be comparable to properly operating inductive loops. Detection accuracy must include the presence of any vehicle in the defined detection zone regardless of the lane, which the vehicle is occupying. Occlusion produced by vehicles in the same or adjacent lanes must not be considered a failure of the VIVDS processor unit, but a limitation of the camera placement. Detection accuracy (a minimum of 95%) must be enforced for the entire design field of view on a lane by lane and on a time period basis. When specified on the plans, furnish up to 24 continuous hours of recorded video of all installed intersection cameras within the 30 day test period for verification of proper camera placement, field of view, focus, detection zone placement, processor setup and operation. The video from each camera must show vehicle detections for all zones.

4.5. **Equipment Failure**. Either camera or VIVDS processor unit must result in constant vehicle detection on affected detection zones.

5. VIVDS PROCESSOR UNIT

5.1. **Cabinet Mounting**. The VIVDS processor unit must be rack mountable.

5.2. **Environmental Requirements**. The VIVDS processor unit must be designed to operate reliably in the adverse environment found in the typical roadside traffic cabinet. It must meet the environmental

requirements set forth by the latest NEMA (National Electrical Manufacturers Association) TS1 and TS2 standards as well as the environmental requirements for Type 170, Type 179 and 2070 controllers. Operating temperature must be from -30°F to +165°F at 0% to 95% relative humidity, non-condensing.

5.3. **Electrical**. The VIVDS must have a modular electrical design.

The VIVDS must operate within a range of 89 to 135 VAC, 60 Hz single phase. Power to the VIVDS must be from the transient protected side of the AC power distribution system in the traffic control cabinet in which the VIVDS is installed.

Serial communications to the field setup computer must be through an RS 232, USB or Ethernet port. This port must be able to download the real time detection information needed to show detector actuations. A connector on the front of the VIVDS processor unit must be used for serial communications.

The unit must be equipped with RS 170 (monochrome) or RS170A (color) composite video inputs video inputs, so that signals from image sensors or other synchronous or asynchronous video sources can be processed in real time. BNC connectors on the front of the VIVDS processor unit or video patch panel must be used for all video inputs.

The unit must be equipped with a single RS 170 composite video output. This output must be capable of corresponding to any one of the video inputs, as selected remotely via the field setup computer or front panel switch. Multiple video outputs requiring external cable connections to create a combined single video output must not be acceptable. A BNC or RCA connector must be used for video output on the front of the processor unit. Any other video formats must be approved by a Department TRF Signal Operation Engineer before use.

Software upgrades or changes must be presented to and approved by the Department's TRF-TM Division before use. Failure to do so will be grounds for termination of contract and probation for responsible partys.

The unit software and the supervisor software must include diagnostic software to allow testing the VIVDS functions. This must include the capability to set and clear individual detector outputs and display the status of inputs to enable setup and troubleshooting in the field.

6. CAMERA ASSEMBLY

6.1. **Camera**. The video detection system must use medium resolution, monochrome image sensors as the video source for real time vehicle detection. The cameras must be approved for use with the VIVDS processor unit by the supplier of the VIVDS. As a minimum, each camera must provide the following capabilities:

- Images must be produced with a Charge Coupled Device (CCD) sensing element with horizontal resolution of at least 480 lines for black and white or 470 lines for color and vertical resolution of at least 350 lines for black and white or color. Images must be output as a video signal conforming to RS170.
- Useable video and resolvable features in the video image must be produced when those features have luminance levels as low as 0.1 lux for black and white, and as low as 1.0 lux for color, for night use.
- Useable video and resolvable features in the video image must be produced when those features have luminance levels as high as 10,000 lux during the day.
- The camera must include an electronic shutter or auto-iris control based upon average scene luminance and must be equipped with an electronic shutter or auto-iris lens with variable focal length and variable focus that can be adjusted without opening up the camera housing to suit the site geometry. The variable focal length must be adjustable from 6 mm to 34 mm.

6.2. **Camera and Lens Assembly**. The camera and lens assembly must be housed in an environmental enclosure that provides the following capabilities:

- The enclosure must be waterproof and dust tight to the latest NEMA 4 specifications.

- The enclosure must allow the camera to operate satisfactorily over an ambient temperature range from -30°F to +140°F while exposed to precipitation as well as direct sunlight.
- The enclosure must allow the camera horizon to be rotated in the field during installation.
- The enclosure must include a provision at the rear of the enclosure for connection of power and video signal cables fabricated at the factory. Input power to the environmental enclosure must be nominally 115 VAC 60 Hz.
- A thermostatically controlled heater must be at the front of the enclosure to prevent the formation of ice and condensation, as well as to assure proper operation of the lens's iris mechanism. The heater must not interfere with the operation of the camera electronics, and it must not cause interference with the video signal.
- The enclosure must be light colored or unfinished and must include a sun shield to minimize solar heating. The front edge of the sunshield must protrude beyond the front edge of the environmental enclosure and must include provision to divert water flow to the sides of the sunshield. The amount of overhang of the sun shield must be adjustable to block the view of the horizon to prevent direct sunlight from entering the lens. Any plastics used in the enclosure must include ultra violet inhibitors.
- The total weight of the image sensor in the environmental enclosure with sunshield must be less than 10 lb.
- When operating in the environmental enclosure with power and video signal cables connected, the image sensor must meet FCC class B requirements for electromagnetic interference emissions.

The video output of the cameras must be isolated from earth ground. All video connections for the cameras to the video interface panel must also be isolated from earth ground.

Use waterproof, quick disconnect connectors to the image sensor for both video and power.

Provide a camera interface panel capable of being mounted to sidewalls of a controller cabinet for protection of the VIVDS processor unit, camera video and power inputs/outputs. The panel must consist of, as a minimum, 4 Edco CX06 coax protectors, an Edco ACP-340 for the cameras and VIVDS processor unit power, a 10 amp breaker, a convenience outlet protected the ACP-340 and a terminal strip with a minimum of sixteen 8-32 binder head screws. The terminal strip must be protected by a piece of 1/8 in. Plexiglas.

When the connection between the image sensor and the VIVDS processor unit is coaxial cable, the coaxial cable used must be a low loss, 75 ohm, precision video cable suited for outdoor installation, such as Belden 8281 or a Department-approved equal.

Camera mounting hardware must allow for vertical or horizontal mounting to the camera enclosure. Pelco AS-0166-4-62 or equivalent is acceptable.

7. FIELD COMMUNICATION LINK

The field communications link must be a one way communications connection from the camera to the equipment cabinet. The primary communications link media may be coaxial cable or fiber optic cable accompanied by a 3 conductor minimum 18 AWG, 24 VDC or 115 VAC camera power cable, or appropriate cable as approved.

The following requirements must govern for the various types of field communications link media described on the plans:

7.1. **Coaxial Cable**. In locations where the plans indicate coaxial cable is required as the primary communications link, this cable must be of the RG 59 type with a nominal impedance of 75 ohms. All cable must have a polyethylene dielectric with copper braid shield having a minimum of 98% shield coverage and not greater than 0.78 dB attenuation per 100 feet at 10 MHz with a minimum 18 AWG external 3 conductor power cable or approved equivalent as directed.

7.2. **Fiber Optic Cable**. If shown on the plans, furnish fiber optic cable in accordance with the Special Specification for fiber optic cable.

7.3. **Twisted Wire Pairs**. Must be Belden 9556 or equivalent 18 AWG TWP control cable.

All connection cables must be continuous from the equipment cabinet to the camera. No splices of any type will be permitted.

Install lightning and transient surge suppression devices on the processor side of the field communications link to protect the peripheral devices. The suppression devices must be all solid state. Lightning protection is not required for fiber optic communication lines. The devices must present high impedance to, and must not interfere with, the communications lines during normal operation. The suppression devices must not allow the peak voltage on any line to exceed 300% of the normal operating peak voltage at any time. The response time of the devices must not exceed 5 nanoseconds.

8. VIVDS SET-UP SYSTEM

The minimum VIVDS set-up system, as needed for detector setup and viewing of vehicle detections, must consist of a field setup computer and Windows based interface software (if required) or a video monitor with interface software built-in to the VIVDS processor unit. Live video (30 frames per second) must be available on the field setup computer to determine proper operation of detectors. The field set-up computer as a minimum, must have an NTSC video input port or equivalent.

If a field setup computer is required for system set-up, it must be supplied by the supplier of the VIVDS.

The field setup computer must include all necessary cabling and a Windows based program to interface with the VIVDS processor unit. This software must provide an easy to use graphical user interface and support all models/versions of the supplied VIVDS.

Live video with the detection overlaid is required for field verification of the system.

9. TEMPORARY USE AND RETESTING

9.1. **Temporary Use**. When shown on the plans, the VIVDS equipment must be used to provide vehicle detection on a temporary basis. When the permanent vehicle detection system and related equipment are installed and made operational, the VIVDS equipment must be carefully removed and delivered to the location shown on the plans.

9.2. **State Retesting and Acceptance**. Before acceptance, all VIVDS equipment may be retested by the Department, even if the system was operating properly before removal. Repair or replace any equipment damaged during removal or transport and any equipment that does not meet the various test requirements.

10. OPERATION FROM CENTRAL CONTROL

The central control must transmit and receive all information needed for detector setup, monitor the vehicle detection, view the vehicle traffic flow at a rate of 2 frames per second or greater for telephone, or 5 frames per second or greater for ISDN lines (as specified by the plans), and interrogate all required stored data. The remote communications link between the VIVDS processor unit and central control may be dial-up (telephone or ISDN lines) or dedicated twisted wire pair communications cable which may be accompanied with coaxial cable or fiber-optic cable, as shown on the plans. Communications with the central control must not interfere with the on-street detection of the VIVDS processor. Quality of the video at 2 frames per second rate must be such that the view with the traffic flow is clear and in focus.

11. INSTALLATION AND TRAINING

The supplier of the video detection system must supervise the installation and testing of the video and computer equipment. A factory certified representative from the supplier must be on site during installation.

If the field setup computer is furnished by the Department, such installation and testing must be done at the time that training is conducted.

Provide up to 2 days of training to personnel of the Department in the operation, setup and maintenance of the video detection system. Provide instruction and materials for a maximum of 20 persons and conduct at a location selected by the Department. The Department will be responsible for any travel and room and board expenses for its own personnel.

Instruction personnel are required to be certified by the equipment manufacturer. The User's Guide is not an adequate substitute for practical, classroom training and formal certification by an approved agency.

Formal levels of factory authorized training are required for installers, contractors, and system operators. All training must be certified by the manufacturer.

12. WARRANTY, MAINTENANCE, AND SUPPORT

The video detection system must be warranted to be free of defects in material and workmanship for a period of 5 yr. from date of shipment from the supplier's facility. During the warranty period, the supplier must repair with new or refurbished materials, or replace at no charge, any product containing a warranty defect provided the product is returned FOB to the supplier's factory or authorized repair site. Return product repair or replaced under warranty by the supplier with transportation prepaid. This warranty does not apply to products damaged by accident, improperly operated, abused, serviced by unauthorized personnel or unauthorized modification.

During the warranty period, technical support must be available from the supplier via telephone within 4 hr. of the time a call is made by a user, and this support must be available from factory certified personnel or factory certified installers.

Ongoing software support by the supplier must include updates of the VIVDS processor unit and supervisor software (if a field setup computer is required for set up). Provide these updates free of charge during the warranty period. The update of the VIVDS software to be NTCIP compliant must be included.

The supplier must maintain a program for technical support and software updates following expiration of the warranty period. Make this program available to the Department in the form of a separate agreement for continuing support.

The supplier must maintain an ongoing program of technical support for the wireless camera system. This technical support must be available via telephone or personnel sent to the installation site.

The supplier must maintain an adequate inventory of parts to support maintenance and repair of the camera system.

13. MEASUREMENT

The VIVDS will be measured as each major system component furnished, installed, made fully operational, and tested in accordance with this Special Specification or as directed.

The VIVDS communication cable will be measured by the foot of the appropriate media type furnished, installed, made fully operational, and tested in accordance with this Specification, other referenced Special Specifications or as directed.

When the VIVDS is used on a temporary basis, the VIVDS will be measured as each system furnished, installed, made fully operational, including reconfiguration and removal if required by the plans, and tested in accordance with this Special Specification or as directed.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., “Plans Quantity Measurement.” Additional measurements or calculations will be made if adjustments of quantities are required.

When recorded video is required by the plans it will be paid for by each camera recorded.

14. PAYMENT

The work performed, materials, and all accompanying software furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "VIVDS Processor System,” "VIVDS Camera Assembly,” "VIVDS Central Control,” "VIVDS Set-up System,” "VIVDS Temporary,” "VIVDS Communication Cable (Coaxial)," "VIVDS Communication Cable (Fiber Optic),” and “VIVDS Video Recording,” These prices are full compensation for furnishing, placing, and testing all materials and equipment, and for all tools, labor, equipment, hardware, operational software packages, supplies, support, personnel training, shop drawings, documentation, and incidentals. A 3-conductor power cable must be included with the communication cable.

These prices also include any and all interfaces required for the field and remote communications links along with any associated peripheral equipment, including cables; all associated mounting hardware and associated field equipment; required for a complete and fully functional visual image vehicle detection system component.

Special Specification 6027

Preparation of Existing Conduits, Ground Boxes, or Manholes

1. DESCRIPTION

Prepare conduits, ground boxes, or manholes; replace conduits, ground boxes, or manholes, when necessary; replace conduit fittings with junction boxes; replace damaged ground box or manholes covers; adjust ground box or manholes covers; install pull lines in conduits; install cable racks in ground boxes or manholes.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and to the pertinent requirements of the following Items:

- Item 624, “Ground Boxes”
- Item 465, “Manholes and Inlets”

When conduit replacement is required, provide conduit meeting the requirements of Item 618, “Conduit.” Use conduit of same size and type of that being replaced or as directed.

Provide 24 in. × 24 in. × 12 in. (L × W × D) minimum size NEMA 4X junction boxes with screw covers.

Provide polyester tapes or rope pull cords with a tensile strength of at least 1200 lb.

Provide heavy duty, non-metallic, non-corrosive cable racks that can support a minimum dead load of 300 lbs. Ensure cable racks are resistant to the effects of oils, hydrocarbons, common esters, ketones, ethers, or amides. Ensure cable racks are adjustable between 8 in. and 14 in. wide. Do not provide grounding or insulators for cable racks.

3. CONSTRUCTION

Check existing conduit and ground boxes.

3.1. **Preparation of Conduit, Ground Box or Manhole**. Pull a mandrel through empty conduits. Use a mandrel with a diameter greater than 70% of the inside diameter of the conduit and 2 in. length. Repair or replace conduit runs that will not allow passage of the mandrel. Replace conduit deemed impractical to repair or remains unsuitable in accordance with Item 618, “Conduit.” Clean the conduit by pulling a rubber swab slightly larger in diameter than the conduit.

Blow compressed air through conduits that contain wires. Remove debris from the conduit by pushing a fish tape through the conduit. Do not use water to clear debris. Retest the conduit by blowing compressed air.

Install 1 pull cord in each conduit for use in installing the conductors, cables, or innerduct. Leave 1 pull cord in each conduit after the conductors, cables, or innerduct have been installed.

Remove silt and debris from ground boxes or manholes prior to installing cable.

3.2. **Installation of Ground Box or Manhole**. Furnish new ground boxes or manholes as directed. Install ground boxes or manholes as shown the plans or as directed.

Backfill disturbed surface with material equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

3.3. **Installation or Adjustment of Ground Box or Manhole Covers**. Remove, dispose, and install ground box or manhole covers as shown on the plans or as directed. Adjust ground box or manhole covers as shown on the plans or as directed. Adjustment may include welding, raising, or lowering.

Backfill disturbed surface with material equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

3.4. **Installation of Junction Box**. Locate conduit fittings in conduits carrying fiber optic cables. Replace the conduit fitting and associated section of conduit with a junction box. Install junction boxes as shown on the plans.

3.5. **Installation of Cable Rack Assembly**. Install cable racks to permit coiling of conductors or cables without violating the manufacturer's minimum bending radius. Install 2 cable rack supports and 4 adjustable levels on each support, at a minimum, on each wall of the ground box or manhole as shown on plans or as directed. Anchor the cable rack support permanently to the ground box wall with mechanical or powder actuated fasteners. Use fasteners with an ultimate pull out strength of at least 2500 lb. and ultimate shear strength of at least 3000 lb. Provide sufficient cable supports for the particular number of conductors or cables coiled or passing through the ground box or manhole as shown on the plans or as directed.

4. MEASUREMENT

This Item will be measured by the foot of conduit cleared, tested, replaced and repaired, by each cable rack, junction box, ground box, or manhole installed or prepared, and by each ground box or manhole cover replaced or adjusted.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Conduit (Prepare),” “Junction Box (Install),” “Manhole (Install),” “Ground Box (Install),” “Manhole (Prepare),” “Ground Box (Prepare),” “Cover (Replace)” of the sizes specified, “Cover (Adjust),” and “Cable Rack Assembly (Install).” This price is full compensation for cleaning and testing conduit, ground boxes, and manholes; furnishing and installing pull cords, ground boxes, manholes, junction boxes, and cable racks; excavating and backfilling; adjusting ground boxes and manholes covers; disposal of unsalvageable material; and equipment, materials, labor, tools, and incidentals.

Repair of existing conduit will be paid for by the Department in accordance with Article 9.7., “Payment for Extra Work and Force Account Method.”

Special Specification 6306
Video Imaging Vehicle Detection System

1. DESCRIPTION

Furnish, install, relocate, or remove video imaging vehicle detection system (VIVDS) at locations shown on the plans, or as directed. Use VIVDS listed on the Department's Prequalified Products List.

2. MATERIALS

2.1. **General**. Furnish, assemble, and install only new materials except as allowed for relocation of VIVDS equipment. Ensure all VIVDS within the project are from the same manufacturer.

VIVDS must analyze video images and produce vehicle detector outputs that can serve as inputs to a traffic signal controller. Provide VIVDS field equipment that is compatible with existing infrastructure and software located in the Department's Traffic Management Control Centers across the state as directed. VIVDS must meet Department TSS Protocol requirements when integration with Traffic Management Center software or systems is shown on the plans.

VIVDS equipment must include the following:

- Camera and mounting hardware (fixed or variable focal length; infrared; or 360° "fish-eye"),
- VIVDS processor,
- Cabinet control unit and associated devices required for system integration, and
- Data, power, and communication cable, connectors, and assemblies.

The VIVDS must use one or more cameras and video processing equipment to accurately provide detector calls for the intersection, approach, or roadway segment where they are installed, and provide detection as shown on the plans. A single camera placed per manufacturer recommendations must be capable of monitoring and detecting 5 lanes of traffic simultaneously.

Ensure the system is designed and constructed with subassemblies, circuits, cards, and modules to maximize standardization and commonality.

Ensure field replaceable parts are accessible for inspection and maintenance. Provide test points for checking essential voltages and waveforms.

VIVDS devices must self-recover from power failure once power is restored.

2.2. **Configuration and Management**. Ensure that the VIVDS allows local and remote configuration and monitoring. The VIVDS must allow the user to fully configure the system and place detection zones using a mouse, monitor, and keyboard (or keypad) connected to the VIVDS. Provide each VIVDS with all associated equipment required to configure and operate the system in a field environment including a video monitor, mouse, keyboard (or keypad), software, and interface cables as applicable. The VIVDS must also support local configuration and monitoring using a laptop computer, but must not require a computer for local configuration, monitoring, and operation.

Ensure that the system can display detection zones and detection activations overlaid on live video from VIVDS cameras.

Ensure that the VIVDS allows a user to edit previously defined configuration parameters, including size, placement, and sensitivity of detection zones.

Ensure that the VIVDS retains its programming in nonvolatile memory. Ensure that the detection system configuration settings can be saved to a computer and restored from a saved file locally and remotely. The system must allow stored configurations to be modified for fine-tuning and optimization. The VIVDS must continue to detect vehicles and operate normally while configuration and detection zone modifications are made.

Ensure the VIVDS does not require adjustment or recalibration to maintain performance once initial calibration and configuration is complete.

2.3. **Detection Zones**. The VIVDS must allow a user to configure detection zones using a graphical user interface (GUI) superimposed on a video image of the roadway. Ensure detection zones can be placed anywhere within a camera field of view. Ensure VIVDS detection zones can detect vehicle presence and collect traffic data, such as traffic counts.

Detection zones must appear as lines or polygons in the field of view. The system must allow a minimum of 8 detection zones per field of view. VIVDS detection zones must be able to provide detection equivalent to a 6 ft. by 6 ft. loop. Ensure zones can be sized, shaped, and overlapped to accurately detect vehicles at the locations shown on the plans.

The system must allow zones to be configured with directionality, delay, extension, and logic functions including “AND” and “OR.” If each detection zone provides a unique output to the signal controller and the controller includes logical functions, then the VIVDS is not required to support logic functions.

Ensure zones displayed on a monitor provide a visual indication when vehicles are detected during configuration and operation.

2.4. **Detection.** VIVDS processor must compensate for minor camera movement. Movement up to 2% of field of view at 400 ft. must not produce a false detection.

Ensure VIVDS processor operates regardless of whether monitoring equipment is connected. If monitoring equipment is connected to the processor unit, vehicle detections are displayed real-time as they occur.

VIVDS must simultaneously detect vehicles in all lanes. VIVDS must be able to accurately detect approaching and departing vehicles in multiple lanes. VIVDS is configurable for which direction of travel to detect. Ensure vehicles traveling in any direction other than the configured direction of travel (e.g., cross-street and wrong-way traffic) do not activate a call to the controller.

Ensure a constant call is placed on outputs associated with zones or cameras that are in an error state or failed. Ensure a constant call is placed on assigned outputs whenever the system is unable to provide accurate detection.

2.5. **Accuracy.** Ensure VIVDS individual lane accuracy for vehicle presence detection is within 5% of actual.

2.6. **Camera.** Use color or thermal cameras that are provided as part of an engineered system by the VIVDS processor manufacturer or approved for use by the VIVDS processor manufacturer. Ensure that analog cameras provide NTSC composite video with a minimum resolution of at least 480 TVL.

Cameras must produce useable video suitable for detection in low light. Cameras with day and night modes must automatically and seamlessly transition between modes without producing vehicle detection errors such as false calls and missed calls. Nighttime monochrome operation must produce feature resolvable video with luminance as low as 0.1 lux. Nighttime color operation must produce feature resolvable video with luminance as low as 1.0 lux.

Cameras must produce resolvable features in the video with luminance as high as 10,000 lux.

Visual spectrum cameras must include automatic electronic shutter and iris control based on average scene luminance.

Variable focal length lenses must be adjustable from 6 mm to 34 mm.

Processed images produced by the VIVDS must use a standard encoding format such as H.264 or MJPEG unless otherwise shown on the plans.

2.6.1. **Thermal cameras.** Thermal imaging cameras must use a long-life, uncooled vanadium oxide microbolometer thermal detector with a spectral range of 7.5 to 13.5 µm.

Ensure analog video is compliant with National Television System Committee (NTSC) Standard and has a minimum NTSC array format of 320 x 240 with a 76,800 pixel effective resolution.

2.6.2. **Camera enclosure.** Camera and lens assembly must be housed in an enclosure designed for outdoor use. The housing must be light in color to limit solar heating and prolong equipment life. Enclosure, including cable connections, must be waterproof and dust tight with a NEMA Type 4 rating.

Ensure enclosures for visual spectrum cameras include a sunshield. Sunshield must protrude beyond the front edge of the enclosure and divert water away from the camera's field of view. Ensure the sunshield overhang is adjustable. Any plastics used in the construction of the enclosure must include ultraviolet inhibitors.

Ensure the enclosure allows the camera horizon to be rotated in the field during installation. Ensure camera focus and zoom can be adjusted, if necessary, without entering the camera enclosure.

The camera enclosure must be provided with mounting bracket designed to mount directly to a pole, mast-arm, or other structure. Ensure the bracket allows the camera to be panned and tilted for alignment and then locked into place once properly positioned.

The camera enclosure with camera and lens installed must weigh 10 lb. or less.

Camera housing must include a means to prevent the formation of ice or condensation. If camera housing includes a heater, wiper, or other electronically controlled mechanism, such mechanism does not interfere with the camera operation or video signal.

2.7. **Video Processor**. Ensure the VIVDS includes a machine vision processor that provides video analysis, presence detection, and interfaces for inputs and outputs. VIVDS must provide data collection features, including storage and reporting of collected vehicle detection data, when shown on the plans.

VIVDS must be able to interface with the traffic controller unit (CU) via the detector rack, SDLC, or another detector interface described in NEMA TS2-2016, unless otherwise shown on the plans. Solid state detection outputs must meet the requirements of NEMA TS2-2016, 6.5.2.26.

Each VIVDS detector rack card must have a minimum of 4 detector outputs. The system must be able to provide a total of 24 detection outputs. Ensure each zone and output is user definable, and previously saved zones can be redefined.

The system must be capable of functioning as a detector BIU using an RS-485 SDLC connector. TS2 Type 1 VIVDS must include indicators that display detector output status for verification of calls.

Analog video inputs must use BNC connectors or be routed through existing loop inputs using connections designed for that purpose. Analog video outputs must use BNC or RCA connectors. Use of external cable connections to create a combined video output is not allowed.

Ensure processor includes provisions to view video image in the field and remotely.

VIVDS processors installed in the traffic controller cabinet must utilize digital video or accommodate asynchronous, synchronous, and line-locked analog video as part of a complete system engineered by the VIVDS manufacturer.

2.8. **Camera Interface Panel**. Supply the VIVDS with a camera interface panel as required by the manufacturer that provides a cabinet connection point between field wiring from VIVDS cameras and VIVDS equipment in the cabinet. The interface panel must be provided by the VIVDS manufacturer as part of a complete engineered system. The panel must include terminal facilities and surge suppression for all conductors used to connect VIVDS field equipment, including camera power and communications. Interface panels for analog cameras must include a 10 amp breaker or blade type fuses and a power terminal strip with a minimum of eight (8) 8/32 binder head screws for camera power connections. The panel must also have, as a minimum, four (4) coax protectors (EDCO CX06 or equivalent). Additional lightning and transient protection will be allowed. All components that reside on the panel must be Department approved. For cameras utilizing POE the interface panel must consist of surge protection meeting GR 1089 standards.

Ensure interface panel is capable of being mounted on the side walls of the controller cabinet. Video connections must be isolated from earth ground.

2.9. **Cabling**. Supply the VIVDS with connector cables of the appropriate length for each installation site. Connector cables must include all conductors necessary for power, video, and communication. All cabling used must meet the minimum recommended specifications of the VIVDS manufacturer.

Ensure the power and data cable connectors are IP 67 to protect against intrusion of solids and water. External connectors must be quick disconnect and keyed to prevent improper connections. All wiring must be color coded and marked appropriately. Ensure all conductors that interface with the connector are encased in a single jacket.

Fiber optic cable, if used, must meet the requirements of Special Specification Item Intelligent Transportation System (ITS) Fiber Optic Cable.

If coaxial cable is used, it must be low loss, 75 ohm, precision video cable suited for outdoor installation and approved by the VIVDS manufacturer.

RS-485 and RS-232 communication cable must meet the requirements of Special Specification 6004 Networking Intelligent Transportation System (ITS) Communications Cable.

2.10. **Communication**. Ensure that the VIVDS includes a minimum of one serial or Ethernet communications interface.

Ensure serial interfaces and connectors conform to Telecommunications Industry Association (TIA)-232 standards. Ensure that the serial ports support data rates up to 115200 bps; error detection utilizing parity bits (i.e., none, even, and odd); and stop bits (1 or 2).

Ensure that wired Ethernet interfaces provide a 10/100 Base TX connection. Verify that all unshielded twisted pair/shielded twisted pair network cables and connectors comply with TIA-568.

Ensure wireless communications are secure and that wireless devices are Federal Communications Commission (FCC) certified. Ensure that the FCC identification number is displayed on an external label and that all detection system devices operate within their FCC frequency allocation.

Ensure the system can be configured and monitored via one or more communications interface. Ensure that all communication addresses are user programmable.

2.11. **Software**. Ensure the VIVDS manufacturer includes all software required to configure and monitor operation of VIVDS field equipment locally and remotely. VIVDS software must be a stable production release approved by the Department's Traffic Operations Division.

Ensure VIVDS computer software includes a GUI that displays all configured lanes and provides visual representation of all detected vehicles. Server software must be designed to run on the Windows Server operating system (Windows Server 2012 or newer). Client workstation software must be designed to run on Microsoft Windows 7 Professional and newer.

VIVDS software must allow the user to program, operate, exercise, diagnose, and read status of all VIVDS features and functions using a laptop computer.

VIVDS computer software must be able to communicate with VIVDS field devices using TCP/IP and serial connections. The software must provide for local and remote configuration and monitoring, including display of detection zone activations on live video and modification of existing detection zone layouts.

System software must provide the user complete control over the configuration process for VIVDS devices and allow the user to load new firmware into non-volatile memory of VIVDS field devices locally and over any supported communication channel including TCP/IP networks.

The system software must include the ability to retrieve and store data collected by VIVDS field devices.

Ensure all licenses required for operation and use of software are included at no additional cost.

Software updates must be provided at no additional cost during the warranty period.

2.12. **Mechanical**. VIVDS detector card rack units must comply with dimensions specified in NEMA TS2-2016, 6.5.2.2.2.

Ensure that all parts are fabricated from corrosion resistant materials, such as plastic, stainless steel, aluminum, or brass.

Ensure that all screws, nuts, and locking washers are stainless steel. Do not use self-tapping screws.

Ensure equipment is clearly and permanently marked with manufacturer name or trademark and part number as well as date of manufacture or serial number.

Ensure VIVDS is modular in design for ease of field replacement and maintenance.

All printed circuit boards must have conformal coating to protect against moisture and fungus.

2.13. **Electrical**. Ensure equipment is designed to protect personnel from exposure to high voltage during installation, operation, and maintenance. Ensure all connections include the manufacturer recommend surge protective device (SPD). SPDs must not interfere with the performance of the VIVDS. VIVDS electrical design must be modular.

Ensure the VIVDS operates on nominal 120 V_{AC}. A power converter must be provided for devices that do not operate on nominal 120 V_{AC}. Camera sensors must operate between 12 V_{DC} and 28 V_{DC}.

2.14. **Environmental.** All VIVDS devices must operate properly during and after being subjected to the environmental testing procedures described in NEMA TS2, Section 2. VIVDS cameras must be able to withstand the maximum wind load defined in the Department's basic wind velocity zone map standard without any damage or loosening from structure.

2.15. **Connectors and Harnesses.** External connections exposed to the outdoor environment must be made with weatherproof connectors. Connectors must be keyed to ensure correct alignment and mating.

Ensure all conductors are properly color coded and identified. Ensure that every conductive contact surface or pin is gold-plated or made of a noncorrosive, nonrusting, conductive metal.

RS-485 and RS-232 communication cables must:

- be shielded, twisted pair cable with a drain wire,
- have a nominal capacitance conductor to conductor @ 1Khz ≥ 26pF/ ft.,
- have nominal conductor DC resistance @ 68°F ≤ 15 ohms/1,000 ft.,
- be one continuous run with no splices, and
- be terminated only on the two farthest ends of the cable.

2.16. **Documentation**. Provide hardcopy operation and maintenance manuals, along with a copy of all product documentation on electronic media. Include the following documentation for all system devices and software:

- operator manuals,
- installation manuals with installation procedures,
- maintenance and troubleshooting procedures, and
- manufacturer's specifications (functional, electrical, mechanical, and environmental).

Provide certification from an independent laboratory demonstrating compliance with NEMA TS2 environmental requirements for temperature, humidity, transients, vibration, and shock.

Provide certification that VIVDS electronic equipment meets FCC Class B requirements for electromagnetic interference and emissions.

Ensure the VIVDS system manufacturer has a quality assurance program for manufacturing VIVDS as described in this specification. Manufacturer of the VIVDS must be ISO 9001 certified, or provide a copy of the company quality manual for review.

The VIVDS must pass testing to ensure functionality and reliability before delivery. Test results and supporting documentation, including serial number tested, must be submitted for each VIVDS. If requested, manufacturing data per serial number must be provided for each VIVDS.

2.17. **Warranty**. Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 5 yr. or in accordance with the manufacturer's standard warranty if that warranty period is greater. The start date of the manufacturer's standard warranty will begin after the equipment has successfully passed all tests contained in the final acceptance test plan. Any VIVDS equipment with less than 90% of its warranty remaining after the final acceptance test is completed will not be accepted by the Department. Guarantee that equipment furnished and installed for this project performs per the manufacturer's published specifications. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project.

Malfunctioning equipment must be repaired or replaced at the Contractor's expense before completion of the final acceptance test plan. Furnish replacement parts for all equipment within 10 days of notification of failure by the Department.

During the warranty period, technical support must be available via telephone within 4 hr. of the time a call is made by a user, and this support must be available from factory certified personnel.

2.18. **Training**. Conduct a training class for a minimum of 8 hr., unless otherwise directed, for up to 10 representatives designated by the Department on installation, configuration, operation, testing, maintenance, troubleshooting, and repair. Submit a training session agenda, a complete set of training material, the names and qualifications of proposed instructors, and proposed training location for approval at least 30 days before the training. Conduct training within the local area unless otherwise directed. Provide 1 copy of course material for each attendee. Ensure that training includes:

- "Hands-on" operation of system software and equipment;
- explanation of all system commands, their function and usage; and
- system "troubleshooting," operation, and maintenance.

3. CONSTRUCTION

3.1. **System Installation**. Install VIVDS devices and configure detection zones and settings as shown on the plans, in accordance with the manufacturer's recommendations, and as directed. Provide configuration file backups, including detector placement, names, communication settings, and output assignments. Completion of the work must present a neat, workmanlike, and finished appearance.

VIVDS installer must be certified by VIVDS manufacturer in proper installation setup and procedures. VIVDS integrator must be certified by the manufacturer for training end users in the maintenance, configuration, and operation of VIVDS.

Ensure VIVDS detector rack cards are properly installed and seated in the controller cabinet detector rack and use the card edge connector to obtain power and provide outputs. Rewiring the backplane or any other cabinet panel for the system is not permitted except for power and grounding for camera interface panels, wiring from the video camera sensor to the loop detector panel for the video signal inputs, as applicable, and wiring to obtain power for the VIVDS cameras.

Mount and aim cameras in a manner that eliminates as much environmentally generated glare as possible.

All wiring must be cut to proper length before assembly. Provide cable service loops. All cable slack must be neatly laced and placed in the bottom of the cabinet. Ensure cables are secured with clamps. Ensure cables between the controller cabinet and VIVDS cameras are continuous with no splices.

Provisions must be made for installation and configuration of software on Department computers.

3.2. **Temporary Use.** When shown on the plans, the VIVDS equipment must be used to provide vehicle detection on a temporary basis. When the permanent vehicle detection system and related equipment are installed and made operational, the VIVDS equipment must be carefully removed and delivered to the location shown on the plans.

3.3. **Mechanical Components.** Ensure that all fasteners, including bolts, nuts, and washers with a diameter less than 5/8 in. are Type 316 or 304 stainless steel and meet the requirements of ASTM F593 and ASTM F594 for corrosion resistance. Ensure that all bolts and nuts 5/8 in. and over in diameter are galvanized and meet the requirements of ASTM A307. Separate dissimilar metals with an inert dielectric material.

3.4. **Wiring.** All wiring and electrical work supplying the equipment must meet the requirements of the most current version of the National Electrical Code (NEC). Supply and install all wiring necessary to interconnect VIVDS cameras to the controller cabinet and incidentals necessary to complete the work. If additional cables are required, the Contractor must furnish and install them at no additional cost to the Department. Provide conductors at least the minimum size indicated on the plans and insulated for 600 V.

Cables must be cut to proper length before assembly. Provide cable slack for ease of removal and replacement. All cable slack must be neatly laced with lacing or straps in the bottom of the cabinet. Ensure cables are secured with clamps and include service loops.

3.5. **Electrical Service.** The Contractor is responsible for checking the local electrical service to determine if a modification is needed for the equipment.

3.6. **Grounding.** Ensure all VIVDS devices and supports are grounded in accordance with the NEC and manufacturer recommendations.

3.7. **Relocation of VIVDS Field Equipment.** Perform the relocation in strict conformance with the requirements herein and as shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Inspect the existing VIVDS field equipment with a representative from the Department and document any evidence of damage before removal. Conduct a pre-removal test in accordance with the testing requirements contained in this Item to document operational functionality. Remove and deliver equipment that fails inspection to the Department.

Before removal of existing VIVDS field equipment, disconnect and isolate the power cables from the electric power supply and disconnect all communication cabling from the equipment located inside the cabinet. Coil and store power and communication cabling inside the cabinet until such time that it can be relocated. Remove existing VIVDS field equipment as shown on the plans only when authorized by the Engineer.

Use care to prevent damage to any support structures. Any equipment or structure damaged or lost must be replaced by the Contractor (with items approved by the Engineer) at no cost to the Department.

Make all arrangements for connection to power and communications including any permits required for the work to be done under the Contract. Provide conductors for the power connection at least the minimum size indicated on the plans and insulated for 600 V. Meet the requirements of the NEC most current version.

3.8. **Removal of VIVDS Field Equipment.** Perform the removal in strict conformance with the requirements herein and as shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Disconnect and isolate any existing electrical power supply before removal of existing field equipment.

Use care to prevent damage to any support structures. Any equipment or structure damaged or lost must be replaced by the Contractor (with items approved by the Engineer) at no cost to the Department.

All materials not designated for reuse or retention by the Department will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver items to be retained by the Department to a location shown on the plans or general notes. The Contractor is fully responsible for any removed equipment until released by the Engineer.

3.9. **Contractor Experience Requirements.** Contractor or designated subcontractor must meet the following experience requirements:

3.9.1. **Minimum Experience.** Three years of continuous existence offering services in the installation of VIVDS.

3.9.2. **Completed Projects.** Three completed projects where personnel installed, tested, and integrated VIVDS field equipment. The completed installations must have been in continuous satisfactory operation for a minimum of 1 yr.

3.9.3. **Equipment Experience**. One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

Submit the names, addresses, and telephone numbers of the references that can be contacted to verify the experience requirements given above.

4. TESTING

Ensure that the following tests are performed on equipment and systems unless otherwise shown on the plans. The Department may witness all the tests.

4.1. **Test Procedures Documentation.** Provide an electronic copy of the test procedures and blank data forms 60 days before testing for each test required on this project. Include the sequence of the tests in the

procedures. The Engineer will approve test procedures before submission of equipment for tests. Conduct all tests in accordance with the approved test procedures.

Record test data on the data forms as well as quantitative results. Ensure the data forms are signed by an authorized representative (company official) of the equipment manufacturer.

4.2. **Design Approval Test.** Ensure that the VIVDS has successfully completed a Design Approval Test that confirms compliance with the environmental requirements of this specification.

Provide a certification and test report from an independent testing laboratory as evidence of a successfully completed Design Approval Test. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification.

4.3. **Demonstration Test.** Conduct a Demonstration Test on applicable equipment at an approved Contractor facility. Notify the Engineer 10 working days before conducting this testing. Perform the following tests:

4.3.1. **Examination of Product.** Examine each unit carefully to verify that the materials, design, construction, markings, and workmanship comply with the requirements of this specification.

4.3.2. **Continuity Tests.** Check the wiring to determine conformance with the requirements this specification.

4.3.3. **Operational Test.** Operate each unit for at least 15 min. to permit equipment temperature stabilization and observation of a sufficient number of performance characteristics to ensure compliance with this specification.

4.4. **Stand-Alone Test.** Conduct a Stand-Alone Test for each unit after installation. The test must exercise all stand-alone (non-network) functional operations. Notify the Engineer 5 working days before conducting this test.

4.4.1. **Performance Test.** Ensure the VIVDS meets functional performance requirements of Section 2.55 using the following methods:

Verify presence detection accuracy at installed field sites by comparing sample data collected from the detection system with ground truth data collected by human observation. Collect samples and ground truth data for each detection zone for a minimum of 5 minutes during a peak period and 5 minutes during an off-peak period. Ensure the sample period for each zone includes a minimum of 3 vehicles. Perform tests in the presence of the Engineer.

Recorded video of all cameras showing vehicle detections during a 24 hr. period at each intersection must be provided within 30 days upon request. This video must allow verification of proper camera placement, field of view, focus, detection zone placement, and operation.

4.5. **System Integration Test.** Conduct a System Integration Test on the complete functional system. Demonstrate all control and monitor functions for each system component and operate the system for 72 hr.. Supply 2 copies of the System Operations manual before the System Integration Test. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Conduct a System Integration Test on the complete functional system. Demonstrate all control and monitor functions for each system component for 72 hr. Supply 2 copies of the System Operations manual before the System Integration Test. Notify the Engineer 10 working days before conducting this testing.

4.6. **Consequences of Test Failure.** If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation before modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be enough cause for rejection of the unit.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures without additional cost or extension of the contract period.

4.7. **Final Acceptance Test.** Conduct a Final Acceptance Test on the complete functional system. Demonstrate all control, monitor, and communication requirements and operate the system for 90 days. The Engineer will furnish a Letter of Approval stating the first day of the Final Acceptance Test. The completion of the Final Acceptance Test occurs when system downtime due to mechanical, electrical, or other malfunctions to equipment furnished or installed does not exceed 72 hr. and any individual points of failure identified during the test period have operated free of defects.

4.8. **Consequences of Final Acceptance Test Failure.** If a defect within the system is detected during the Final Acceptance Test, document and correct the source of failure. Once corrective measures are taken, monitor the point of failure until a consecutive 30-day period free of defects is achieved.

If after completion of the initial test period, the system downtime exceeds 72 hr. or individual points of failure have not operated for 30 consecutive days free of defects, extend the test period by an amount of time equal to the greater of the downtime more than 72 hr. or the number of days required to complete the performance requirement of the individual point of failure.

4.9. **Relocation and Removal**

4.9.1. **Pre-Test.** Tests may include, but are not limited to, physical inspection of the unit and cable assemblies. Include the sequence of the tests in the procedures along with acceptance thresholds. Contractor to resubmit, if necessary, rejected test procedures for final approval within 10 days. Review time is calendar days. Conduct all tests in accordance with the approved test procedures.

Conduct basic functionality testing before removal of VIVDS field equipment. Test all functional operations of the equipment in the presence of representatives of the Contractor and the Department. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the Department. Compare test data before removal and test data after installation. The performance test results after relocation must be equal to or better than the test results before removal. Repair or replace those components within the system that failed after relocation, but passed before removal.

4.9.2. **Post-Test.** Testing of the VIVDS field equipment is for relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, “Legal Relations and Responsibilities,” after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all existing VIVDS field equipment has been installed, conduct approved continuity, stand alone, and performance tests. Furnish test data forms containing the sequence of tests including all the data taken as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days before the day the tests are to begin. Obtain Engineer’s approval of test procedures before submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

Conduct an approved stand-alone test of the equipment installation at the field sites. At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment installed per the plans as directed. Complete the approved data forms with test results and turn over to the Engineer for review and either acceptance or rejection of equipment. Give at least 30 working days notice before all tests to permit the Engineer or his representative to observe each test.

The Department will conduct approved VIVDS field equipment system tests on the field equipment with the central equipment. The tests will, as a minimum, exercise remote control functions and confirm communication with field equipment.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the Contract period.

5. MEASUREMENT

The VIVDS will be measured as each major system component furnished, installed, relocated, made fully operational, and tested or removed in accordance with this Special Specification or as directed.

The VIVDS communication cable will be measured by the foot of the appropriate media type furnished, installed, made fully operational, and tested in accordance with this Specification, other referenced Special Specifications, or as directed.

When the VIVDS is used on a temporary basis, the VIVDS will be measured as each system furnished, installed, made fully operational, including reconfiguration and removal if required by the plans, and tested in accordance with this Special Specification or as directed.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., “Plans Quantity Measurement.” Additional measurements or calculations will be made if adjustments of quantities are required.

When recorded, video is required. It will be paid for by each camera recorded.

6. PAYMENT

6.1. **Furnish and Install.** The work performed, materials, and all accompanying software furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "VIVDS Processor System," "VIVDS Camera Assembly" of the various types, "VIVDS Central Control Software," "VIVDS Temporary," "VIVDS Cabling," and “VIVDS Video Recording.” These prices are full compensation for furnishing, configuring, placing, and testing all materials and equipment, and for all tools, labor, equipment, hardware, operational software packages, supplies, support, personnel training, shop drawings, documentation, and incidentals.

These prices include all interfaces required for the field and remote communications links along with any associated peripheral equipment, including cables; all associated mounting hardware and associated field equipment; and incidentals required for a complete and fully functional video imaging vehicle detection system.

6.2. **Install Only.** The work performed and materials furnished in accordance with this Item will be paid for at the unit bid price for "VIVDS Processor System (Install Only)," "VIVDS Camera Assembly (Install Only)," "VIVDS Temporary (Install Only)," and "VIVDS Cabling (Install Only)." This price is full compensation for installing, configuring, integrating, and testing the completed installation, including VIVDS equipment, voltage converters or injectors, cables, connectors, associated equipment, and mounting hardware; and for all labor, tools, equipment, documentation, testing, training, software, and incidentals necessary to complete the work.

6.3. **Relocate.** The work performed and materials furnished in accordance with this Item will be paid for at the unit bid price for "VIVDS Processor System (Relocate)," "VIVDS Camera Assembly (Relocate)," "VIVDS Temporary (Relocate)," and "VIVDS Cabling (Relocate)." This price is full compensation for relocating and making fully operational existing equipment; furnishing and installing additional cables or connectors; testing, delivery, and storage of components designated for salvage or reuse; and all labor, tools, equipment and incidentals necessary to complete the work.

6.4. **Remove.** The work performed and materials furnished in accordance with this Item will be paid for at the unit bid price for "VIVDS Processor System (Remove)," "VIVDS Camera Assembly (Remove)," "VIVDS Temporary (Remove)," and "VIVDS Cabling (Remove)." This price is full compensation for removing existing

equipment as shown on the plans; testing, delivery, and storage of components designated for salvage; and all labor, materials, tools, equipment, and incidentals necessary to complete the work.

DMS - 4350

DETECTABLE WARNING MATERIAL

EFFECTIVE DATE: JUNE 2012

4350.1. Description. This Specification governs for the evaluation and qualification of detectable warning materials.

4350.2. Units of Measurements. The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

4350.3. Definitions. Detectable warnings are a distinctive surface pattern of truncated domes that are detectable by cane or underfoot and are used to alert people with vision impairments of their approach to streets and other hazardous areas. Detectable warning products comply with the 2010 ADA Standards for Accessible Design, Section 705, published by the U.S. Department of Justice on September 15, 2010, and the 2012 Texas Accessibility Standards (TAS), Section 705, published by the Texas Department of Licensing and Regulation effective March 15, 2012.

- Surface applied detectable warning materials are those materials or systems affixed to an existing substrate without demolition. Methods of adherence include chemical bonding, adhesives, mechanical fasteners, or other methods.
- Cast-in-place detectable warning systems include those materials or systems that are "wet set" into freshly poured concrete while it is still in the plastic state and require existing ramps to be demolished and re-poured for installation.
- Unit paver detectable warning systems include concrete and fired clay pavers that fit together to form a detectable warning surface.

4350.4. Material Producer List. The Plan Development Section of the Design Division maintains a Material Producer List (MPL) of all detectable warning materials. Materials appearing on the MPL, entitled **"**Detectable Warning Material,**"** require product evaluation prior to listing.

4350.5. Pre-Qualification Procedure for Surface Applied and Cast-in-Place Detectable Warning Systems.

A. Pre-Qualification Request. Submit a letter of intent and a 6 × 6 in. product sample to the Texas Department of Transportation, Design Division, Director of Plan Development, 125 East 11th Street, Austin, Texas 78701-2483.

B. Pre-Qualification Sample. Install a representative sample of material at a test location approved by the Department. Department personnel will monitor and evaluate the test site for at least six months and will grant approval after successful completion of the testing period.

C. Installation Requirements. Manufacturers and suppliers must act in accordance with the following guidelines when installing material at the test location.

- Secure an approved location and date for product installation from the Department's Design Division.
- Protect adjacent property and vehicles from damage. If any damage results from an act or omission on the part of the material supplier or contractor, notify the Campus Building Manager immediately. Prepare to take corrective action to restore the damaged property to its original condition.
- Install detectable warning material or system at a minimum of 24 in. in the direction of travel and extending the full width of the curb ramp. Normally, a 24 × 48 in. installation is required.
- Follow Department Pedestrian Facilities Standards (PED) for installation.
- For cast-in-place systems, the material supplier or contractor may be required to saw cut and remove existing concrete ramps or detectable warnings.
- Protect product from damage until materials are fully set or cured.

D. Evaluation. Department personnel will conduct evaluations six months after installation, at which time the team will determine whether the product is performing at an acceptable level.

1. **Qualification.** Department personnel will evaluate the installation according to the following criteria:
   - Product meets the requirements listed under Article 4350.7 of this Specification.
   - At least 19 of 20 domes must meet size requirements.
   - Domes and field area must show little to no surface wear at six months and little wear at one year, if applicable.
   - Product must have a visually appealing appearance at six months.
   - Product must be free of bubbles/lifting, cracks, chipped tiles, loose areas, and other non-desirable performance features and maintenance problems.

   The Department will list materials meeting the requirements of this Specification on the MPL.

2. **Failure.** Producers not qualified under this Specification may not furnish materials for Department projects and must show evidence of correction of all deficiencies before reconsideration for qualification.

E. Disqualification. The Department reserves the right to reevaluate the initial material installation and any subsequent installations in the field to ensure a continued level of acceptable performance. Failure of materials to comply with the requirements of this Specification as a result of periodic evaluation may be cause for removal of those materials from the MPL

F. Re-Qualification. A manufacturer or supplier may submit material for re-qualification after documenting the problem and its resolution. Submit documentation identifying the

cause and corrective action taken. If the Department deems the documentation acceptable, the product will be reevaluated in accordance with Article 4650.5 of this Specification.

4350.6. Pre-Qualification Procedure for Unit Pavers.

A. Pre-Qualification Request. Submit a letter of intent to the Texas Department of Transportation, Design Division, Director of Plan Development, 125 East 11th Street, Austin, Texas 78701-2483. Include with the request certified test results showing that the pavers meet the requirements of Article 4350.7.

B. Evaluation. Department personnel will evaluate the data provided by the manufacturer or supplier and determine if the material meets the requirements of this Specification.

1. **Qualification**. The Department will list materials meeting the requirements of this Specification on the MPL.

2. **Failure**. Producers not qualified under this Specification may not furnish materials for Department projects and must show evidence of correction of all deficiencies before reconsideration for qualification.

C. Disqualification. The Department reserves the right to evaluate any field installations to ensure a continued level of acceptable performance. Failure of materials to comply with the requirements of this Specification as a result of periodic evaluation may be cause for removal of those materials from the MPL.

D. Re-Qualification. A manufacturer or supplier may submit material for re-qualification after documenting the problem and its resolution. Submit documentation identifying the cause and corrective action taken. If the Department deems the documentation acceptable, the product will be reevaluated in accordance with Article 4350.6 of this Specification.

4350.7. Material Requirements. All detectable warning products must meet the following:

- Product must be compliant with 2010 ADA Standards for Accessible Design and the 2012 TAS.
- Visual Contrast must meet the requirements of 2010 ADA Standards for Accessible Design, Section 705.1.3, and the 2012 TAS.

In addition to the above, concrete pavers must meet all requirements of ASTM C 936, and clay fired pavers must meet all requirements in ASTM C 902 for Class SX, Type I, or ASTM C 1272.

4350.8. Archived Versions. Archived versions are available.

DMS - 6130

BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS

EFFECTIVE DATE: JANUARY 2008

6130.1. Description. This Specification establishes the requirements for bituminous type hot-melt adhesive used for the placement of pavement markers. Two types are addressed: standard bituminous marker adhesive consisting of an asphalt base with homogeneously mixed mineral filler; and flexible bituminous marker adhesive consisting of a highly polymer modified asphalt.

Either adhesive must be suitable for bonding ceramic and plastic markers to hydraulic cement concrete, asphaltic concrete, and chip-sealed road surfaces and be applicable when road surface and marker temperatures are in the approximate range of 4–71°C (40–160°F).

The composition of the adhesive must be such that its properties will not deteriorate when heated to and applied at temperatures up to 218°C (425°F) using either air or oil-jacketed melters.

6130.2. Units of Measurements. The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

6130.3. Material Requirements.

A. Adhesive Properties. The adhesive must be smooth and homogeneous, containing no visible particles, and must comply with the requirements in Table 1.

Table 1

Adhesive Properties

Property	Material	Standard Adhesive		Flexible Adhesive	
	Test Method	min	max	min	max
Softening Point, °F	ASTM D 36	200		200	
Penetration, 100 g, 5 s, 25°C (77°F), 0.1 mm	ASTM D 5	10	20	15	25[4]
Flow, 5 hr., 70°C (158°F), mm			5		5[4]
Heat Stability Flow, 5 hr., 70°C (158°F), mm			5		5
Viscosity, 10 rpm, 204°C (400°F), Pa-s			7.5		7.5
Flash Point, C.O.C., °F	ASTM D 92	550		550	
Ductility, 5 cm/min, 77°F, cm	AASHTO T 51	-		15	-
Flexibility, 1 in. mandrel, 90° bend, 10 s	ASTM D 3111			pass	

1. Exception to ASTM D 5329; heat the sample as described in ASTM D 5, Section 7.1.
2. Exception to ASTM D 5329; condition the sample as described in "Test Methods."
3. As modified in "Test Methods"
4. Maximum penetration of 30 is allowed provided the result of the flow test is less than 1 mm.

B. Asphalt Properties. This applies to standard bituminous adhesive only. The filler-free asphalt, obtained from the Extraction and Abson recovery process, as explained in Section 6130.4, must have the properties in Table 2.

Table 2

Filler-Free Asphalt Properties

Property	Minimum	Maximum	Test Method
Penetration, 100 g, 5 s, 25°C, (77 °F), 0.1 mm (in.)	25		ASTM D 5
Viscosity, 135°C (275°F) Pa-s (Poises)	1.2 (12)		ASTM D 2171
Viscosity Ratio, 135°C (275°F)		2.2	ASTM D 1754 and ASTM D 2171

C. Filler Properties. This applies to standard bituminous adhesive only. The filler material, obtained using the filler separation technique described in Section 6130.4, must have the properties in Table 3.

Table 3

Filler Properties

Property	Minimum	Maximum	Test Method
Filler Content, wt. %	50	75	As in Section 6130.4.
Filler Fineness, % passing: 45 µm (No. 325) 75 µm (No. 200) 150 µm (No. 100)	 75 95 100	 -- -- --	ASTM C 430, as modified in Section 6130.4.

6130.4. Test Methods.

A. Heat Stability Flow. To determine the heat stability flow, place 1000 g of adhesive in a loosely-covered quart can, heat to 218°C (425°F) and maintain at this temperature 4 hours before performing the flow test.

B. Extraction and Abson Recovery. Use this procedure to separate and recover the base asphalt from the adhesive. Heat the adhesive just to the point where it will easily flow. Transfer between 125 and 150 g into a 1000-mL (1-qt.) Erlenmeyer flask containing 400 mL (13.5 fl. oz.) of trichloroethylene with a temperature of 52–66°C (125–150°F). Stir this mixture thoroughly to dissolve the asphalt. Decant the solvent-asphalt mixture. Recover the base asphalt from solvent according to Tex-211-F, but begin with the centrifuge step; the primary distillation is not necessary. Repeat the above extraction-recovery method as necessary to obtain the desired quantity of asphalt.

C. Filler Separation Technique. Use this procedure to separate the filler material from the asphalt and determine the filler content of the adhesive. Weigh 10.00 ± 0.01 g of solid adhesive, broken into small pieces, into a centrifuge flask with approximately 100 mL (3.5 fl. oz.) volume such as that specified in ASTM D 1796. Add 50 mL (1.7 fl. oz.) of trichloroethylene to the adhesive. Swirl or stir the mixture with a fine rod, taking care not

to lose any solids. Place the sample flask in a balanced centrifuge and spin using a minimum relative centrifugal force of 150 (as determined in ASTM D 1796, Section 6.) Remove the sample flask and decant the solvent, taking care not to lose any solids. Repeatedly add more solvent, centrifuge, and decant until the solvent becomes clear and the filler appears free of asphalt. Dry the recovered filler at 71 ± 3°C (160 ± 5°F) to remove solvent. Weigh the dried filler. Filter the decanted solvent through a filter paper with a 20–25 µm retention factor to verify there is no loss of filler. Calculate the filler content as a percentage of the original sample weight.

D. Filler Fineness. Use this procedure to determine the filler fineness. Use the same apparatus as described in ASTM C 430, except also use 75µm (No. 200) and 150 µm (No. 100) sieves. Prepare a water solution containing 1 wt. percent of a nonionic, water-soluble surfactant, such as Triton X-100, beforehand. Thoroughly wet the 1 g dry sample in the surfactant solution and allow it to soak for 30 min. Transfer the filler completely into the 45 µm (No. 325) sieve cup. Wash the sample with the water spray, as described in ASTM C 430, Section 5, for 2 min., adding surfactant solution as needed to disperse any clumped particles. Dry and weigh the sample and perform calculations as directed in ASTM C 430. Repeat the procedure using the other two sieve sizes.

6130.5. Acceptance. Bituminous adhesives are pre-qualified in accordance with Tex-538-C. Consult "Bituminous Marker Adhesive" for a list of materials currently pre-qualified under this procedure.

6130.6. Packaging and Labeling. Package the adhesive in self-releasing cardboard containers with essentially flat and parallel top and bottom surfaces such that the packages will stack properly. Each package must have a net weight of either 23 or 27 kg (50 or 60 lb.) and must weigh within 1 kg (2 lb.) of the stated quantity.

Self-releasing cardboard dividers, which will separate each package into sections weighing no more than 7 kg (15 lb.) each, must be part of the packaging.

Each package must display:

- the manufacturer's name,
- net weight,
- lot or batch number, and
- a product name that clearly identifies the material as either standard or flexible bituminous marker adhesive.

6130.7. Archived Versions. Archived versions are available.

SECTION 7
STANDARD FORMS

THE · CITY · OF

COPPELL

TEXAS · 1890

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Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

Application For Payment

Change Order Summary

Approved Change Orders				
Number	Additions		Deductions	
	Cost ($)	Calendar Days	Cost ($)	Calendar Days
TOTALS				
NET CHANGE BY CHANGE ORDERS				

1. ORIGINAL CONTRACT PRICE	$
2. Net change by Change Orders	$
3. Current Contract Price (Line 1 ± 2)	$
4. TOTAL COMPLETED AND STORED TO DATE (Column F total on Progress Estimates)	$
5. RETAINAGE:	
a. X _____ Work Completed	$
b. X _____ Stored Material	$
c. Total Retainage (Line 5.a + Line 5.b)	$
6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)	$
7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)	$
8. AMOUNT DUE THIS APPLICATION	$
9. BALANCE TO FINISH, PLUS RETAINAGE (Column G total on Progress Estimates + Line 5.c above)	$
10. CALENDAR DAYS USED ON PROJECT	
11. CURRENT CONTRACT DAYS (540 + Net Change)	
12. PROJECT DAYS REMAINING (Line 11 - Line 12)	
12a. CONTRACT DAY INC/DECR PENDING CHG ORDER	

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and
(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.
(4) Project days remaining reflects true, full, and accurate accounting of work days utilized and remaining in accordance with the Contract Documents as of the date of signature. No adjustments to "current contract days" for previous time impacts will be made unless identified on a pending change order, and reflected on line 12a.

Contractor Signature

By:	Date:

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ _____
(Engineer) (Date)

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding or Financing Entity (if applicable) (Date)

Progress Estimate - Lump Sum Work

Contractor's Application

For (Contract):	Application Number:
Application Period:	Application Date:

			Work Completed		E	F		G
A		B	C	D				
Specification Section No.	Description	Scheduled Value ($)	From Previous Application (C+D)	This Period	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (F / B)	Balance to Finish (B - F)
	Totals							

Progress Estimate - Unit Price Work

Contractor's Application

For (Contract):								Application Number:			
Application Period:								Application Date:			
A					B	C	D	E	F		
Item		Contract Information				Estimated Quantity Installed	Value of Work Installed to Date	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F / B)	Balance to Finish (B - F)
Bid Item No.	Description	Item Quantity	Units	Unit Price	Total Value of Item ($)						
	Totals										

Stored Material Summary

Contractor's Application

For (Contract):								Application Number:			
Application Period:								Application Date:			
A		B	C		D		E		F		G
Bid Item No.	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Storage Location	Description of Materials or Equipment Stored	Stored Previously		Amount Stored this Month ($)	Subtotal Amount Completed and Stored to Date (D + E)	Incorporated in Work		Materials Remaining in Storage ($) (D + E - F)
					Date Placed into Storage (Month/Year)	Amount ($)			Date (Month/ Year)	Amount ($)	
				Totals							

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: ☐ None ☐ As follows

Amendments to Contractor's responsibilities: ☐ None ☐ As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

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ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Work Change Directive No.

Date of Issuance:	Effective Date:
Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

☐ Non-agreement on pricing of proposed change.

☐ Necessity to proceed for schedule or other Project reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price $ [increase] [decrease].

Contract Time days [increase] [decrease].

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price

☐ Cost of the Work ☐ Other

RECOMMENDED:	AUTHORIZED BY:	RECEIVED:
By:	By:	By:
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title:	Title:	Title:
Date:	Date:	Date:

Approved by Funding Agency (if applicable)

By: Date:

Title:

Change Order No. _____

Date of Issuance: Effective Date:

Owner: Owner's Contract No.:

Contractor: Contractor's Project No.:

Engineer: Engineer's Project No.:

Project: Contract Name:

The Contract is modified as follows upon execution of this Change Order:

Description:

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	**CHANGE IN CONTRACT TIMES** *[note changes in Milestones if applicable]*
Original Contract Price: $_____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: $_____	[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: $_____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: $_____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: $_____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (if required)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title _____	Title _____
Date: _____	Date _____	Date _____

Approved by Funding Agency (if applicable)

By: _____ Date:

Title: _____

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Field Order No. _____

Date of Issuance: Effective Date:

Owner: Owner's Contract No.:

Contractor: Contractor's Project No.:

Engineer: Engineer's Project No.:

Project: Contract Name:

Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference: _____ Specification(s) _____ Drawing(s) / Detail(s)

Description:

Attachments:

ISSUED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____
Date: _____	Date: _____

Copy to: Owner

Addenda

ADDENDUM NO. 1

Date: November 13, 2020

Project: Denton Tap Intersection Improvements

Project Bid Date: Thursday, November 19, 2020, 2:00 pm

The following additions, deletions, modifications, or clarifications shall be made to the appropriate sections of the plans and specifications and shall become a part of the Contract Documents. Bidders shall acknowledge receipt of this Addendum in the space provided in BID SUBMITTAL section of the Project Manual.

GENERAL CLARIFICATIONS TO PROJECT

Question 1: What is the estimated cost range?

The estimate is not available.

Question 2: What is the proposed construction start date?

Proposed construction start date will be January 2021.

Question 3: When will the franchise utility relocations in conflict with the proposed work be completed?

City is currently working with franchise utility relocations and City anticipates relocations to be completed before the construction begins at each intersection.

Question 4: The Bid Item description for Pay Item No. 112 - Restore Irrigation System states the Contractor shall contact property owners or system operators prior to construction to determine the limits of the existing systems to identify and document any damage. The Contractor has no way of accurately determining the scope of work necessary to repair damaged systems prior to submitting a bid. Will the City consider changing this to an Allowance item?

Bid Form will be updated to remove Bid Item 112 – Restore Irrigation System and replaced with an allowance item.

Question 5: The Project Communications and Traffic Control bid items include the use of Message Boards to notify the travelling public. How many Message Boards will be required, and for what duration?

No message boards will be required by the Owner.

Question 6: Bid Item 9 is for replacing existing trees. What type and size of tree will be required? Also which location(s) will receive the new trees?

Refer to drawing sheet #2, Tree Replacement Notes.

Question 7: The Ramp Grading plans on sheets 21 and 22 show proposed stamped and stained concrete behind the back of curb. Bid Item 24 is for 8" Crosswalk, and Bid Item 25 is for 6" Median. Which Bid Item will be used for this work?

All quantity of stamped and stained concrete paving located behind back of curb shall be Bid Item 25.

Question 8: Pay Item 64 is for furnishing and installing Low Profile Type 1 Portable Concrete Barrier. Plan Sheet 66, Note 7 states to install the barrier to protect the signal pole during construction. Is the installed barrier permanent, or is it to be removed after construction?

To be removed after construction.

Question 9: Instructions to Bidders, 11.2 - Electronic Bids states a version of the Bid Proposal in Excel format has been provided on BidSync. I haven't found this version. Where can I find it, or when will it be provided?

Bid proposal in excel format has not been provided. Bidders will complete bid form in project manual, from page 1-19 through 1-34.

Question 10: Bid Item 10, R.O.W. Prep and Bid Item 113, Restore Parkways each have a bid quantity of 44 Stations. How was the quantity calculated? My take-off resulted in a quantity of approximately 31 Stations. If the bid quantity is incorrect, please adjust it to the correct quantity or make each item 1 lump sum. It would be detrimental to the Contractor to have bid items with so much subsidiary work underrun in pay quantity?

Bid quantity will be updated with Addendum No. 1 to 33 stations.

MODIFICATIONS TO CONTRACTUAL DOCUMENTS

PROPOSAL SUBMITTAL

INSTRUCTIONS TO BIDDERS

DELETE the third (3rd) sentence in §7.1 in its entirety and REPLACE with "The deadline for submitting questions shall be Monday, November 16, 2020 at 5:00pm.".

BID FORM

DELETE Pages 1-19 to 1-33 in their entirety and REPLACE with attached Pages 1-19 to 1-33.

BID SUMMARY

DELETE Page 1-34 in its entirety and REPLACE with attached Page 1-34.

DESCRIPTION OF PAY ITEMS

DELETE Pages 5-29 to 5-33 in their entirety and REPLACE with attached Pages 5-29 to 5-34.

MODIFICATIONS TO TECHNICAL SPECIFICATIONS

NONE

MODIFICATIONS TO CONSTRUCTION DRAWINGS

NONE

REFERENCE MATERIAL

NONE

END OF ADDENDUM NO. 1

ADDENDUM NO. 2

Date: November 17, 2020

Project: Denton Tap Intersection Improvements

Project Bid Date: Thursday, November 19, 2020, 2:00 pm

The following additions, deletions, modifications, or clarifications shall be made to the appropriate sections of the plans and specifications and shall become a part of the Contract Documents. Bidders shall acknowledge receipt of this Addendum in the space provided in BID SUBMITTAL section of the Project Manual.

GENERAL CLARIFICATIONS TO PROJECT

Question 12: Question #3 sought to find out when the franchise utility relocations would be complete. The response given was that they would be done before work would begin at each intersection, which is an obvious answer. There are significant utility conflicts with power poles right behind the curb that are also holding several communication lines that will take an extensive amount of time to get relocated, particularly along Bethel School Rd. Do you have an actual start date and anticipated date of completion of the franchise utility relocations for all of the impacted intersections? A more concise response would be appreciated.

City is coordinating the franchise utility relocations at Bethel School Road. The relocations are anticipated to be completed within the next 2 to 4 months.

Question 13: For the vehicle detection equipment - can it be an approved equal? or something that has already been approved by city use that is being currently used by the City of Coppell?

Please refer to project manual specifications, City will not accept any approved equal.

Question 14: Will a slip form paving machine be required or will a vibratory screed be acceptable?

Slip form paving machine is the preferred method. Alternative paving methods are allowable but require approval by the Owner. All paving shall conform with the plans and specifications.

Question 15: In the “INSTRUCTIONS TO BIDDERS” section of the project manual under Item 4 – Minimum Qualifications of Bidders, are items A thru E required to be submitted with the proposal? Item 14 last sentence seems to indicate the five days rule. If so, what exactly is expected for item B.1.h?

Refer to Instructions to Bidders Item 14 (page 1-10) for items to include in bid submission. Additional information may be requested of the Bidder as outlined in Item 4 (page 1-4). Bidders are encouraged to have this evidence ready by Bid Opening.

Question 16: Item 11.1 and Item 14 both state that two (2) copies of the bid proposal are required to be submitted with the proposal. In the prebid meeting, it was stated that one copy and a digital copy were required to be submitted. Please clarify how many copies and in what format is required.

One original and one digital copy to be included in response

Question 17: How/when do we get an invitation to the Zoom Meeting bid opening as referenced under Item 14?

Send an email request to Charles Ellis at cellis@coppelltx.gov. Once input by the A/V group, an invitation will be forwarded to the requestor.

MODIFICATIONS TO CONTRACTUAL DOCUMENTS

NONE

MODIFICATIONS TO TECHNICAL SPECIFICATIONS

NONE

MODIFICATIONS TO CONSTRUCTION DRAWINGS

NONE

REFERENCE MATERIAL

NONE

END OF ADDENDUM NO. 2

ADDENDUM NO. 3

Date: November 18, 2020

Project: Denton Tap Intersection Improvements

Project Bid Date: Thursday, November 19, 2020, 2:00 pm

The following additions, deletions, modifications, or clarifications shall be made to the appropriate sections of the plans and specifications and shall become a part of the Contract Documents. Bidders shall acknowledge receipt of this Addendum in the space provided in BID SUBMITTAL section of the Project Manual.

GENERAL CLARIFICATIONS TO PROJECT

NONE

MODIFICATIONS TO CONTRACTUAL DOCUMENTS

PROPOSAL SUBMITTAL

BID FORM

DELETE Pages 1-19 to 1-33 in their entirety and REPLACE with attached Pages 1-19 to 1-33.

DESCRIPTION OF PAY ITEMS

DELETE Pages 5-29 to 5-33 in their entirety and REPLACE with attached Pages 5-29 to 5-33.

MODIFICATIONS TO TECHNICAL SPECIFICATIONS

NONE

MODIFICATIONS TO CONSTRUCTION DRAWINGS

NONE

REFERENCE MATERIAL

NONE

END OF ADDENDUM NO. 3