

**CONTRACT DOCUMENTS AND SPECIFICATIONS**

*for*

**METCALF AVENUE BRIDGE OVER  
THE BLUE RIVER (BR-1377)**

**CARS Project No. 320000947**

**OVERLAND PARK**  
K A N S A S

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**ABOVE AND BEYOND. BY DESIGN.**

CITY OF OVERLAND PARK

SPECIFICATIONS  
CONTRACT DOCUMENTS

**METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377)**  
**CARS Project No. 320000947**

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CITY OF OVERLAND PARK, KANSAS

NOTICE TO BIDDERS

Sealed bids for **METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377), CARS Project No. 320000947**, will be received by the City of Overland Park, Kansas, at the office of the City Clerk, City Hall, 8500 Santa Fe Drive, Overland Park, Kansas 66212 until 2:00 p.m. local time on **July 2, 2013**. At that time all sealed bids will be transferred to the **City Council Chamber**, City Hall, where they will be publicly opened and read aloud. Any bid received after the designated closing time will be returned unopened.

All bids shall be submitted in sealed envelopes addressed to the City Clerk of Overland Park, Kansas, and marked "**BID FOR: METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377)**." Copies of plans, specifications, bid documents and other contract documents can be seen or purchased on-line at [www.drexeltech.com](http://www.drexeltech.com) in their eDistribution plan room, additional assistance is available at [distribution@drexeltech.com](mailto:distribution@drexeltech.com). Information regarding this project can be found in the "Public Jobs" link on the website. Contractors desiring the Contract Documents for use in preparing bids may also obtain a set of such documents from Drexel Technologies, 10840 West 86<sup>th</sup> Street, Lenexa, KS 66214, telephone number is (913) 371-4430. Hard copy sets of full size plans and specifications will be available for a non-refundable cost of One Hundred Five and 00/100 Dollars (\$105.00). A cd or download of the plans and specifications will be available for a non-refundable cost of Thirty and 00/100 Dollars (\$30.00). Checks should be made payable to Drexel Technologies. Questions regarding these documents may be addressed to: Mark Hartegan, H. W. Lochner, Inc., at 816-363-2696.

Neither the City nor consultant shall be responsible for the accuracy, completeness, or sufficiency of any bid documents obtained from any source other than the source indicated above. Obtaining copies of plans, specifications, bid documents and other contract documents from any other source(s) may result in obtaining incomplete and inaccurate information. Obtaining these documents from any source other than directly from the source listed herein may also result in failure to receive any addenda, corrections, or other revisions to these documents that may be issued.

Contractors should read and be fully familiar with all contract documents before submitting a bid. In submitting a bid, the bidder warrants that it has read the contract documents and is fully familiar therewith and that it has visited the site of the work to fully inform itself as to all existing conditions and limitations and shall include in its bid a sum to cover the cost of all items of the work.

Should a bidder find "defects" as defined in paragraph GC-3 of the General Conditions, it shall follow the procedures outlined in paragraph GC-3 to bring same to the attention of City. Changes necessitated thereby shall be in the form of addenda issued by the consultant.

All bidders shall verify that they have considered all written addenda. Neither the City nor the consultant shall be responsible for oral instructions.

Any written addenda issued during the time of bidding shall be covered and included in the bid. There will be no clarifications or exceptions allowed on the bid. Bids are for a total bid package, total contract price.

Bids shall be made upon the form provided in ink or typewritten. Numbers shall be stated both in writing and in figures; the signature shall be long hand; and the complete form shall be without alteration or erasure. On alternate items for which a bid is not submitted, a written indication of "no bid" on the bid form is required.



## INSTRUCTIONS TO BIDDERS

- IB-1. **BIDS:** All bids shall be made on the forms provided in this bound volume of contract documents and shall be in compliance with the Notice to Bidders. All appropriate blanks shall be filled in and shall be signed by the appropriate individual on behalf of him/herself or the entity submitting the bid. Each bid must be enclosed in a sealed envelope plainly marked "BID FOR METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377)". As per the Notice to Bidders, bid shall be addressed to:

CITY OF OVERLAND PARK, KANSAS  
Attention: City Clerk  
8500 Santa Fe Drive  
Overland Park, Kansas 66212

IB-2. **DEFINITIONS:**

- a. All definitions set forth in the General Conditions or in other contract documents are applicable to the Bidding Documents.
- b. "Alternative Bid" (or "Alternate") means an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the work, as described in the Bidding Documents, is accepted.
- c. "Base Bid" means the sum stated in the Bid for which the Bidder offers to perform the work described in the Bidding Documents as the base, to which work may be added or from which work may be deleted for sums stated in Alternate Bids.
- d. "Bid" shall mean the offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the work to be performed (and the City reserves the right to reject any and all bids).
- e. "Bidder" shall mean any individual, partnership, corporation, association or other entity submitting a Bid for the work.
- f. "Bidding Documents" shall mean all documents related to a Bidder's submitting a Bid, including, but not limited to, the advertisement for Bids, if applicable, Instructions to Bidders, the Bid form, other sample bidding and contract forms and the proposed contract documents, including any addenda issued prior to receipt of Bids. At the City's option, Bidders may be required to complete and submit a prequalification statement.
- g. "City" means the City of Overland Park, Kansas.
- h. "Contractor" shall mean the entity entering into the contract for the performance of the work covered by the contract, together with its duly authorized agents or legal representatives.
- i. "Successful Bidder" means the person or entity who is determined and declared by the City to have submitted the lowest and best responsible Bid in conformity with the terms of the Bidding Documents.

- j. "Unit Price" means an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Bidding Documents or in the proposed contract documents.

**IB-3. BIDDER'S REPRESENTATIONS:** Each Bidder by making its Bid represents that:

- a. It has read and understands the Bidding Documents, and its Bid is made in accordance therewith.
- b. It has visited the site, has familiarized itself with the local conditions under which the work is to be performed, has reviewed all published reports, inspections and other documents relating to the project and has correlated its observations with the requirements of the proposed contract documents.
- c. Its Bid is based upon the materials, systems and equipment required by the Bidding Documents without exception.
- d. It has familiarized itself with state, federal law and local ordinances, regulations, and permitting requirements which may affect cost and/or progress or performance of the work.

**IB-4. BIDDING DOCUMENTS:** Bidders may obtain complete sets of the Bidding Documents from the City or the consultant for the sum stated in the Notice to Bidders. Neither the City nor the consultant shall be responsible for the accuracy, completeness, or sufficiency of any Bidding Documents obtained from any source other than the source indicated in the Notice to Bidders. Obtaining copies of Bidding Documents from any other source(s) may result in obtaining incomplete and inaccurate information or result in failure to receive any addenda, corrections, or other revisions to these documents that may be issued.

Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the City nor the consultant assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

The City in making copies of the 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.

**IB-5. DEFECTS IN BIDDING DOCUMENTS:** Bidders shall promptly notify the City of any errors, omissions, discrepancies or inconsistencies (hereinafter "defects") which they may discover upon examination of the Bidding Documents or of the site and local conditions. Bidders will not be permitted to take advantage of any such defect.

Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the consultant at least seven days prior to the date for receipt of Bids.

Any interpretation, correction or change of the Bidding Documents will be made by Addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.

- IB-6. SUBSTITUTIONS: The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the consultant at least seven (7) days prior to the date for receipt of Bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or other work that incorporation of the substitute would require shall be included. The burden of proof of the merit of the proposed substitute is upon the Bidder. The consultant's decision of approval or disapproval of a proposed substitution shall be final.

If the consultant approves any proposed substitution prior to receipt of Bids, such approval will be set forth in a written addendum. Bidders shall not rely upon approvals made in any other manner.

No substitutions will be considered after the contract award unless specifically provided in the contract documents (see GC-61).

- IB-7. ADDENDA: Written addenda will be mailed or delivered to all who are known by the consultant to have received a complete set of Bidding Documents.

Copies of written addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

No written addenda will be issued later than four (4) days prior to the date for receipt of Bids except an addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

Each Bidder shall ascertain prior to submitting its Bid that it has received all written addenda issued, and it shall acknowledge its receipt in its Bid.

- IB-8. INSURANCE:

- a. General: The Contractor shall secure and maintain, throughout the duration of the agreement, insurance (on an occurrence basis unless otherwise agreed to) of such types and in at least such amounts as required herein. Contractor shall provide certificates of insurance and renewals thereof on forms provided by the City or on forms acceptable to the City. The City shall be notified by receipt of written notice from the insurer or the Contractor at least thirty (30) days prior to material modification or cancellation of any policy listed on the Certificate.

Bidders are referred to Article GC-38 of the General Conditions for additional insurance information.

- b. Notice of Claim Reduction of Policy Limits: The Contractor, upon receipt of notice of any claim in connection with the agreement, shall promptly notify the City, providing full details thereof, including an estimate of the amount of loss or liability.

The Contractor shall monitor and promptly notify the City of any reduction in limits of



protection afforded under any policy listed in the Certificate (or otherwise required by the contract documents) if the Contractor's limits of protection shall have been impaired or reduced to such extent that the limits fall below the minimum amounts required herein. The Contractor shall promptly reinstate the original limits of liability required hereunder and shall furnish evidence thereof to the City.

c. Commercial General Liability:

Limits –

General Aggregate:	\$2,000,000
Products / Completed Operations Aggregate:	\$2,000,000
Personal & Advertising Injury:	\$1,000,000
Each Occurrence:	\$1,000,000

Policy MUST include the following conditions:

**NAME CITY OF OVERLAND PARK AND BOARD OF COUNTY COMMISSIONERS OF JOHNSON COUNTY, KANSAS AS "ADDITIONAL INSURED"**

d. Automobile Liability: Policy shall protect the Contractor against claims for bodily injury and/or property damage arising from the ownership or use of any owned, hired and/or non-owned vehicle.

Limits (Same as Commercial General Liability) -

Combined Single Limits, Bodily Injury and Property Damage - Each Accident:

Policy MUST include the following condition:

**NAME CITY OF OVERLAND PARK AND BOARD OF COUNTY COMMISSIONERS OF JOHNSON COUNTY, KANSAS AS "ADDITIONAL INSURED"**

e. Umbrella Liability: The Umbrella / Excess Liability must be at least as broad as the underlying general liability and automobile liability policies.

Limits –

Each Occurrence	\$1,000,000
General Aggregate	\$1,000,000

f. Workers' Compensation: This insurance shall protect the Contractor against all claims under applicable state workers' compensation laws. The Contractor shall also be protected against claims for injury, disease or death of employees which, for any reason, may not fall within the provisions of workers' compensation law. The policy limits shall not be less than the following:

Workers' Compensation:	Statutory
Employer's Liability:	
Bodily Injury by Accident	\$100,000 each accident
Bodily Injury by Disease	\$500,000 policy limit
Bodily Injury by Disease	\$100,000 each employee

- g. Owner's Protective Liability: The Contractor shall take out, pay for and deliver to the City, an Owner's Protective Liability insurance policy written on an occurrence basis and naming the City as named insured. The policy shall be maintained during the life of the agreement. Limits of protection shall be at least **\$1,000,000** Combined Single Limits, Bodily Injury and Property Damage, and shall contain no exclusion relative to any function performed by the City or its employees and agents in connection with the project.
- h. Industry Ratings: The City will only accept coverage from an insurance carrier who offers proof that it:
1. Is authorized to do business in the State of Kansas;
  2. Carries a Best's policy holder rating of A- or better; and
  3. Carries at least a Class VIII financial rating, **or**
  4. Is a company mutually agreed upon by the City and Contractor.
- i. Subcontractors' Insurance: If a part of the Contract is to be sublet, the Contractor shall either:
1. Cover all subcontractors in its insurance policies, **or**
  2. Require each subcontractor not so covered to secure insurance which will protect subcontractor against all applicable hazards or risks of loss as and in the minimum amounts designated.

Whichever option is chosen, contractor shall indemnify and hold harmless the City as to any and all damages, claims or losses, including attorney's fees, arising out of the acts or omissions of its subcontractors.

- j. Railroad Protective Liability: Additional requirement applicable when working on railroad property.

Named Insured:	Applicable Railroad
Limits – Bodily Injury & Property Damage:	Per Railroad Requirements

- k. Aircraft Liability: Additional requirement applicable for aerial photograph or contract involving any use of aircraft.

Limits- Single Limit Bodily Injury; Including Passengers; and Property Damage:  
\$1,000,000 Each Occurrence

Coverage must include all Owned, Hired and Non-Owned Aircraft.

Policy **MUST** include the following condition:

**NAME CITY OF OVERLAND PARK AND BOARD OF COUNTY COMMISSIONERS OF JOHNSON COUNTY, KANSAS AS "ADDITIONAL INSURED".**

- IB-9. BID SECURITY: Each Bid shall be accompanied by a bid bond or a certified cashier's check on an acceptable bank, made payable, without condition, to the City of Overland Park, Kansas, (hereinafter "City") in an amount of not less than five percent (5%) of the total Bid. In addition to other legal remedies, the amount of said bid security may be retained by and forfeited to the City as liquidated damages if such Bid is accepted and the Successful

Bidder fails to enter into an agreement in the form prescribed, within the time specified in the notice of award by the City; provided, however, that the City shall not necessarily be limited in protecting its legal rights to enforcement of its rights under the bid security. Deposits will be returned to unsuccessful Bidders, with the exception of the second qualifying Bidder, at such time as their Bids are rejected. The Bid deposit of the Successful Bidder and the second qualifying Bidder will be returned when satisfactory insurance certificates, performance bond and statutory or labor and material payment bond in an amount equal to 100% of the agreement and other documents required by the General Conditions have been furnished and the contract documents have been executed.

IB-10. TAXES: It is the intent of the City to supply the Contractor with a Project Exemption Certificate for use in purchasing materials and supplies used on the project. The Contractor shall, in preparing its Bid, omit from its computed costs all sales and compensation taxes. Upon issuance of a Kansas tax exemption number, two (2) copies of the Project Exemption Certificate (Form PR-74a) will be forwarded to the Contractor. Upon completion of the project, the City will provide the State of Kansas with the project completion date and the State will issue a Project Completion Certification. This will be forwarded to the Contractor who must sign and return it to the City. All invoices must be retained by the Contractor for a period of five (5) years and are subject to audit by the Kansas Department of Revenue. Final payment will not be made to the Contractor until the City has received the Project Completion Certification from the Contractor along with a Consent of Surety Company to Final Payment.

IB-11. LIQUIDATED DAMAGES: In case of failure on the part of the Contractor to effect completion within the time specified, the City shall have the right to deduct from the total compensation otherwise due the Contractor as liquidated damages based on the full Bid price of the agreement, fixed and agreed to in advance, according to the following schedule:

<u>Contract Amount</u>		<u>Liquidated Damages</u>
\$0	to \$50,000	\$250.00
\$50,000	to \$100,000	\$400.00
\$100,000	to \$500,000	\$800.00
\$500,000	to \$1,000,000	\$1,000.00
\$1,000,000	to \$2,000,000	\$1,750.00
\$2,000,000	to \$5,000,000	\$2,500.00
\$5,000,000	to \$10,000,000	\$3,500.00
\$10,000,000	to \$20,000,000	\$5,500.00
\$20,000,000	and up	\$6,000.00

for each twenty-four (24) hour calendar day, including Sundays and holidays, the work remains incomplete over the specified completion time. **(THE CITY RESERVES THE RIGHT TO ADJUST THE SCHEDULE OF LIQUIDATED DAMAGES, PRIOR TO ADVERTISING FOR BIDS, BASED ON THE SCOPE AND URGENCY OF THE PROJECT.)**

In the event moneys being retained by the City shall not be sufficient to cover the amount of any liquidated damages, City may sue for and recover compensation for damages for nonperformance of the contract at the time stipulated herein and provided for.

IB-12. MODIFICATION OR WITHDRAWAL OF BIDS: Bids may be modified or withdrawn by written request of the Bidder received in the office of the City Clerk, prior to the time and

date for Bid opening. No Bidder may withdraw its Bid for a period of thirty (30) days from the date set for the opening thereof.

- IB-13. ACCEPTANCE AND REJECTION OF BIDS AND AWARD OF CONTRACT: The contract will be awarded to the lowest and best, responsible Bidder as determined by the City.

The City reserves the right to reject any and all Bids; to waive any and all irregularities and informalities; to negotiate contract terms with the Successful Bidder; and the right to disregard all nonconforming, non-responsive or conditional Bids.

In evaluating Bids, the City may consider the qualification of Bidders, whether or not the Bids comply with the prescribed requirements, and alternates and Unit Prices if requested in the Bid forms. The City reserves the right to reject the Bid of any Bidder who does not pass the evaluation to the City's satisfaction.

- IB-14. BONDS: The Contractor to whom the work is awarded will be required to furnish a Performance Bond, Maintenance Bond, and a Statutory or Labor and Material Payment Bond in the forms hereinafter provided in an amount equal to 100 percent (100%) of the amount of the contract to be awarded in each case in addition to any other bonds as may be required by the contract documents. With each bond there shall be filed with the City one copy of "Power of Attorney" certified to include the date of the bonds.

- IB-15. INDEMNIFICATION: The Contractor shall be required to indemnify and hold the City harmless as set forth in Article GC-33 of the General Conditions.

- IB-16. BID PREFERENCE: Existing State law (K.S.A. 75-3740a) requires that, to the extent permitted by federal law and regulations, the City, when letting contracts for bids, must require any Successful Bidder-Contractor domiciled outside the state of Kansas to submit a Bid the same percent less than the lowest bid submitted by a responsible Kansas contractor as would be required of such Kansas domiciled contractor to succeed over the bidding Contractor domiciled outside Kansas on a like contract let in the foreign Bidder's domiciliary state. All Bids are received on this condition, and if it is determined by the City that the apparent lowest and best Bidder is a foreign domiciled contractor, such contractor shall be awarded the Contract only if such Contractor's Bid complies with this state law requirement.

All Bidders domiciled outside of the State of Kansas may be requested to furnish the City with a copy of their state's preferential bidding statutes, if any.

- IB-17. NON-DISCRIMINATION, AFFIRMATIVE ACTION AND SEXUAL HARASSMENT: The Contractor shall comply with Article GC-68 of the General Conditions.

- IB-18. APPOINTMENT OF SERVICE AGENT: Kansas Statutes Annotated 16-113 requires that non-resident Contractors appoint an agent for the service of process in Kansas. The executed appointment must then be filed with the Secretary of State, Topeka, Kansas. Any Successful Bidder-Contractor domiciled outside the State of Kansas must comply with these statutory requirements.

- IB-19. SUBCONTRACTING: As provided in Article GC-36, the Contractor may utilize the services of subcontractors on those parts of the work which, under normal contracting practices, are performed by subcontractors.

IB-20. CONFLICT OF INTEREST: 31 USCS Section 1352 requires all subgrantees, Contractors, subcontractors and consultants who receive federal funds via the City to certify that they will not use federal funds to pay any person for influencing or attempting to influence a federal agency or Congress in connection with the award of any federal contract, grant, loan or cooperative agreements.

In addition, contract applicants, recipients and subrecipients must file a form disclosing any expenditures they make for lobbying out of non-federal funds during the agreement period. Necessary forms are available from the City Engineer and should be returned to the City with other contract documents. It is the responsibility of the general Contractor to obtain executed forms from any subcontractors who fall within the provisions of the Code and to provide the City with the same.

BID

**METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377)  
CARS PROJECT NO. 320000947**

TO: CITY OF OVERLAND PARK,  
JOHNSON COUNTY, KANSAS

Neither the City nor Consultant shall be responsible for the accuracy, completeness, or sufficiency of any bid documents obtained from any source other than the source indicated in the Notice to Bidders. Obtaining copies of plans, specifications, bid documents and other contract documents from any other source(s) may result in obtaining incomplete and inaccurate information. Obtaining these documents from any source other than directly from the source listed in the Notice to Bidders may also result in failure to receive any addenda, corrections, or other revisions to these documents that may be issued.

The undersigned bidder hereby proposes to mobilize and furnish all materials, supplies, transportation, tools, equipment and plant, perform all necessary labor and construct, install and complete all work stipulated in, required by, and in conformity with the proposed contract documents (including all documents referred to therein) and any and all addenda thereto, for and in consideration of prices as follows:

ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Force Account (Set)	L.S.	1		
2	Maintenance Bond	L.S.	1		
3	Clearing and Grubbing	L.S.	1		
4	Removal of Existing Structures	L.S.	1		
5	Unclassified Excavation	Cu. Yds.	149		
6	Class 1 Excavation	Cu. Yds.	53		
7	Embankment (Contractor Furnished)	Cu. Yds.	942		
8	Compaction of Earthwork	Cu. Yds.	888		
9	Asphaltic Concrete (Overland Park Mix)	Tons	262		
10	Milling (Total Width)(2") (Depth Transitions)	Sq. Yds.	1,070		
11	Aggregate Base Course (AB-3 Overland Park Modified)	Sq. Yds.	296		
12	KCMMB 4K Concrete	Cu. Yds.	252.4		
13	Concrete Pavement (12" Uniform)(Bridge Appr.)	Sq. Yds.	272		
14	Bridge Approach Slab Footing	Cu. Yds.	17.8		
15	Reinforcing Steel (Grade 60) (Epoxy Coated)	Lbs.	74,060		



16	Piles (Steel)(HP 10x42)	Lin. Ft.	152		
17	Abutment Strip Drain	Sq. Yds.	37		
18	Bridge Backwall Protection System	Sq. Yds.	43		
19	Temporary Shoring	L.S.	1		
20	Slope Protection (Shot Rock)	Cu. Yds.	129		
21	Removal of Existing Guardrail	Lin. Ft.	863		
22	Guardrail (Steel Plate)(MGS)	Lin. Ft.	906		
23	Guardrail End Terminal (MGS)	Each	4		
24	Object Marker (Type 3)	Each	4		
25	Traffic Control	L.S.	1		
26	Permanent Pavement Markings	L.S.	1		
27	CARS Sign	Each	2		
28	Temporary Erosion Control	L.S.	1		
29	Seed	L.S.	1		
30	Contractor Construction Staking	L.S.	1		
31	Control Point (Vertical)(Reset)	Each	1		
<b>TOTAL BID</b>					\$

1. The undersigned further agrees to begin upon the date stated in the Notice to Proceed and to complete the work, if this bid is accepted, **no later than November 1, 2013.**

The undersigned also declares that it understands that if not preset by the City the time to begin construction and to complete the work will be one factor considered in determining the lowest and best responsible bidder.

The undersigned also declares that he/she understands that liquidated damages based on the full bid price of the contract shall be assessed against Contractor, as stipulated liquidated damages and not as a penalty, in an amount as set forth in paragraph GC-46 of the General Conditions for each and every calendar day the work remains incomplete over the specified completion time(s) stated above.

2. In submitting this bid, the undersigned declares that it is of lawful age and executed the accompanying bid on behalf of the bidder therein named, and that it had lawful authority so to do. The undersigned further declares that it has not directly or indirectly entered into any agreement, expressed or implied, with any bidder or bidders, having for its object the controlling of the price or amount of such bid or any bids, the limiting of the bid or bidders, the parceling or farming out to any bidder or bidders, or other persons, of any part of the contract or any part of the subject matter of the bid or bids or of the profits thereof, and that





it has not and will not divulge the sealed bid to any person whomsoever, except those having a partnership or other financial interest with bidder in said bid or bids, until after sealed bid or bids are opened.

3. The undersigned further declares that it has carefully examined the Notice to Bidders, Instructions to Bidders and other contract documents, and that it has inspected the actual location of the work, together with the local sources of supply, and has satisfied itself as to all conditions and quantities, and understands that in signing this Bid it waives all right to plead any misunderstanding regarding the same.
4. The undersigned hereby agrees to furnish the required bonds and insurance certificates and execute an agreement within ten (10) calendar days from and after notice of the award of the contract, and failure of the bidder to do so shall constitute a default, and the City may thereafter take such steps to protect its legal rights as it deems in its best interest, including, but not limited to, enforcement of its rights as to bid security.
5. It is understood that the City will pay in a prompt and timely manner pay estimates when submitted and approved by the Architect/Engineer and further approved by the City staff coordinator for the project, all as provided in the contract documents.
6. Undersigned acknowledges receipt of the Plans and Specifications for the project including the following addenda (complete) \_\_\_\_\_.

Enclosed is a certified check, cashier's check or bid bond in the amount of \_\_\_\_\_

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_) which the undersigned agrees is subject to being forfeited to and becoming the property of the City as liquidated damages and not as a penalty, together with other legal remedies the City may choose to invoke, all as set forth in the Instructions to Bidders Section IB-9, should this Bid be accepted and the contract be awarded to this bidder and it should fail to enter into an agreement in the form prescribed and to furnish the required insurance, bonds and other required documents within ten (10) calendar days as above stipulated, otherwise the bid security shall be returned to the undersigned upon signing of the agreement and delivery of the approved bonds and other required documents to the City of Overland Park, Kansas.

DATED in \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_, 2013.

(SEAL)

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Street Address or P.O. Box



---

City, State, Zip

---

Telephone Number

---

Fax Number



CITY OF OVERLAND PARK, KANSAS

AGREEMENT BETWEEN  
CITY OF OVERLAND PARK, KANSAS  
AND CONTRACTOR

**METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377)  
CARS PROJECT NO. 32000947**

THIS AGREEMENT is made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2013, by and between the City of Overland Park, Kansas, hereinafter the "City", and \_\_\_\_\_, hereinafter the "Contractor".

WITNESSETH:

WHEREAS, the City has caused to be prepared, in accordance with the law, Notice to Bidders, Instructions to Bidders, Bid, this Agreement, General Conditions, Project Special Provisions, Plans, Specifications and other Contract Documents, as defined in the General Conditions, for the work herein described, and has approved and adopted these said Contract Documents and has caused to be published, in the manner and for the time required by law, an advertisement inviting sealed Bids for furnishing construction materials, labor, tools, equipment and transportation necessary for, and in connection with, the construction of public improvements in accordance with the terms of this Agreement; and

WHEREAS, the Contractor, in response to the advertisement, has submitted to the City, in the manner and at the time specified, a sealed Bid in accordance with the terms of this Agreement; and

WHEREAS, the City, in the manner prescribed by law, has publicly opened, examined and canvassed the Bids submitted, and as a result of this canvass has, in accordance with the law, determined and declared the Contractor to be the lowest and best responsible bidder for the construction of the public improvements, and has duly awarded to the Contractor a contract therefor upon the terms and conditions set forth in this Agreement and for the sum or sums named in the Bid attached to and made a part of this Agreement.

NOW, THEREFORE, in consideration of the compensation to be paid the Contractor, and of the mutual agreements herein contained, the parties hereto have agreed, and hereby agree, the City for itself and its successors, and the Contractor for itself, himself/herself or themselves, its, his/her or their successors and assigns, or its, his/her or their executors and administrators, as follows:

ARTICLE I. The Contractor will furnish at its own cost and expense all labor, tools, equipment, materials and transportation required to construct and complete the work as designated, described and required by the Contract Documents, to wit: METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377) all in accordance with the Notice to Bidders, Instructions to Bidders, Bid, this Agreement, General Conditions, Project Special Provisions, Plans, Specifications and other Contract Documents as defined in paragraph GC-1 of the General Conditions of the Contract for Construction, on file with the City Clerk of Overland Park, Kansas, all of which Contract Documents form the Contract, and are as fully a part hereof as if repeated verbatim herein; all work to be done in a good, substantial and workmanlike manner to the

entire satisfaction of the City, and in accordance with the laws of the City, the State of Kansas and the United States of America. All terms used herein shall have the meanings ascribed to them in the General Conditions unless otherwise specified.

ARTICLE II. The City shall pay to the Contractor for the performance of the work embraced in this Contract, and the Contractor will accept in full compensation therefor, the sum of \_\_\_\_\_

DOLLARS (\$ \_\_\_\_\_) (subject to adjustment as provided by the Contract Documents) for all work covered by and included in the Contract award and designated in the foregoing Article I, payment thereof to be made in cash or its equivalent and in the manner provided in the Contract Documents.

ARTICLE III. The Contractor shall commence work upon the date stated in the Notice to Proceed, and will complete all work covered by this Contract **no later than November 1, 2013**. Liquidated damages based on the full bid price of the Contract shall be assessed against Contractor, as stipulated liquidated damages and not as a penalty, in an amount as set forth in paragraph GC-46 of the General Conditions for each and every calendar day the work remains incomplete over the specified completion time(s) stated above.

ARTICLE IV. The Contractor shall not subcontract, sell, transfer, assign or otherwise dispose of the Contract or any portion thereof without previous written consent of the City. In case such consent is given, the Contractor shall be permitted to subcontract a portion thereof, but shall self perform not less than forty percent (40%) of the total Contract Price based upon the unit prices within the Bid submitted to the City by the Contractor. No subcontracts, or other transfer of Contract, shall release the Contractor of its liability under the Contract and Bonds applicable thereto.

ARTICLE V. Contractor specifically acknowledges and confirms that: (1) it has visited the site, made all inspections it deems appropriate and has read and fully understands the Contract Documents, including all obligations and responsibilities undertaken by it as specified herein and in the other Contract Documents and knowingly accepts same; (2) it has furnished copies of all Contract Documents to its insurance carrier(s) and its surety(ies); and (3) its insurance carrier(s) and surety(ies) agree to be bound as specified herein, in the Contract Documents and in the insurance policy(ies) and bonds as to liability and surety coverage.

ARTICLE VI. It is specifically agreed between the parties executing this Agreement that the Contract Documents are not intended to create any third party beneficiary relationship nor to authorize anyone not a party to this Agreement to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this Agreement. The duties, obligations and responsibilities of the parties to this Agreement with respect to third parties shall remain as imposed by law.

ARTICLE VII. This Agreement, together with the other Contract Documents, constitutes the entire agreement between the parties and supersedes all prior agreements, whether oral or written, covering the same subject matter. This Agreement may not be modified or amended except as provided herein or in the other Contract Documents.

ARTICLE VIII. This Agreement is entered into, under and pursuant to, and is to be construed and enforceable in accordance with, the laws of the State of Kansas.

ARTICLE IX. Should any provision of this Agreement or the other Contract Documents be determined to be void, invalid, unenforceable or illegal for whatever reason, such provision(s) shall be null and void; provided, however, that the remaining provisions of this Agreement

and/or the other Contract Documents shall be unaffected thereby and shall continue to be valid and enforceable.

IN WITNESS WHEREOF, the City of Overland Park, Kansas, has caused this Agreement to be executed on its behalf, thereunto duly authorized, and the said Contractor has executed 8 counterparts of this Contract in the prescribed form and manner, the day and year first above written.

CITY OF OVERLAND PARK, KANSAS

ATTEST:

By \_\_\_\_\_  
Carl Gerlach  
Mayor

\_\_\_\_\_  
Marian Cook  
City Clerk

APPROVED AS TO FORM:

\_\_\_\_\_  
Tammy M. Owens  
Deputy City Attorney

\_\_\_\_\_  
Contractor

(SEAL)

By \_\_\_\_\_  
Title President

***(If the Contract is not executed by the president of the corporation or general partner of the partnership, please provide documentation which authorizes the signatory to bind the corporation or partnership. If a corporation, Contractor shall furnish City a current certificate of good standing, dated within ten (10) days of the date of this Contract.)***





CITY OF OVERLAND PARK, KANSAS

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned \_\_\_\_\_ of \_\_\_\_\_ as principal, hereinafter referred to as the "Contractor," and \_\_\_\_\_, a corporation organized under the laws of the State of \_\_\_\_\_ and authorized to transact business in the State of Kansas, as surety, are held and firmly bound unto the City of Overland Park, Kansas, hereinafter referred to as "City," in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) lawful money of the United States of America, for the payment of which sum well and truly to be made we bind ourselves, and our heirs, executors, administrators, successors and assigns, jointly and severally by these presents:

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

WHEREAS, the above bonded Contractor, has on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, executed a written Agreement with the aforesaid City for furnishing in a good, substantial and workmanlike manner all construction, labor, materials, equipment, tools, transportation, superintendence and other facilities and accessories for METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377), CARS Project No. 320000947, designated, defined and described in the Agreement and in accordance with the Contract Documents to include the General Conditions, Project Special Provisions, Specifications, Plans and other Contract Documents therefor; a copy of the Agreement being attached hereto and made a part hereof.

NOW, THEREFORE, if said Contractor shall in all particulars promptly and faithfully perform each and every covenant, condition, and part of the Agreement, and the General Conditions, Project Special Provisions, Specifications, Plans and other Contract Documents thereto attached or by reference made a part thereof, according to the true intent and meaning in each case, upon written acceptance by the City of the improvement herein described in substantial compliance with the Contract Documents and upon the effective date of the Maintenance Bond for the improvement then this obligation shall be and become null and void.

PROVIDED, that said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or the Work to be performed thereunder or the General Conditions, Project Special Provisions, Specifications, Plans and other Contract Documents accompanying same shall in any way 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 Agreement or to the Work or to the Specifications, Plans and other Contract Documents.

PROVIDED, FURTHER, that it is expressly agreed that the bond shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Agreement not increasing the contract price more than 50 percent, so as to bind the Contractor and the Surety to the full and faithful performance of the Agreement so amended. The term "amendment," wherever used in this bond, and whether referring to this bond or the Agreement, shall include any alteration, addition, extension, or modification of any character whatsoever.

Whenever Contractor is declared by City to be in default under the Contract Documents, the Surety may promptly remedy the default or shall within fourteen (14) days from the date of notice from the City:

1. Commence completing the Work of the Agreement in accordance with its terms and conditions. However, Surety may not use the defaulting Contractor, or any legal reformation of the defaulting Contractor, to complete the Work and the Surety may not use any of the subcontractors of the defaulting Contractor to complete the Work without the written consent of the City; or
2. Commence the process of obtaining a bid or bids for completing the Work of the Agreement in accordance with its terms and conditions, and upon determination by the City and the surety jointly of the lowest and best responsive, responsible bidder, arrange for an Agreement between such bidder and the City, and make available as work progresses sufficient funds to pay the cost of completion less the balance of the Contract Price, including other costs and damages for which the surety may be liable hereunder, which sum shall not exceed the amount set forth in the first paragraph hereof. The term "balance of the Contract Price," as used in this paragraph, shall mean the total amount payable by City to Contractor under the Agreement and any amendments thereto, less the amount properly paid by City to Contractor. No right of action shall accrue on this bond to or for the use of any person or corporation other than the City or successors of the City.

IN TESTIMONY WHEREOF, said Contractor has hereunto set his/her hand, and said surety has caused these presents to be executed in its name; and its corporate seal to be hereunto affixed by its attorney-in-fact duly authorized thereunto so to do at \_\_\_\_\_, \_\_\_\_\_ on this, the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Contractor/Principal

ATTEST: By \_\_\_\_\_ (SEAL)

\_\_\_\_\_  
Secretary

\_\_\_\_\_  
Title

\_\_\_\_\_  
Surety Company

By \_\_\_\_\_ (SEAL)  
Attorney-in-Fact

NOTE:

1. Date of bond must not be prior to date of contract.
2. If Contractor is partnership, all partners should execute bond.
3. Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state of Kansas.
4. Accompany this bond with Attorney-in-Fact's Authority from the surety company certified to include the date of the bond.

CITY OF OVERLAND PARK, KANSAS

MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned \_\_\_\_\_  
\_\_\_\_\_ of \_\_\_\_\_  
as principal, hereinafter referred to as the "Contractor," and \_\_\_\_\_  
\_\_\_\_\_, hereinafter referred to as the "Surety",  
a corporation organized under the laws of the State of \_\_\_\_\_ and authorized to  
transact business in the State of Kansas, as surety, are held and firmly bound unto the City of  
Overland Park, Kansas, hereinafter referred to as "City," in the penal sum of \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_), lawful  
money of the United States of America, for the payment of which sum well and truly to be made  
we bind ourselves, and our heirs, executors, administrators, successors and assigns, jointly and  
severally by these presents:

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

WHEREAS, the above bonded Contractor, has on the \_\_\_\_\_ day of \_\_\_\_\_,  
2013, executed a written Agreement with the aforesaid City for furnishing in a good, substantial  
and workmanlike manner all construction, labor, materials, equipment, tools, transportation,  
superintendence and other facilities and accessories for METCALF AVENUE BRIDGE OVER  
THE BLUE RIVER (BR-1377), CARS Project No. 320000947, hereinafter referred to as the  
"Improvement", designated, defined and described in the Agreement and the Contract  
Documents, and in accordance with the Specifications and Plans and other Contract  
Documents therefor; a copy of the Agreement being attached hereto and made a part hereof.

NOW, THEREFORE, upon acceptance of the Improvement by the City in substantial  
compliance with the Contract Documents, if said Improvement endures without defect or need  
of repair or maintenance for a period of two (2) years from the date of final payment, then this  
obligation shall be and become null and void.

If the Improvement requires repairs or maintenance within such two (2) year period then this  
obligation shall remain in full force and effect and Contractor and the Surety shall be responsible  
for the prompt payment of the penal sum to the City for such repairs and/or maintenance  
including any incidental costs associated therewith, including but not limited to the costs of  
consultants and/or engineering investigations, testing, analysis and any other costs incurred to  
determine the cause of the defect and/or the necessary repair or maintenance and attorney fees  
incurred in collection of this Maintenance Bond.

PROVIDED, that said Surety, for value received, hereby stipulates and agrees that no change,  
extension of time, alteration or addition to the terms of the Agreement or the Work to be  
performed thereunder or the Specifications, Plans and other Contract Documents  
accompanying same shall in any way 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  
Agreement or to the Work or to the Specifications, Plans and other Contract Documents.

PROVIDED, FURTHER, that it is expressly agreed that the bond shall be deemed amended  
automatically and immediately, without formal and separate amendments hereto, upon  
amendment to the Agreement not increasing the contract price more than 50 percent, so as to  
bind the Contractor and the Surety to the full and faithful performance of the Agreement so  
amended. The term "amendment," wherever used in this bond, and whether referring to this  
bond or the Agreement, shall include any alteration, addition, extension, or modification of any  
character whatsoever.

IN TESTIMONY WHEREOF, said Contractor has hereunto set his/her hand, and said surety has caused these presents to be executed in its name; and its corporate seal to be hereunto affixed by its attorney-in-fact duly authorized thereunto so to do at \_\_\_\_\_  
\_\_\_\_\_ on this, the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Contractor/Principal

ATTEST:  
(SEAL)

By \_\_\_\_\_  
Print Name: \_\_\_\_\_

\_\_\_\_\_  
Title

\_\_\_\_\_  
Secretary

\_\_\_\_\_  
Surety Company

(SEAL)

By \_\_\_\_\_  
Attorney-in-Fact

NOTE:

1. Date of bond must not be prior to date of contract.
2. If Contractor is partnership, all partners should execute bond.
3. Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state of Kansas.
4. Accompany this bond with Attorney-in-Fact's Authority from the surety company certified to include the date of the bond.

CITY OF OVERLAND PARK, KANSAS

STATUTORY BOND

**METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377)**  
**CARS Project No. 320000947**

KNOW ALL MEN BY THESE PRESENTS, that we \_\_\_\_\_  
\_\_\_\_\_ as Contractor and principal, and \_\_\_\_\_  
\_\_\_\_\_ a corporation organized under the laws of the State of \_\_\_\_\_  
\_\_\_\_\_ and authorized to transact business in the State of Kansas, as surety, are held and  
firmly bound unto the State of Kansas, in the penal sum of \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$\_\_\_\_\_ ) lawful money of the  
United States of America, for the payment of which sum well and truly to be made, we bind  
ourselves, and our heirs, executors, administrators, successors, and assigns, jointly and  
severally, firmly by these presents:

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

WHEREAS, the said Contractor has on the \_\_\_\_\_ day of \_\_\_\_\_, 2013, entered  
into an Agreement with the City of Overland Park, Kansas, a copy of which is attached hereto  
and incorporated herein for furnishing all tools, equipment, materials, transportation and  
supplies, performing all labor, and constructing public improvements described in the  
Agreement and the Contract Documents, all in accordance with Provisions, Specifications,  
Plans and other Contract Documents on file in the office of the City Clerk of the City of Overland  
Park, Kansas.

NOW, THEREFORE, if the Contractor or the subcontractors of the Contractor shall pay all  
indebtedness incurred for supplies, materials, transportation or labor furnished, or equipment  
used or consumed in connection with or in or about the construction or making of the  
improvements described in the above-mentioned Contract Documents, then this obligation shall  
be void; otherwise, it shall remain in full force and effect.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of  
time, alteration or addition to the terms of the Agreement and the Contract Documents to the  
work to be performed thereunder, or the Provisions, Plans and Specifications accompanying the  
same, shall in any way 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 Agreement, Contract  
Documents or to the Plans and Specifications.

PROVIDED, that it is expressly agreed that this bond shall be deemed amended automatically  
and immediately, without formal and separate amendments hereto, upon amendment to the  
Agreement not increasing the contract price more than 50 percent, so as to bind the Contractor  
and the Surety to the full and faithful performance of the Agreement as so amended. The term  
"amendment," wherever used in this bond and whether referring to this bond or the Agreement  
shall include any alteration, addition, extension or modification of any character whatsoever.

The said Surety further agrees that any person to whom there is due any sum for labor  
furnished, transportation, materials, equipment or supplies used or consumed in connection with  
or in or about the construction of said public improvement, as hereinbefore stated or said

person's assigns, may bring action on this bond for the recovery of said indebtedness within six (6) months from the completion of said public improvement.

IN TESTIMONY WHEREOF, the said Contractor has hereunto set his/her hand, and the said surety has caused these presents to be executed in its name, and its corporate seal to be hereunto affixed, by its attorney-in-fact duly authorized thereunto so to do, at \_\_\_\_\_ on this, the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Contractor/Principal

ATTEST:

\_\_\_\_\_  
Secretary

By \_\_\_\_\_ (SEAL)

\_\_\_\_\_  
Title

\_\_\_\_\_  
Surety Company

By \_\_\_\_\_ (SEAL)  
Attorney-in-Fact

NOTE:

1. A Statutory Bond is required only in connection with a Contract exceeding one hundred thousand dollars (\$100,000.00) in accordance with K.S.A. 60-1111 as amended.
2. Contractor shall be responsible for seeing to it that this Statutory Bond is filed with the Clerk of the District Court for Johnson County, Kansas.
3. Date on bond must not be prior to date of contract.
4. If Contractor is partnership, all partners should execute bond.
5. Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state of Kansas.
6. Accompany this bond with Attorney-in-Fact's Authority from the surety company certified to include the date of the bond.

This form **must be complete** and accompanied by **the correct filing fee** or the document will **not** be accepted for filing.

THIS SPACE FOR OFFICE USE ONLY.

**1. Individual/entity name**

[Empty box for Individual/entity name]

**2. Appointing authority's mailing address**

Must be a street, rural route, or highway. A P.O. box is unacceptable.

Address			
City	State	Zip	Country

**3. State of formation**

Complete if appointing authority is an entity.

[Empty box for State of formation]

**4. Name of service agent**

Must be a Kansas resident.

[Empty box for Name of service agent]

**5. Service agent address**

Must be a street, rural route, or highway in Kansas. A P.O. box is unacceptable.

Address			
City	State KS	Zip	Country

**6. The following section must be completed in the presence of a notary public.**

Signature of Individual Authorized by Appointing Agent in Question 1

Month Day Year

X

Name of Signer (printed or typed)

Phone Number

Acknowledged before me by

Day of Month Year  
on this of

Signature of Notary

Month Day Year

X

My appointment or commission expires

State

County

AFFIX NOTARY'S SEAL HERE.



**ASA**  
51-15

KANSAS SECRETARY OF STATE  
**Appointment of Service Agent**  
Instructions

The following form **must be complete** and accompanied by **the correct filing fee** or the document will **not** be accepted for filing.

**Kansas Office of the Secretary of State:**

Memorial Hall, 1st Floor (785) 296-4564  
120 S.W. 10th Avenue kssos@sos.ks.gov  
Topeka, KS 66612-1594 www.sos.ks.gov

<input type="checkbox"/> <b>Filing fee</b>	Please submit this form, properly notarized, with the <b>\$35</b> filing fee.
<input type="checkbox"/> <b>Payment</b>	Please enclose a check or money order payable to the Secretary of State. Forms received without the appropriate fee will not be accepted for filing. Please do not send cash. <b>NOTICE:</b> There is a \$25 service fee for all checks returned by your financial institution. Also, to expedite processing, please do not use staples on your documents or to attach checks.
<input type="checkbox"/> <b>Expiration</b>	This appointment expires three years from date of filing.
<input type="checkbox"/> <b>Foreign entities</b>	Nonresident contractors under K.S.A. 16-113 who are foreign corporations, foreign limited partnerships, or foreign limited liability companies qualified to do business and in good standing in Kansas are not required to file this form.

**METCALF AVENUE BRIDGE OVER THE BLUE RIVER (BR-1377)**  
**CARS Project No. 320000947**

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## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

### GC-1 CONTRACT DOCUMENTS/CONTRACT FOR CONSTRUCTION

The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the Contract Documents is to include all construction, labor, materials, tools, equipment and transportation necessary for the workmanlike construction of the Project in accordance with the Contract Documents.

The Contract Documents shall consist of (but not necessarily be limited to) the Agreement between the City and Contractor (sometimes referred to herein as the "Agreement"), these General Conditions, the Project Special Provisions, the Plans, the Specifications, all addenda issued prior to and all modifications issued after execution of the Contract (modifications consisting of written amendments to the Contract signed by both parties, Change Orders, written interpretations issued by the Consulting Engineer, written orders for minor changes in the Work issued by the Consulting Engineer and changes in the Work identified in Article GC-25), drawings and data which may be furnished by the Contractor and approved by the City, additional drawings which may be furnished by the Architect/Engineer which the Consulting Engineer deems necessary to make clear the intent of the Contract Documents (and, in particular, the Specifications), and the Bidding Documents. It is understood that the Work shall be carried out and the Project shall be constructed fully in accordance with the Contract Documents.

It is expressly understood and agreed that the bound volume of Contract Documents, any plans, schedules and other drawings herein referred to, and data which may be furnished by the Engineer as are necessary to make clear the intent of the Specifications and Plans, are each and all included in this Contract and the Work shall be done fully in accordance therewith.

If there is any conflict or discrepancy between the Agreement between the City and Contractor and these General Conditions or between the Agreement between City and Contractor and any other of the Contract Documents, the Agreement between City and Contractor shall prevail. If there is any discrepancy between the General Conditions and any other Contract Documents other than the Agreement between City and Contractor, the General Conditions shall prevail, unless such discrepancy is between the General Conditions and the Project Special Provisions, if any, in which case the Project Special Provisions shall prevail. The Contract Documents supersede all previous agreements and understandings between the parties, which previous agreements and understandings are of no further force and effect.

The Contract Documents as enumerated herein form the Contract for construction. The Contract may not be amended or modified except by a modification as hereinabove defined. These Contract Documents do not, nor shall they be construed to, create any contractual relationship of any kind between the City and any Subcontractor or remote tier Subcontractor.

All time limits stated in the Contract Documents are of the essence of the Contract.

### GC-2 DEFINITIONS

Whenever any word or expression defined herein, or pronoun used in its stead, occurs in these Contract Documents, it shall have and is mutually understood to have the meaning herein given. Work described in words which so applied have a well-known technical or trade meaning shall be held to refer to such recognized standards.

1. "Bid" shall mean the offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed (and the City reserves the right to reject any and all bids).

2. "Bidder" shall mean any individual, partnership, corporation, association or other entity submitting a Bid for the Work.

3. "Bidding Documents" shall mean all documents related to a Bidder's submitting a Bid, including, but not limited to, the advertisement for Bids, if applicable, Instructions to Bidders, the Bid form, other sample bidding and contract forms and the proposed Contract Documents, including any addenda issued prior to receipt of Bids. At the City's option, Bidders may be required to complete and submit a prequalification statement.

4. "Bonds" shall mean the Bid, Performance, Maintenance, and Statutory or Labor and Material Payment Bond, together with such other instruments of security as may be required by the Contract Documents.

5. "Change Order" is a written order issued after the Agreement is executed by which the City, the Consulting Engineer and the Contractor agree to construct additional items of work, to modify the Contract Time, or, in lump sum contracts, to change the character and scope of Work shown on the Contract Plans, or as otherwise provided in Article GC-25. Change Orders must be signed by the City and the Contractor to be binding.

6. "City" shall mean the City of Overland Park, Kansas.

7. "Consultant" or "Consulting Engineer" shall mean the individual, firm or entity designated in the Contract Documents which has been employed by the City for the performance of professional engineering services in connection with the Project; or shall mean the City if the City acts as its own Engineer.

8. "Contract" and "Contract Documents" shall have the meaning ascribed to them in Article GC-1, such terms sometimes being used interchangeably.

9. "Contract Price" shall be the amount identified in the Agreement between City and Contractor as the total amount due Contractor for total completion of the Work as per the Contract Documents. Where the Contract provides that all or a part of the Work is to be Unit Price Work the Contract Price shall initially be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work multiplied by the estimated quantity of each item required for the Work. It is understood and agreed that estimated quantities of items for Unit Price Work are not guaranteed and are solely for the purpose of comparison of bids and determining an initial Contract Price. Determinations of actual quantities and classifications of Unit Price Work shall be made by the Consulting Engineer. Each unit price shall be deemed to include Contractor's overhead and profit for each separately identified item.

10. "Contract Time" shall be the number of calendar days stated in the Contract Documents for the completion of the Work or shall be a date certain if so designated in the Contract Documents.

11. "Contractor" shall mean the entity entering into the Contract for the performance of the Work covered by this Contract, together with its duly authorized agents or legal representatives. (For purposes of indemnification, see GC-33 for definition of "Contractor".)

12. "Defective Work" shall mean Work which is unsatisfactory, faulty or deficient, or not in conformity with the Contract Documents. It shall also include Work damaged prior to approval of final payment unless responsibility for such damage shall have been expressly assumed by the City at substantial completion.

13. "Effective Date of the Agreement" shall mean the date indicated in the Agreement on which it becomes effective, but, if no such date is indicated, it shall mean the date on which the Agreement is signed and delivered by the City to the Contractor. For this purpose, delivery shall be accomplished by either hand-delivery to the Contractor or placing a copy in the mail, first class, postage prepaid.

14. "Field Order" shall mean a written order issued by the Consulting Engineer which orders minor changes in the Work in accordance with Article GC-25 but which does not involve a change in the Contract Price or Contract Time.

15. "Final Acceptance" shall mean the date when the Consulting Engineer accepts in writing that the construction of the Project is complete in accordance with the Contract Documents such that the entire project can be utilized for the purposes for which it is intended and Contractor is entitled to final payment.

16. "General Requirements" shall mean those provisions of the Specifications which apply to the entire Work.

17. "Inspector" shall mean the engineering or technical inspector or inspectors duly authorized by the Consulting Engineer or the City.

18. "Notice of Award" shall mean the written notice by the City to the apparent successful Bidder stating that upon compliance with the conditions precedent enumerated therein, within the time specified, the City will sign and deliver the Agreement.

19. "Notice to Proceed" shall mean the written notice by the City to the Contractor fixing the date on which the Contract Time is to commence and on which the Contractor shall start to perform its obligations under the Contract Documents. Without the prior express written consent of the City, Contractor shall do no Work until the date set forth in the Notice to Proceed.

20. "Partial Utilization" shall mean placing a portion of the Work to be provided under the Contract Documents to the use intended by the City.

21. "Pay Estimate No. \_\_\_\_\_" or "Final Pay Estimate" shall mean the form to be used by the Contractor in requesting progress and final payments, including supporting documentation required by the Contract Documents.

22. "Plans" or "the Plans" shall mean and include all drawings which may have been prepared by the City and/or the Consulting Engineer on the City's behalf as a basis for Bids, all drawings (other than Shop Drawings, as defined in Definition No. 23, below.) submitted by the successful Bidder with its Bid or by the Contractor to the City, if and when approved by the Consulting Engineer, and all drawings submitted by the City to the Contractor during the progress of the Work, all of which show the character and scope of the Work to be performed.

23. "Shop Drawings" shall mean all drawings, diagrams, illustrations, schedules and other data which are specifically prepared by the Contractor, a Subcontractor, manufacturer, fabricator, supplier or distributor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information

prepared by a manufacturer, fabricator, supplier or distributor and submitted by the Contractor to illustrate material or equipment for some portion of the Work.

24. "Specifications" shall mean those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction methods, standards and workmanship as applied to the Work and certain administrative details applicable thereto. They may include, but not necessarily be limited to:

- (1) design specifications, e.g. measurements, tolerances, materials, inspection requirements and other information relative to the Work;
- (2) performance specifications, e.g., performance characteristics required, if any;
- (3) purchase description specifications, e.g. products or equipment required by manufacturer, trade name and/or type; provided, however, equivalent alternatives (including aesthetics, warranty and manufacturer reputation) may be substituted upon written request and written approval therefore by the City in accordance with Article GC-61;
- (4) such other information deemed appropriate by the City for inclusion in the Specifications for the proper construction of the Project.

25. "Subcontractor" shall mean an individual, firm or corporation having a direct contract with the Contractor or with another Subcontractor for the performance of a part of the Work.

26. "The Work" or "The Project" (used interchangeably) shall mean the work to be done necessary to complete the construction required of the Contractor by the Contract Documents, and includes all construction, labor, materials, tools, equipment and transportation necessary to produce such construction in accordance with the Contract Documents.

27. "Underground Facilities" shall mean all pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish services or materials including, but not limited to, electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

28. "Unit Price Work" shall mean Work to be paid for on the basis of unit prices (quantity variations).

29. Whenever in these Contract Documents the words "as ordered," "as directed," "as required," "as permitted," "as allowed," or words or phrases of like import are used, it is understood that the order, direction, requirement, permission or allowance of the City and/or the Consulting Engineer is intended.

30. Whenever any statement is made in the Contract Documents containing the expression "it is understood and agreed," or an expression of like import, such expression means the mutual understanding and agreement of the parties hereto.

31. The words "approved," "reasonable," "suitable," "acceptable," "properly," "satisfactory," or words of like effect in import, unless otherwise particularly specified herein, shall

mean approved, reasonable, suitable, acceptable, proper or satisfactory in the judgment of the City and/or the Consulting Engineer.

### GC-3 DEFECTS IN CONTRACT DOCUMENTS

If Contractor has reasonable cause such that it should, in the exercise of ordinary care of someone in its position, know that any errors, omissions, discrepancies or inconsistencies (hereinafter "defects") appear in the Contract Documents, including, but not limited to, the Plans, Specifications and other documents or the Work, Contractor shall, notify the Consulting Engineer in writing of such defects. Contractor shall remedy any such defects whether or not disclosed to the Consulting Engineer without any increase in the cost of the Work. The Contract Documents shall be appended to all contracts between the Contractor and any Subcontractor or any more remote tier Subcontractor, and such Subcontractors and remote tier Subcontractors shall, likewise, notify the Contractor in writing of any defects therein, and it shall be the obligation of the Contractor to remedy same as if Contractor had discovered such defects itself. The Contractor will not be permitted to take advantage of any such defect.

### GC-4 BID

The Contractor acknowledges and agrees that the unit prices and/or lump sum prices shown in the Bid contemplate the construction of all facilities, complete, and in conformance with the Plans and Specifications. Any item or items required in construction for which a specific unit price and/or lump sum price is not provided shall be included in the price for the closest applicable items.

### GC-5 COPIES OF THE CONTRACT

Unless otherwise provided in the Contract Documents, City will furnish to Contractor a maximum of five (5) copies of the Contract Documents, free of charge, necessary for the execution of the Work.

Sufficient copies of the Bidding Documents, Bonds and Agreement between City and Contractor shall be prepared, each containing an exact copy of the Contractor's Bid as submitted, the Bonds properly executed and the Contract signed by both parties hereto. These executed counterparts shall be filed with the City, Contractor and the surety company executing the Bonds. The original Bid submitted by the Contractor will be retained by the City.

Contractor shall keep, and make available to City at the Project site, one copy of all Contract Documents for the Work at the Project site, in good order and legibly marked to reflect actual construction. Contractor shall also maintain at the site all approved samples and a print of all approved Shop Drawings. Such Documents, samples and Shop Drawings shall be turned over to the City at the completion of the Work if requested by the City.

Contract Documents are the property of the City, and none of the Contract Documents are to be used on other work by Contractor. At City's request, all Contract Documents shall be returned to the City with the exception of one record set for Contractor. All models and calculations are the property of City.

### GC-6 SCOPE, NATURE AND INTENT OF PLANS AND SPECIFICATIONS

The Plans and Specifications are intended to complement, but not necessarily duplicate each other. Together they shall constitute one complete set of the Plans and Specifications, and any Work exhibited in one but not in the other shall be executed just as if it had been set forth in



both in order that the Work shall be completed according to the complete design or designs as decided and determined by the Consulting Engineer.

Should anything be omitted from the Plans and Specifications which is necessary to a clear understanding of the Work, or should it appear that various instructions are in conflict, or in the event the Plans and Specifications are silent as to any detail, then it shall be the duty of the Contractor to secure written instructions from the Consulting Engineer before proceeding with the construction affected by such omissions, discrepancies or silence. In accordance with Article GC-3, Contractor's failure to bring any such matter to the attention of the Consulting Engineer shall be at the Contractor's peril, and there shall be no compensation for extra work necessitated thereby.

Dimensions and elevations shown on the Plans shall be accurately followed, even though they may differ from scaled measurements. No Work shown on the Plans, the dimensions of which are not indicated, shall be executed until the required dimensions have been obtained from the Consulting Engineer. Contractor shall be responsible for verification of all locations, dimensions and elevations in the field (including, but not limited to verification of location of Underground Facilities and utilities) and shall verify all field dimensions shown on the Contract Documents.

All Work performed under this Contract shall be done to the lines, grades, and elevations shown on the Plans. The Contractor shall keep the Consulting Engineer informed, a reasonable time in advance of the times and places at which it wishes to do Work, in order that lines and grades may be furnished and necessary measurements for record and payment may be made with the minimum of inconvenience and delay to the Consulting Engineer and the Contractor.

Any Work done without being properly located and established by base lines, offset stakes, bench marks, or other basic reference points may be ordered removed and replaced at the Contractor's cost and expense.

Contractor, together with its Subcontractors, shall carefully examine the Plans and Specifications for any interferences with the Work and clearances that may be required. Contractor shall be responsible for the proper fitting of materials and equipment without substantial alterations. Contractor shall be responsible for eliminating interferences without additional cost to City. If departures from the Plans and Specifications, or other Contract Documents, are deemed necessary by Contractor, details of such departures and reasons therefore shall be submitted to Consulting Engineer, with drawings (if Consulting Engineer determines that drawings are necessary), for approval as soon as practical. No such departure shall be made except at the peril of the Contractor without the prior written approval of the Consulting Engineer.

#### GC-7 BEGINNING, PROGRESS AND TIME OF COMPLETION OF WORK

After being awarded the Contract, the Contractor shall immediately prepare and submit for approval by the City Engineer a construction schedule giving the dates on which it expects to start and to complete separate portions of the Work, which schedule shall be strictly adhered to unless agreed to in writing by all parties or modified by any extension or extensions of time as hereinafter provided. The schedule shall be submitted before the Notice to Proceed is issued. No Work on this Contract shall begin until said schedule is approved. The City reserves the right to adjust the Contractor's schedule to coordinate with any other projects in the same area.

The Contractor shall, within ten (10) days after being instructed to do so in the written "Notice to Proceed" from the City, commence the Work to be done under this Contract; and the rate of progress shall be such that the Work shall have been completed in accordance with the terms of the Contract on or before the termination of the construction period contractually specified, subject to any extension or extensions of such time made as hereinafter provided.

The Contractor shall submit monthly progress reports and schedules. The progress report shall summarize Work completed, identify any weather and/or utility delays encountered, and indicate Work anticipated for the upcoming month. The schedule will be detailed indicating how the remaining Work will be completed within the stated deadlines (the remaining Work shall include identifying/incorporating utility relocation work with the project-related construction work). The progress report and schedule will be required before payment of monthly pay estimates.

If requested, a weekly construction schedule shall be submitted to the City and approved by the City Engineer. Modifications and/or revisions to the schedule shall have twenty-four (24) hour notice with approval by the City Engineer.

#### GC-8 SHOP DRAWINGS

Contractor shall review, approve, and submit, with such promptness as to cause no delay in its own Work or in that of any Subcontractor or other Contractor, three (3) copies of all shop, fabrication, assembly, foundation and other drawings and schedules required by the Specifications, including, but not limited to: (1) drawings of equipment and devices offered by the Contractor for approval of the Consulting Engineer in sufficient detail to adequately show the construction and operation thereof; (2) drawings showing essential details of any change in design of construction proposed, for consideration by the Consulting Engineer, by the Contractor in lieu of the design or arrangement required by the Contract Documents, or any item of extra work there under; (3) all required wiring and piping layouts; and (4) structural and reinforcing fabrication drawings. All submittals, regardless of origin, shall be stamped with the approval of the Contractor and identified with the name and number of this Contract, Contractor's name and references to applicable specification paragraphs and Contract drawings. Each submittal shall indicate the intended use of the item in the Work. Contractor's stamp of approval is representation to the Consulting Engineer, that the Contractor accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, and similar data, and that he has reviewed or coordinated each submittal with the requirements of the Work and the Contract Documents. All deviations from the Contract Documents shall be identified on each submittal and shall be tabulated in the Contractor's letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of each deviation).

The Consulting Engineer shall review the Shop Drawings for conformance with the design concept of the Work and information as given in the Contract Documents. The Contractor is not relieved of responsibility for any deviation from the requirements of the Contract Documents by the Consulting Engineer's approval of the Shop Drawings, product data, or samples. The Contractor is not relieved from responsibility for errors or omissions in Shop Drawings by the Engineer's approval thereof. The Consulting Engineer shall respond to, accept or reject such submissions within a reasonable time after receipt thereof. Contractor shall make such revisions as deemed necessary. On Final Acceptance, the Consulting Engineer shall be furnished with a total of five (5) copies of each drawing as finally approved, such number to include any copies of preliminary or revised drawings which are approved as submitted. No Work shall be performed in connection with the fabrication or manufacture of material or equipment shown by any drawing thereof, nor shall any accessory, appurtenance or device not fabricated or manufactured by the Contractor or its Subcontractors be purchased, until the drawing or drawings therefore have been approved as stipulated, except at the Contractor's own risk and responsibility.

#### GC-9 CONTRACTOR'S RESPONSIBILITIES AS TO AMBIGUITIES

If there is any ambiguity in Consulting Engineer's drawings or instructions, Contractor shall ask the Consulting Engineer for clarification. Upon written request of Contractor, the Consulting Engineer shall furnish, with reasonable promptness, additional instructions by means of drawings, Specifications or other information necessary for the proper execution of the Work. The Work shall be executed in conformity therewith, and, in accordance with Article GC-3, Contractor shall do no Work without proper instructions except at its peril. Nothing herein to the contrary shall affect Contractor's responsibilities with regard to defects as set forth in Article GC-3.

#### GC-10 CONCEALED CONDITIONS

The Contractor understands that the City does not warrant that the various and sundry materials and information, including, for example, soil tests, bore reports, utility locations and other such data and as-builts in the case of renovation of or addition to existing facilities, reflect actual conditions. The Contractor warrants that it has examined the site and conducted such tests and examinations as it deems necessary. That being the case, should concealed conditions encountered in the performance of the Work below the ground or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the Contract Documents, or should unknown physical conditions below the surface of the ground or should concealed or unknown conditions in an existing structure of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, be encountered, there shall be no adjustment in the Contract Price for any extra work necessitated thereby, although, if necessary, the Contract Time may be adjusted.

#### GC-11 CONTRACTOR TO FURNISH STAKES AND HELP

The Contractor, unless otherwise instructed, shall stake the Work and shall furnish, without charge, competent people from its force and such tools, stakes, and other materials as required in properly staking out the Work, in making measurements and surveys and in establishing temporary or permanent reference marks in connection with said Work. The stakes furnished for the staking of the Work shall be of such type, size and quality as to be acceptable to the Consulting Engineer.

#### GC-12 PRESERVATION OF MONUMENTS AND STAKES

The Contractor shall carefully preserve all monuments, property corners, bench marks, reference points and stakes, and in case of destruction of the same, will be responsible for proper replacement and for any mistakes or loss of time that may be caused by their unnecessary loss or disturbance. In the event that the loss of stakes, etc., causes a delay in the Work, the Contractor shall have no claim for damages or extensions of time. In the case of any permanent monuments, property corners or bench marks which must of necessity be removed or disturbed in the construction of the Work, the Contractor shall carefully protect and preserve the same until they can be properly referenced for relocation. The Contractor shall furnish at its own expense such materials, surveyors and assistance as are necessary for the proper replacement of monuments, property corners or bench marks that have been moved or destroyed.

#### GC-13 PERMITS AND NOTICES

(a) All permits and licenses shall be secured and paid for by Contractor, unless otherwise specified.

(b) Contractor shall give all notices required by and all Work shall be done in accordance with all applicable federal and state laws, City and County laws and ordinances, building codes and rules and regulations bearing on the conduct of the Work.

(c) Contractor shall notify all affected utilities of the Work and coordinate with the utilities to avoid interruption of utility service and damage to utility lines and property. This notice requirement shall also apply as to the owner/operator of any affected Underground Facility. Any project delay, damages or increase in construction costs due to utility relocation delays shall be at the Contractor's risk.

#### GC-14 GENERAL ADMINISTRATION OF THE CONTRACT

(a) Unless otherwise stipulated, Contractor shall provide and initially pay for all Work (including labor, transportation, tools, equipment, machinery, plant and appliances) necessary in producing the results called for by the Contract Documents.

(b) Unless otherwise specified, all supplies, materials, equipment and other facilities are guaranteed to be new and all Work shall be of good quality and workmanship and free from defects or fault. Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of the Work.

(c) The Contractor shall be solely responsible for and have complete control and charge of construction means, methods, techniques, sequences and procedures, and for safety precautions and programs in connection with the Work. The City shall not be responsible for nor have control or charge over the acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other persons performing any of the Work.

(d) The Contractor shall, in addition to the schedule required by Article GC-7, give to the Consulting Engineer full information in advance as to its plans for carrying on any part of the Work. If at any time before the beginning or during the progress of the Work, any part of the Contractor's plant or equipment or any of its methods of executing the Work, appear to the Consulting Engineer to be unsafe, inefficient or inadequate to ensure the required quality or rate of progress of the Work, the Consulting Engineer may order the Contractor to increase or improve its facilities or methods, and the Contractor shall promptly comply with such orders; but neither compliance with such orders nor failure of the Consulting Engineer to issue such orders shall relieve the Contractor from its obligation to secure the degree of safety, the quality of Work and the rate of progress required by the Contract.

(e) The approval by the Consulting Engineer of any plan, schedule or method of work proposed by the Contractor shall not relieve the Contractor of any responsibility therefore, and such approval shall not be considered as an assumption by the City, or any officer, agent or employee thereof, of any risk or liability, and the Contractor shall have no claim under this Contract on account of the failure or inefficiency of any plan or method so approved. Such approval shall be considered and shall mean that the Consulting Engineer has no objection to the Contractor's use or adoption, at the Contractor's own risk and responsibility, of the plan or method so proposed by the Contractor.

(f) Any plan or method of Work suggested by the Consulting Engineer or the City, to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor, and the Consulting Engineer and the City will assume no responsibility therefor.

#### GC-15 CONTRACTOR'S EMPLOYEES

(a) Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ on the Work any unfit person or anyone not skilled in the Work assigned to him.

(b) Contractor shall be responsible for compliance with all state and federal laws, if applicable, pertaining to wages, hours and benefits for workers employed to carry out the Work.

#### GC-16 SAMPLES

Contractor shall furnish for approval samples if directed by the Consulting Engineer or the Contract Documents. The Work shall be in accordance with approved samples.

#### GC-17 PROTECTION AND MAINTENANCE OF PUBLIC AND PRIVATE PROPERTY; LIABILITY

(a) Contractor shall be solely liable for all damages to the City or the property of the City, to other contractors or other employees of the City, to neighboring premises, or to any private or personal property, due to improper, illegal or negligent conduct of the Contractor, its Subcontractors, employees or agents in and about said Work, or in the execution of the Work. The Contractor shall be liable to the City for any damages, whether property damage or personal injury, occasioned by Contractor's use of any scaffolding, shoring, apparatus, ways, works, machinery, plant or any other process or thing that is required for the Work.

(b) Without in any manner limiting Contractor's responsibilities as provided elsewhere in the Contract Documents, the Contractor shall maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards, and assume full responsibility, for the protection of all public and private property, life, the Work, supplies, materials and equipment on the Project site not yet incorporated in the Work, structures, sewers and utilities both above the ground and Underground Facilities, along, beneath, above, across or near the site or sites of the Work being performed under this Contract, or which are in any manner affected by the prosecution of the Work or the transportation of people or materials in connection therewith.

(c) Protection may include, shoring, bracing, supporting and maintaining all underground pipes, conduits, drains and other underground construction uncovered or otherwise affected by the construction Work performed by Contractor. Barriers shall be kept placed at all times to protect bracing and shoring of the trenches shall be in full accordance with Occupational Safety and Health Standards – Excavations; Final Rule 29 CFR Part 1926. All open trenches and other excavations shall be provided with suitable barriers, signs and lights, at Contractor's expense, such that adequate protection is provided to the public against accident by reason of such open construction. Obstructions such as material piles and equipment shall be provided with similar warning lights and signs. All pavement, surfaces, driveways, curbs, walks, buildings, utility poles, guy wires, and other surface structures affected by construction operations in connection with the performance of the Contract, shall be maintained, and if removed or otherwise damaged, shall be restored to the original condition thereof, as determined and approved by the Engineer. All replacement of such underground construction and surface structures or parts thereof shall be made with new materials conforming to the requirements of these Specifications, or if not specified, as approved by the Engineer, at the Contractor's own expense, unless otherwise provided by the Contract.

(d) Barriers shall be kept placed at all times to protect other than those engaged on or about the Work from accident and the Contractor shall be held responsible for all accidents to persons or property resulting from the acts of Contractor or its employees. Contractor shall give reasonable notice to any affected owner or owners when any property is liable to injury or damage through the performance of the Work and shall make all necessary arrangements with such owner or owners relative to the removal and replacement or protection of such property and/or utilities.

(e) Contractor shall comply with any and all instructions from the Consulting Engineer regarding prevention of accidents, fires or for the elimination of any unsafe practice and shall observe all the applicable recommendations of the National Fire Protection Association Standard No. 241 (or other, later revision) "Standards For Safeguarding Building Construction and Demolition Operations".

(f) Contractor shall post danger signs warning against the hazards created by such features of construction as protruding nails, hood hoists, well holes, elevator hatchways, scaffolding, window openings, stairways, falling materials, open trenches, other excavations, obstructions and similar conditions. It shall designate a responsible member of its organization on the Project whose duty shall be the prevention of accidents. The name and position of the person so designated shall be reported to the Consulting Engineer by Contractor.

(g) In an emergency affecting the safety of life, the Work, City's property or of adjoining property, Contractor, without special instruction or authorization from the Consulting Engineer, is hereby permitted to act, at its discretion, to prevent such threatened injury or loss. Any compensation claimed by Contractor on account of emergency work shall be determined by mutual agreement of City and Contractor.

(h) Contractor shall develop and maintain an up-to-date emergency action plan, taking into account fires, hazardous materials, explosions, adverse weather, floods, etc., which shall be in compliance with all federal, state and local laws and ordinances. The procedures should outline specific action to be taken to protect life and to secure and protect the building materials, constructed work, buildings, equipment and the position of cranes. Contractor shall be fully responsible for the contents of and procedures outlined in said plan, including deficiencies therein, whether or not City shall have reviewed said plan.

(i) Contractor shall be responsible for any damage caused by settlement of backfill placed beneath pavement, street, road, and driveway surfacing, and drainage and other structures beneath yards, parking and parks, which may occur at any time prior to and during a period of two (2) years from and after the date of Final Acceptance of Work covered by the Contract; during such period, the Contractor shall at his own expense, refill all excavations where backfill settlement has occurred, and shall repair or cause to be repaired all damage to structures, pavements, surfacing and sod caused by such settlement, to the satisfaction of the City. Should the Contractor fail to repair settlements, which may occur as described above within thirty (30) days after being given notice thereof, the City shall have the right to repair such settlement and charge the cost of such repairs to the Contractor.

(j) Contractor shall be held responsible for all damage to roads, highways, shoulders, ditches, embankments, bridges, culverts, and other property, caused by the Contractor or any of the Contractor's Subcontractors in hauling or otherwise transporting materials to or from the several sites of Work, regardless of the location of such damage. Contractor shall make arrangements relative to the payment for, or repair or replacement of, such damage or damaged surfaces of structures; said arrangements shall be satisfactory and acceptable to the owner or owners of such damaged surfaces or structures, or to their legally responsible officers, agents or other representatives, and said payment shall be at the Contractor's own cost and expense, unless otherwise provided by the Contract.

(k) All streets, roads, highways and other public thoroughfares which are closed to traffic, under the authority of a proper permit, shall be protected, at Contractor's expense, by means of effective barricades on which shall be placed proper warning signs; such barricades being located at the nearest intersecting public highway or street on each side of the blocked section of such public thoroughfare.

(l) All barricades and obstructions shall be illuminated by means of amber lights at night and all lights used for this purpose shall be at Contractor's expense and shall be kept burning from sunset to sunrise. Materials stored upon or alongside public streets and highways shall be so placed, and the Work at all times shall be so conducted, as to cause the minimum obstruction and inconvenience to the traveling public.

(m) All barricades, signs, lights and other protective devices in public rights-of-way shall be installed and maintained in conformity with applicable statutory requirements and as required by the Manual on Uniform Control Devices, as amended, or any other applicable statutes or ordinances.

#### GC-18 WORK IN OR ACROSS STREET OR HIGHWAY RIGHT-OF-WAY

All Work performed and all preparations of the Contractor or its employees, and Subcontractors, if any, within the limits of street or highway rights-of-way shall be in conformity with the requirements, and be under the control, through the City, of the street or highway authority owning or having jurisdiction and control over such rights-of-way in each case. Any costs incurred to comply with such requirements are the responsibility of Contractor.

#### GC-19 MAINTENANCE OF TRAFFIC

Local traffic on all streets shall be carried through construction whenever possible. Detours of traffic will be permitted when necessary and with the prior permission of the City. Streets may be closed for short periods of time under authority of proper permit issued by the City or authority having jurisdiction. However, the Contractor shall conduct its Work so as to interfere as little as possible with public travel, whether vehicular or pedestrian, on such streets. Proper notification to County and City police units and to Fire Districts shall be given by the Contractor before closing any public thoroughfare.

Where construction operations require the closing of private driveways, the Contractor shall give adequate notice to the owner or owners thereof and where necessary shall provide temporary access to private property.

#### GC-20 NOISE CONTROL

Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

#### GC-21 DUST CONTROL

Adequate precaution shall be taken to insure that excessive dust does not become airborne during construction. The Contractor shall comply with any local, state, or federal regulations which apply to this matter in the geographical area of the Work. No separate payment will be made for performing dust control or for applying water for this purpose.

#### GC-22 INSPECTION OF WORK

(a) Consulting Engineer shall at all times have access to the Work for the observation and inspection thereof wherever it is in preparation or progress, and Contractor shall provide proper

facilities for such inspection. The Contractor shall furnish all reasonable aid and assistance required for any such inspection.

(b) All Work must be inspected, tested or approved and the Contractor shall give the Consulting Engineer timely notice of its readiness for such inspection, testing or approval and the date fixed for such inspection, testing or approval, if the inspection, testing or approval is by an authority other than Consulting Engineer. If any Work should be covered up which is required by the above to be inspected, tested or approved and which, by virtue of being so covered up, is not susceptible to being properly inspected, tested or approved, Contractor shall, if requested by Consulting Engineer, uncover such Work and at Contractor's expense bear the cost of uncovering such Work and redoing same after inspection, testing or approval and redoing such other Work damaged as a result of having to uncover and redo same.

(c) Consulting Engineer reserves the right to inspect any and all Work before it is covered up; and, accordingly, Contractor must notify Consulting Engineer before covering any Work. Consulting Engineer shall be given a reasonable time to make its inspection. Contractor shall not cover any Work prior to Consulting Engineer having a reasonable time to inspect. If Work to be covered does not conform to the Contract Documents, Consulting Engineer can withhold its consent to covering up Work until such Work is made to conform at Contractor's expense.

(d) If any labor, supplies, materials or equipment are found not to be in accordance with the Contract Documents, Contractor shall at its own expense bear the cost of uncovering such labor, supplies, materials or equipment, the cost of removing same, as well as the cost of undoing and redoing the Work and other Work damaged by such nonconforming labor, supplies, materials or equipment.

(e) The Contractor shall comply with the directions and instructions of the Consulting Engineer.

(f) The City, the Consulting Engineer and all designated Inspectors shall be free at all times to perform their duties, including the observation and inspection of the Work, and intimidation or attempted intimidation of any one of them by the Contractor or by any of its employees shall be sufficient reason, if the City so desires, to terminate the Contract.

(g) Any inspection, by whosoever conducted, shall not relieve the Contractor from any obligation to perform the Work strictly in accordance with the Plans and Specifications, and any of the Work not so constructed shall be removed and made good by the Contractor at its own expense.

#### GC-23 SUPERINTENDENCE AND SUPERVISION

The Contractor shall be responsible for coordination between all phases of the Work and provide all necessary supervision to the Work using its best skill, care, judgment and attention and shall keep on the Work, during its progress, a competent superintendent and any necessary assistants, all satisfactory to Consulting Engineer. The Contractor shall coordinate the activities and scheduling of all operations in accordance with the approved schedule. All unsupervised Work shall be unacceptable and subject to removal and replacement at the Contractors expense. The superintendent shall not be changed except with the consent of the Consulting Engineer unless the superintendent proves to be unsatisfactory to the Contractor and/or ceases to be in its employ; provided however, that the Consulting Engineer retains the right to require that the Contractor replace the superintendent at any time, such right not to be arbitrarily exercised.



The superintendent shall be fully authorized to act for the Contractor and receive whatever orders as may be given for the proper prosecution of the Work or notices in connection therewith. Use of Subcontractors on portions of the Work shall not relieve the Contractor of its obligation to have a competent superintendent directly employed by the Contractor on the Work at all times.

#### GC-24 CONTRACTOR'S OFFICE AT SITE OF WORK

During the performance of this Contract, the Contractor shall maintain a suitable office at or near the site of the Work which shall be the headquarters of the superintendent authorized to receive drawings, instructions, or other communications or articles from the Consulting Engineer, and any such communication given to the said superintendent or delivered at the Contractor's office at the site of the Work in his/her absence shall be deemed to have been given to the Contractor.

#### GC-25 CHANGES IN THE WORK

(a) Change Orders. City, without invalidating the Contract, may by Change Order direct changes in the Work which may result in an addition to or deduction from the Contract Price and/or changes in the Contract Time. All Change Orders shall be executed under the provisions of the original Contract Documents. If the Change Order consists of a modification to the Contract Price, the value of such change shall be determined as per paragraph (e) below.

Except for Work done as a result of an emergency endangering life or property, no Work resulting in an additional pay item shall be performed unless pursuant to the provisions of a Change Order.

(b) Quantity Variations. Where changes in the Work involve a change in the quantity of any Bid item, the Contract Price shall be revised by extension of the quantities and unit price of all Bid items so changed subject to written approval of the Consulting Engineer.

(c) Field Orders. Consulting Engineer may order minor changes in the Work through Field Orders, which in no specific, concrete or substantial way increase or decrease the Work; and such minor changes in the Work shall not involve an addition or deduction from the Contract Price.

(d) From time to time the Consulting Engineer may also issue written orders to Contractor for needed clarifications, modifications or corrections. Should a difference of opinion arise as to whether the order constitutes extra work for which additional compensation is due, and the City insists on its performance, the Contractor shall proceed with the Work after making a written request for a Change Order, and it shall keep an accurate account of the actual field cost thereof as provided for in (e)(3) below. The Contractor will thereby preserve the right to submit a claim therefor.

(e) The value of any change in the Work which results in an addition/deletion to the Contract Price shall be determined in one or more of the following ways, at the option of City:

- (1) By agreed lump sum.
- (2) By unit prices named in the Contract or subsequently agreed upon.
- (3) By actual field cost (time and material) plus fifteen percent (15%) and shall include a "Not to Exceed" figure.

In order to arrive at the value for any change, Contractor shall credit City with its projected cost(s), including overhead and fee for any Work which was previously included but which has been excluded by any such change.

(f) No change in the Work shall entail additional time unless the Consulting Engineer determines that additional time is required and specifically so provides in the Change Order. No change in the Work shall entitle the Contractor to delay damages.

(g) Where extra work is performed under (e)(3) above, the term "actual field cost" of such extra work is hereby defined to be and shall include:

- (1) The cost of all workers, such as foremen, timekeepers, mechanics, and laborers, for the time actually employed in the performance of the said extra work;
- (2) All materials and supplies;
- (3) Trucks and rentals on machinery and equipment for the time actually employed or used in the performance of said extra work;
- (4) Any transportation charges necessarily incurred in connection with said equipment authorized by the Consulting Engineer for use on said Work and similar operating expenses;
- (5) All incidental expenses incurred as a direct result of such extra work, including payroll taxes and a ratable proportion of premiums on construction Bonds and, where the premiums therefore are based on payroll costs, public liability and property damage, worker's compensation, and other insurance required by the Contract; provided, however, Contractor must enumerate and justify to City's satisfaction any such claimed incidental expenses; and provided, further, that without in any way limiting City's right to challenge any individual costs claimed by Contractor, incidental costs shall not include:
  - (A) Payroll costs and other compensation of Contractor's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, lawyers, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by Contractor whether at the site or in Contractor's principal or a branch office for general administration of the Work unless specifically agreed to by City - all of which are to be considered administrative costs covered by the Contractor's overhead and profit.
  - (B) Expenses of Contractor's principal and branch offices other than Contractor's office at the site.
  - (C) Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
  - (D) Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the

correction of Defective Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

- (E) Other overhead of general expense costs of any kind and the costs of any item not specifically and expressly agreed to by City.

The Consulting Engineer may direct the form in which accounts of the actual field cost shall be kept and may also specify in writing, before the Work commences, the method of doing the Work and the type and kind of machinery and equipment, if required, which shall be used in the performance of extra work under (e)(3) above. In the event that machinery and heavy construction equipment shall be required for such extra work, the authorization and basis of payment for the use thereof shall be stipulated in the written extra work order.

The fifteen percent (15%) of the actual field cost to be paid to the Contractor shall cover, and be full compensation for, the Contractor's profit, overhead, general superintendence, field office expense and all other elements of cost not embraced within the "actual field cost" as herein defined.

(h) In the event that unit prices are provided for in the Contract Documents as to all or a part of the Work, if the quantities originally contemplated are so changed in a proposed Change Order that application of the agreed unit prices to the quantities of Work proposed is substantially inequitable to either the City or the Contractor, the unit prices shall be reevaluated and adjusted in accordance with the following:

- (1) If the total cost of a particular item of Unit Price Work amounts to twenty percent (20%) or more of the Contract price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than thirty-three percent (33%) from the estimated quantity of such item indicated in the Contract; and
- (2) If there is no corresponding adjustment with respect to any other item of Work; and
- (3) If Contractor has incurred additional expense as a result thereof; or
- (4) If City believes that the quantity variation entitles it to an adjustment in the unit price and, the parties are unable to agree as to effect of any such variations in the quantity of Unit Price Work performed; then either City or Contractor may request the Consulting Engineer to make an adjustment in the Contract price.

(i) No claim for extra work of any kind will be allowed except as provided herein. If extra work orders are given in accordance with the provisions of this Contract, such Work shall be considered a part hereof and subject to each and all of the terms and requirements of this Contract.

(j) Contractor shall be responsible for notifying its surety(ies) of any modifications to the Contract price or time, and said surety(ies) shall not seek discharge as a result of any failure on Contractor's part to notify surety(ies).

#### GC-26 DEDUCTIONS FOR UNCORRECTED WORK

If City deems it inexpedient to have corrected any Work which is not in accordance with the Contract Documents, an equitable deduction from the Contract Price shall be made therefor.

## GC-27 DELAYS AND EXTENSION OF TIME

(a) If Contractor shall be delayed at any time in the progress of the Work by an act or omission of City or by any separate contractor employed by City and over which Contractor has no control and which is not a result of the Contractor's acts or the acts of any of its employees, Subcontractor or suppliers, negligent or otherwise, then the time of completion shall be extended for such reasonable time as the Consulting Engineer shall decide, and no adjustment shall be made in the Contract Price.

(b) No such extension shall be made for delay unless Contractor provides written notice to Consulting Engineer of such delay, the reasons therefore and the expected length of delay within seven (7) days of the commencement of such delay. In the case of a continuing cause of delay, only one claim is necessary.

(c) In executing the Contract, the Contractor expressly covenants and agrees that, in undertaking to complete the Work within the time therein fixed, it has taken into consideration and made allowances for all hindrances and delays incident to such Work, whether growing out of delays in securing materials, workers, weather conditions or otherwise. No charge shall be made by the Contractor for hindrances or delays from any cause during the progress of the Work, or any portion thereof, included in this Contract, except as provided in subparagraph (a), (b), or (d) of this Article.

(d) The Contractor shall delay or suspend the progress of the Work or any part thereof, whenever it shall be so required by written order of the Consulting Engineer, and for such periods of time as the Consulting Engineer shall require; provided, that in the event of such delay or delays or of such suspension or suspensions of the progress of the Work, or any part thereof, the time for completion of Work so suspended or of Work so delayed by such suspension or suspensions shall be extended for a period equivalent to the time lost by reason of such suspension or suspensions; but such order of the Consulting Engineer shall not otherwise modify or invalidate in any way, any of the provisions of this Contract. In the event that the Work shall be stopped by order of the Consulting Engineer, through no fault of the Contractor, its employees, Subcontractors or suppliers, any incidental expenses (see Article GC-25 (g)(5)) which, in the opinion and judgment of the Consulting Engineer, are caused thereby shall be paid by the City to the Contractor; provided, however, that such suspension or suspensions shall not be the basis for any claim by Contractor for additional compensation or damages for delay.

(e) The City reserves the right and may delay Work on certain portions of Work until such time as weather and/or utility relocations will allow proper progress on major items of Work. The City may direct the Contractor to clear the right-of-way before utility relocations, if, in the opinion of the Engineer, such clearing would expedite utility relocation. Also, the City may direct the Contractor to work on certain items of Work after partial utility relocations have been made. There shall be no charge made by the City or the Contractor for delays arising from the issuance of such delayed Work direction other than provided for in paragraphs (a) through (d) in this Article.

## GC-28 WORK STOPPAGES

Contractor warrants to the City that there shall be no work stoppages or interruptions arising out of labor disputes, including, but not limited to, those due to the presence of both union and non-union workforces at the job site. Contractor further agrees that in the event of any strike, picket, sympathy strike, work stoppage or other form of labor dispute or picket in connection with the Work of the Contractor, other contractors, Subcontractors, the City, or any other person, the Contractor will, contingent upon the City providing a picket-free entrance, continue to perform the Work

required herein without interruption or delay. Anything in this Contract to the contrary notwithstanding, in the event the Contractor fails to continue performance of the Work included herein without interruption or delay, because of such picket or other form of labor dispute, the City may terminate the services of said Contractor after giving forty-eight (48) hours written notice to Contractor and its sureties of its intent to do so, or the City may invoke any of the rights set forth elsewhere in the Contract Documents.

#### GC-29 PATENT LIABILITY CLAUSE

Contractor agrees to defend any claim, action or suit that may be brought against City, its Governing Body, officers, agents or employees for infringement of any patents arising out of the performance of this Contract or out of the use or disposal by or for the account of City of supplies furnished or construction Work performed hereunder, and also to indemnify and hold harmless City, its Governing Body, officers, agents, and employees against all judgments, decrees, damages, costs and expenses recovered against it or them or sustained by it or them on account of any such actual or alleged infringement.

It is understood that all royalties and fees for and in connection with patents, or patent infringement, claims for materials, articles, apparatus, devices or equipment used in or furnished for the Work shall be included in the Contract Price. Final payment to the Contractor by the City shall not be made while any suit or claim involving infringement or alleged infringement of any patent remains unsettled.

#### GC-30 INDEPENDENT CONTRACTOR

The right of general supervision of the City and/or the Consulting Engineer shall not make the Contractor an agent of the City, and the liability of the Contractor for all damages to persons, firms and corporations arising from the Contractor's execution of the Work shall not be lessened because of such general supervision, but as to all such persons, firms and corporations, and the damages, if any, to them or their property, the Contractor herein is an independent contractor in respect to the Work.

#### GC-31 SEPARATE CONTRACTS

(a) City reserves the right to perform by itself or let other contracts in connection with Work. Contractor shall afford reasonable opportunity for the introduction and storage of materials and the execution of Work by City or others and shall properly connect and coordinate its Work with the Work of City or others.

(b) If any part of Contractor's Work depends upon the Work of the City or others, Contractor shall inspect and promptly report to City any defects in any such Work that render it unsuitable for proper execution or results. Its failure to so inspect and report shall constitute an acceptance by it of such other Work as fit and proper for the reception of its Work.

#### GC-32 RELATIONS WITH OTHER CONTRACTORS

The Contractor shall cooperate with all other contractors or workers who may be performing Work on behalf of the City or any other entity on any Work in the vicinity of the Work to be done under this Contract, and it shall so conduct its operations as to interfere to the least possible extent with the Work of such Contractors or workers. Contractor shall be responsible for any injury or damages that may be sustained by other contractors, workers or their Work because of any fault or negligence on Contractor's part, and shall at its own expense repair or pay for such injury or damage. Any difference or conflict which may arise between the Contractor and other contractors,

or between the Contractor and the workers of the City or any other entity, in regard to their Work, shall be adjusted and determined by the Consulting Engineer. If the Work of the Contractor is delayed or damaged because of any acts or omissions of any other contractor or contractors, the Contractor shall have no claim against the City on that account; provided, however, the City may, in its discretion, grant an extension of time.

When two or more contracts are being executed at one time in such manner that Work on one Contract may interfere with that on another, the Consulting Engineer shall decide which contractor shall cease Work and which shall continue, whether the Work on both contracts shall progress at the same time, and in what manner the Work is to proceed.

When the territory of one contract is the necessary or convenient means of access for the transportation or movement of men/women, materials or appliances required for the execution of another contract, such privileges of access or any other responsible privilege may be granted by Consulting Engineer to the Contractor so desiring to the extent which may be reasonably necessary.

In the event that Contractor is performing Work at a site or on a project involving City and one or more other private or governmental entities, which have their own contractors on site as well, Contractor shall advise Consulting Engineer when it anticipates that there may be interference with the Contractor's Work or with the Work of any other contractor. Consulting Engineer shall, to the best of its ability, with input from Contractor as to coordination of the Work, seek to schedule Work of the various contractors so as to avoid as much inconvenience and delay as possible; provided, however, that in the event Contractor experiences a delay or damage to the Contractor's Work as a result of the presence of other such contractors, Contractor shall not be entitled to additional compensation or damages for delay or damage to the Contractor's Work; rather, Contractor's only recourse shall be an extension of time to be determined by the Consulting Engineer.

### GC-33 INDEMNITY

#### (a) Definitions

For purposes of indemnification requirements as set forth throughout the Contract, the following terms shall have the meanings set forth below:

- (1) "The Contractor" means and includes Contractor, all of its affiliates and subsidiaries, its Subcontractors and materialmen and their respective servants, agents and employees; and
- (2) "Loss" means any and all loss, damage, liability or expense, of any nature whatsoever, whether incurred as a judgment, settlement, penalty, fine or otherwise (including attorney's fees and the cost of defense), in connection with any action, proceeding, demand or claim, whether real or spurious, for injury, including death, to any person or persons or damages to or loss of, or loss of the use of, property of any person, firm or corporation, including the parties hereto, which arise out of or are connected with, or are claimed to arise out of or be connected with, the performance of this Contract whether arising before or after the completion of the Work required hereunder.

#### (b) The Indemnity

For purposes of this Contract, and without in any way limiting indemnification obligations that may be set forth elsewhere in the Contract, Contractor hereby agrees to indemnify, defend and

hold harmless the City from any and all Loss where Loss is caused or incurred or alleged to be caused or incurred in whole or in part as a result of the negligence or other actionable fault of the Contractor, its employees, agents, Subcontractors and suppliers.

It is agreed as a specific element of consideration of this Contract that this indemnity shall apply notwithstanding the joint, concurring or contributory or comparative fault or negligence of the City or any third party and, further, notwithstanding any theory of law including, but not limited to, a characterization of the City's or any third party's joint, concurring or contributory or comparative fault or negligence as either passive or active in nature.

(c) General Limitation

Nothing in this Article shall be deemed to impose liability on the Contractor to indemnify the City for Loss when the City's negligence or other actionable fault is the sole cause of Loss.

(d) Waiver of Statutory Defenses

With respect to the City's rights as set forth herein, the Contractor expressly waives all statutory defenses, including, but not limited to, those under workers compensation, contribution, comparative fault or similar statutes to the extent said defenses are inconsistent with or would defeat the purposes of this Article.

#### GC-34 PROTECTION OF PROPERTY/LIABILITY

Without in any manner limiting Contractor's responsibilities as provided elsewhere in the Contract Documents, the Contractor shall assume full responsibility for the protection of all public and private property, structures, sewers and utilities, both above the ground and Underground Facilities, along, beneath, above, across or near the site or sites of the Work being performed under this Contract, or which are in any manner affected by the prosecution of the Work or the transportation of men/women or materials in connection therewith. Barriers shall be kept placed at all times to protect persons other than those engaged on or about the Work from accident, and the Contractor will be held responsible for all accidents to persons or property resulting from the acts of Contractor or its employees.

The Contractor shall give reasonable notice to the affected owner or owners when any such property is liable to injury or damage through the performance of the Work and shall make all necessary arrangements with such owner or owners relative to the removal and replacement or protection of such property and/or utilities.

The Contractor shall satisfactorily shore, support and protect any and all structures and all pipes, sewers, drains, conduits and other facilities and shall be responsible for any damage resulting thereto. The Contractor shall not be entitled to any additional time on account of any postponement, interference or delay caused by any such structures and facilities being on the line of the Work, whether they are shown on the Plans or not.

#### GC-35 PROVISION FOR EMERGENCIES

Whenever, in the opinion of the Consulting Engineer, the Contractor has not taken sufficient precaution for the safety of the public or the protection of the Work to be constructed under this Contract, or of adjacent structures or property which may be injured by process of construction, and whenever, in the opinion of the Consulting Engineer, an emergency shall arise and immediate action shall be considered necessary in order to protect property interests and to avoid personal injury and/or death, then the Consulting Engineer, with or without notice to the Contractor, shall,

upon notification to the City, provide suitable protection to the said interests by causing such Work to be done and materials to be furnished at places as the Consulting Engineer may consider necessary and adequate. The cost and expense of such Work and material so furnished shall be borne by the Contractor and, if the same shall not be paid on presentation of the bills therefore, such costs shall be deducted from any amounts due or to become due the Contractor. The performance of such emergency work shall in no way relieve the Contractor of responsibility for damages which may occur during or after such precaution has been duly taken.

#### GC-36 ASSIGNMENT AND SUBLETTING OF CONTRACT

In case the Contractor assigns all, or any part, of the monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due the Contractor shall be subject to all prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract and that no money shall be paid assignee on behalf of the Contractor by the City until such time as the Contractor has discharged its obligations to the City under the Contract. It is expressly understood and agreed that no assignment shall be effective as against the City unless it complies with the foregoing.

The Contractor shall not award subcontracts which total more than sixty percent (60%) of the total Contract Price based upon the unit prices within the Bid submitted to the City by the Contractor and shall self-perform not less than forty percent (40%) of the total Contract Price based upon the unit prices within the Bid submitted to the City by the Contractor. Should any Subcontractor fail to perform in a satisfactory manner, the Work undertaken by such Subcontractor shall be immediately terminated by the Contractor. The Contractor shall be as fully responsible to the City for the acts and omissions of its Subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for the acts and omissions of persons directly employed by it. Approval by the City of any Subcontractor shall not constitute a waiver of any right of the City to reject Defective Work, material or equipment not in compliance with the requirements of the Contract Documents. The Contractor shall not make any substitution for any Subcontractor accepted by the City unless the City so agrees in writing.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the Work of the Subcontractor and to give the Contractor the same power to terminate any subcontract as the City has to terminate the Contractor under any provisions of the Contract Documents.

Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor and the City, nor shall anything contained in the Contract Documents create any obligation on the part of the City to pay to or to see to the payment of any sums due any Subcontractor.

Prior to the City's approval of the Contract Bid, the successful Bidder shall submit to the City Engineer or the City's designated representative for City acceptance a list of the names of all Subcontractors proposed for portions of the Work and shall designate which Work each is to perform.

The City Engineer or the City's designated representative shall, prior to City's approval of the Contract Bid, notify the successful Bidder, in writing, if the City, after due investigation, has reasonable objection to any Subcontractor on such list, and the Contractor shall substitute a Subcontractor acceptable to the City at no additional cost to the City or shall be allowed to withdraw its Bid, and the City shall either rebid the Project or accept the next best lowest and responsible



Bidder. The failure of the City to make objection to a Subcontractor shall constitute an acceptance of such Subcontractor but shall not constitute a waiver of any right of the City to reject Defective Work, material or equipment not in conformance with the requirements of the Contract Documents.

The Contractor shall not make any substitution for any Subcontractor who has been accepted by the City unless the City Engineer or the City's designated representative determines that there is a good cause for doing so. The City's disapproval of any Subcontractor shall not, under any circumstance, be the basis for an increase in the Contract Price or a claim for delay damages.

#### GC-37 DISPUTE RESOLUTION

City and Contractor agree that disputes relative to the Work shall first be addressed by negotiations between the parties. If direct negotiations fail to resolve the dispute, the party initiating the claim that is the basis for the dispute shall be free to take such steps as it deems necessary to protect its interests; provided, however, that notwithstanding any such dispute Contractor shall proceed with the Work as per the Contract Documents as if no dispute existed; and provided further that no dispute will be submitted to arbitration without the City's express written consent.

In order to preserve its rights to dispute a matter hereunder, the complaining party must submit a written notice to the other party setting forth the basis for its complaint within twenty (20) calendar days following receipt of the decision of the Consulting Engineer as to such matter as per Article GC-39. No dispute resolution shall be a condition precedent to any legal action.

#### GC-38 INSURANCE

The Contractor shall secure and maintain through the duration of this Contract insurance (on an occurrence basis unless otherwise agreed to) of such types and in such amounts (but not less than the amounts set forth in Section IB-8 of the Instructions to Bidders) as may be necessary to protect the Contractor and the City and agents of the City against all hazards or risks of Loss as hereinafter specified. The form and limits of such insurance, together with the underwriter thereof in each case, shall be approved by the City, but regardless of such approval it shall be the responsibility of the Contractor to maintain adequate insurance coverage at all times. Failure of the Contractor to maintain adequate coverage shall not relieve it of any contractual responsibility or obligation, including, but not limited to, the indemnification obligation.

Satisfactory certificates of insurance shall be filed with the City prior to Contractor's starting any construction work on this Contract. The certificates shall state that thirty (30) days written notice will be given to the City before any policy covered thereby is changed or cancelled. Failure by the Contractor to furnish the required insurance within the time specified in the Notice of Award of the Contract by the City may, at the City's option, be the basis for the City's exercising its right to terminate the Contract pursuant to Article GC-42.

(a) General Liability - This insurance shall protect the Contractor against all claims arising from the injuries to members of the public or damage to property of others arising out of any act or omission of the Contractor or its agents, employees or Subcontractors. In addition, this policy shall specifically insure the contractual liability assumed by the Contractor under Article GC-33.

The property damage liability coverage shall contain no exclusion relative to blasting, explosion, collapse of buildings or damage to underground property and/or facilities.

The liability limits shall be as stated in the Instructions to Bidders or in the Special Conditions.

(b) Automobile Liability - This insurance shall protect the Contractor against all claims for injuries to members of the public and damage to property of others arising from the use of motor vehicles, and shall cover operation on and off the site of all motor vehicles licensed for highway use, whether they are owned, non-owned or hired.

The liability limits shall be as stated in the Instructions to Bidders or in the Special Conditions.

(c) Worker's Compensation and Employer's Liability - This insurance shall protect the Contractor against all claims under applicable state worker's compensation laws. The Contractor shall also be protected against claims for injury, disease or death of employees which, for any reason, may not fall within the provisions of a worker's compensation law. This policy shall include an "all states" endorsement.

The liability limits shall be as stated in the Instructions to Bidders or in the Special Conditions.

(d) Additional Insurance -

(1) The Contractor shall be required to purchase an Owner's Protective Liability Insurance Policy, issued on an occurrence basis and covering bodily injury (and death) and property damage, naming the City as named insured. The liability limits shall be as stated in the Instructions to Bidders or in the Special Conditions. The original policy shall be placed on file with the City and maintained during the life of the Contract. Such policy shall contain no exclusion relative to any function performed by the City or its employees and agents in connection with the Work.

(2) Additional insurance covering special hazards may be required on certain projects. Such additional insurance requirements shall be as specified in Instructions to Bidders or Special Conditions.

(e) Subcontractors' Insurance - If a part of the Contract is to be sublet, the Contractor shall either:

(1) Cover all Subcontractors in its insurance policies; or

(2) Require each Subcontractor not so covered to secure insurance which will protect Subcontractor and the City against all applicable hazards or risks of loss as and in the minimum amounts designated for the Contractor.

#### GC-39 AUTHORITY AND DUTY OF THE CONSULTING ENGINEER

Unless the City acts as its own Consulting Engineer, the Consulting Engineer is an independent contractor. It is mutually agreed by and between the parties to this Contract that the Consulting Engineer shall observe and inspect all Work included herein (provided, however, that any such observations and inspections shall not alter the rights, responsibilities and obligations of the parties as set forth in Article GC-22). Anything in the Contract Documents to the contrary notwithstanding, in order to prevent delays and disputes, it is further agreed by and between the parties to this Contract that the Consulting Engineer shall in all cases determine the amount and quantities of the several kinds of Work which are to be paid for under this Contract; that Consulting Engineer shall determine all questions relating to the Plans and Specifications for the Project; that

Consulting Engineer shall issue promptly any written clarifications or interpretations of the requirements of the Contract Documents (in the form of drawings or otherwise) which Consulting Engineer may determine are necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents; that Consulting Engineer's decisions and findings shall be a condition precedent to the right of the parties to submit any proper matter and to any rights of the Contractor to receive any money under this Contract; provided, however, that should the Consulting Engineer render any decision or give any direction which, in the opinion of either party hereto, is not in accordance with the meaning and intent of this Contract, either party may file with the other, within twenty (20) days a written objection to the decision or direction so rendered and, by such action, may reserve the right to submit the question so raised as herein provided, except as otherwise provided in Article GC-37. It is the intent of the Contract that there shall be no delay in the execution of the Work, and the decisions or directions of the Consulting Engineer as rendered shall be promptly carried out.

#### GC-40 CORRECTION OF LABOR, ETC. - BEFORE FINAL PAYMENT

At Consulting Engineer's request, Contractor shall, at Contractor's expense, promptly remove from the job site all labor, supplies, materials, equipment and/or other facilities condemned by Consulting Engineer as not in accordance with the Contract Documents, whether incorporated or not; and the Contractor shall, at Contractor's expense, promptly replace and re-execute all labor, supplies, materials, equipment and/or other facilities in accordance therewith and, at Contractor's expense, restore all Work of other Contractors and Subcontractors destroyed or damaged as a result of such removal, replacement and re-execution.

#### GC-41 CORRECTION OF LABOR, ETC. - AFTER FINAL PAYMENT

(a) Contractor guarantees to City that all Work performed under this Contract shall be free from defects in material or workmanship for a period of not less than two (2) full years from the date of final payment by City; provided, however, that whenever any provision of the Contract Documents requires a guarantee for a period in excess of two (2) years to be furnished by Contractor, Contractor shall promptly execute same in writing and shall promptly deliver same to City.

(b) Contractor shall promptly procure from each Subcontractor a written guarantee that all Work performed by such Subcontractor shall be free from defects in material or workmanship for a period of not less than two full (2) years from the date of final payment by City to Contractor and shall promptly deliver same to City; provided, however, that wherever any provision of the Contract Documents requires a guarantee for a period in excess of two (2) years to be furnished by a Subcontractor, Contractor shall promptly procure same in writing from the appropriate Subcontractor and shall promptly deliver same to City.

(c) Whenever any provision of the Contract Documents requires a guarantee for a period in excess of two (2) years, but does not specify who is to give such a guarantee, it shall be given by the Contractor regardless of who is performing the Work for which the guarantee is required. All such guarantees shall be in writing and shall be promptly delivered to City.

(d) The furnishing of guarantees by Subcontractors and materialmen shall not relieve Contractor of its obligations under guarantees required of Contractor under the Contract Documents. In addition to the above guarantees, Contractor will (1) obtain and assign to City all available manufacturers and suppliers warranties; and (2) at City's sole option, assign to City any rights Contractor may have against any Subcontractor and/or supplier for Defective Work, materials or equipment.

(e) Any provision of the Contract Documents to the contrary notwithstanding, all guarantees provided for in the Contract Documents shall begin to run from the date of final payment by City to Contractor.

(f) Neither the issuance of the final certificate, payment nor any provision in the Contract Documents shall relieve the Contractor of responsibility for Work determined by City not to be in accordance with the Contract Documents. If, within two (2) years of the date of final payment to Contractor or within any longer period of time as may be prescribed by applicable law or by the terms of any applicable special warranty required by the Contract Documents, any of the Work is found by City to be defective or not in conformance with the Contract Documents then, at City's request, Contractor shall, at Contractor's expense, promptly remove from the premises all Work determined by the City to be defective or not in accordance with the Contract Documents; and Contractor shall, at Contractor's expense, promptly replace and re-execute all Work in accordance therewith and, at Contractor's expense, restore all Subcontractors' Work and Work of other Contractors and Subcontractors damaged as a result of such removal, replacement and re-execution. City shall with reasonable promptness give notice of any Work condemned by City as not in accordance with the Contract Documents. If, within ten (10) days after the mailing of such notice, the Contractor shall fail or neglect to make, or undertake to make, with due diligence any required repairs or corrections, the City shall make such repairs at Contractor's expense; provided, however, that, in case of an emergency which, in the judgment of City, would cause serious loss, hazard or damage if not corrected immediately, such repairs may be made without prior notice being sent to the Contractor, and Contractor shall nevertheless be liable to the City for the cost thereof.

#### GC-42 RIGHT OF CITY TO TERMINATE CONTRACT

Without in any manner limiting the right of the City to terminate the Contract or declare the Contractor in default thereof for any reason set forth in the Contract Documents, if the Work to be done under this Contract shall be abandoned by the Contractor; or if this Contract shall be assigned by Contractor otherwise than as herein provided; or if the Contractor should be judged as bankrupt; or if a general assignment of its assets should be made for the benefit of its creditors; or if a receiver should be appointed for the Contractor or any of its property; or if at any time the Consulting Engineer shall certify in writing to the City that the performance of the Work under this Contract is being unnecessarily delayed, that the Contractor is violating any of the conditions or covenants of this Contract or the Specifications therefore, that it is executing the same in bad faith or otherwise not in accordance with the terms of said Contract; or if all Bid items of the Project are not completed within the time named for their completion or within the time to which such completion date may be extended; then, in addition to other rights the City may choose to exercise, the City may, at its option, serve written notice upon the Contractor and its surety of City's intention to terminate this Contract, and, unless within five (5) days after the serving of such notice upon the Contractor, a satisfactory arrangement be made for the continuance thereof, this Contract shall cease and terminate. In the event of such termination, the City shall immediately serve notice thereof upon the surety and the Contractor, and the surety shall have the right to take over and complete the Work; provided, however, that if the surety does not commence performance thereof within thirty (30) days from the date of said notice of termination, the City may take over the Work and prosecute same to completion, by contract or otherwise, for the amount and at the expense of the Contractor, and the Contractor and its surety shall be liable to the City for any and all excess cost sustained by the City by reason of such prosecution and completion; and in such event the City may take possession of, and utilize in completing the Work, all such materials, equipment, tools and plant as may be on the site of the Work and necessary therefore. When Contractor's services have been so terminated, such termination shall not affect any rights or remedies of City against

Contractor then existing or which may later accrue. Similarly, any retention or payment of monies due Contractor shall not release Contractor from liability.

City reserves the right, in its sole discretion and for its convenience and without cause or default on the part of Contractor, to terminate the Contract by providing written notice of such termination to Contractor. Upon receipt of such notice from City, Contractor shall: (1) immediately cease all Work; or (2) meet with City and, subject to City's approval, determine what Work shall be required of Contractor in order to bring the Project to a reasonable termination in accordance with the request of City. If City shall terminate for its convenience as herein provided, City shall: (1) compensate Contractor for all purchased materials and actual cost of Work completed to date of termination; and (2) release and indemnify Contractor against any liability Contractor may have to any third parties as the result of any contracts, commitments, purchase orders or any other such liabilities Contractor may have incurred as a result of its obligations under the provisions of the Contract. Contractor agrees that it shall minimize such potential liabilities by, where practical, informing third parties of City's right to terminate and attempting to obtain from such third parties a waiver of any liability in the event of such termination.

Any termination of the Contract for alleged default by Contractor that is ultimately determined to be unjustified shall automatically be deemed a termination for convenience of the City.

#### GC-43 CITY'S RIGHT TO DO WORK

Without otherwise limiting City's rights under the Contract Documents, if Contractor should neglect to prosecute the Work properly or fail to perform any provision of the Contract Documents, City, after three (3) days' written notice to Contractor may, without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due Contractor.

#### GC-44 PAYMENTS

(a) Before the first application for payment, the Contractor shall submit to the Consulting Engineer a schedule of values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Consulting Engineer may require. This schedule, unless objected to by the Consulting Engineer, shall be used only as a basis for the Contractor's applications for payment and does not constitute approval by the Consulting Engineer of the method or performance by the Contractor.

(b) Payment will be made to Contractor monthly from funds available within thirty (30) days of the City's receipt of a proper undisputed pay request from the Contractor on the basis of a duly certified estimate of the value of all labor and materials delivered on the site and accepted by the Consulting Engineer during the preceding month, calculated in proportion to the Contract Price, but to ensure the proper performance of the Contract, ten percent (10%) of the amount of each estimate will be retained until final completion and acceptance of all Work covered by the Contract.

(c) Each payment made to the Contractor shall be on account of the total amount payable to the Contractor by or for the City, and all materials and Work covered by the partial payments made shall therefore become the sole property of the City. This provision shall not be construed as relieving the Contractor from the responsibility imposed by the Contract Documents for the care and protection of materials and Work upon which payments have been made, for the restoration of any damaged Work, or as a waiver of the right of the City to require the fulfillment of all the terms of the Contract. Progress payments in respect to materials will be made only for

materials delivered on the site and accepted by the Consulting Engineer, all calculated in proportion to the Contract Price.

(d) In general, no allowance will be made in estimates for materials delivered on the site and not incorporated in the Work except in case of those items considered by the Consulting Engineer to be major items of considerable magnitude, which will be allowed in estimates on the basis of ninety percent (90%) of invoices, the value calculated in proportion to the Contract Price.

(e) The retained percentages herein provided for are to be retained and held for the sole protection and benefit of the City, and no other person, firm or corporation shall have or assert any lien, claim, right or priority therein, thereon or thereto, or be entitled to receive any part thereof, except as herein expressly provided.

(f) The City shall require at intervals as it shall determine and at any time before final payment is made for the Work specified herein that the Contractor furnish the City with written acknowledgments (to the extent of payment made) by all Subcontractors and vendors who have done work or labor on, or who have furnished materials for, this Project that they have been fully paid in whole or in part by the Contractor for such work or labor done or materials furnished by them. Contractor's failure to furnish said list or to include all such Subcontractors and vendors shall not relieve Contractor or its surety of any obligation assumed under this Contract, nor shall the City's request for such list create any obligation on City's part to verify accuracy. City may require, at its option, lien waivers on forms supplied by City.

(g) The Contractor has, per the Instructions to Bidders, Bid this job net of all sales and compensation taxes. No application for payment shall include any amount for reimbursement of such taxes paid by Contractor resulting from Contractor's failure to use the Project Exemption Certificate for any purchase in connection with the Work. Final payment will not be made to Contractor until the City has received the Project Completion Certification from the Contractor along with a Consent of Surety to Final Payment.

(h) The Contractor shall be responsible for the return and/or exchange of surplus materials, and all credits for returned or exchanged materials shall be first submitted to the Consulting Engineer for approval. Applications for payment shall reflect any such credits, and the Contract Price shall be adjusted as necessary to reflect such credits. Non-returnable excess materials shall be turned over to the City, or, at its option, be removed from the Project site at Contractor's expense.

(i) The acceptance by the Contractor of final payment shall be and shall operate as a release to the City of all claims and all liability to the Contractor other than written claims in stated amounts as may be specifically excepted by the Contractor for all things done or furnished in connection with this Contract and for every act and neglect of the City and others relating to or arising out of this Contract. Any payment, however, final or otherwise, shall not release the Contractor or its sureties from any obligations under the Contract Documents, the Bonds, or insurance coverage's.

#### GC-45 PAYMENTS WITHHELD

City may withhold or, on account of subsequently discovered evidence, nullify the whole or a part of any application for payment to the extent necessary to protect City from loss on account of:

(a) Incomplete Work or Defective Work not remedied;

- (b) A reasonable doubt that the Work can be completed for the balance of the Contract Price then unpaid;
- (c) Damage to City; or
- (d) A breach of this Contract.

**GC-46 LIQUIDATED DAMAGES**

It is mutually understood and agreed by and between the parties to this Contract that time is of the essence of this Contract, and that in the event that the Contractor shall fail in the performance of the Work specified and required to be performed within the period of time stipulated therefore in the Contract, after due allowance for any extension or extensions of time which may be granted under the Contract, the said Contractor shall pay to City, as stipulated liquidated damages and not as a penalty, the sum stipulated herein for each and every day that the Contractor shall be in default.

In the case of joint responsibility for any delay in the final completion of the Work covered by this Contract, where two or more separate contracts are in force at the same time and cover work on the same project and at the same site, the total amount of liquidated damages assessed against all contractors under such contracts, for any one day of delay in the final completion of the Work will not be greater than the approximate total of the damages sustained by the City by reason of such delay in completion of the Work as set forth in the table below, and the amount assessed against any one contractor for such one day of delay will be based upon the individual responsibility of such contractor for the aforesaid delay as determined by, and in the judgment of, the City.

In case of failure on the part of the Contractor to effect completion within the time specified, the City shall have the right to deduct from the total compensation otherwise due the Contractor as liquidated damages based on the full Bid price of the Contract, fixed and agreed to in advance, an amount according to the following schedule:

<u>Contract Amount</u>		<u>Liquidated Damages</u>
\$0	to \$50,000	\$250.00
\$50,000	to \$100,000	\$400.00
\$100,000	to \$500,000	\$800.00
\$500,000	to \$1,000,000	\$1,000.00
\$1,000,000	to \$2,000,000	\$1,750.00
\$2,000,000	to \$5,000,000	\$2,500.00
\$5,000,000	to \$10,000,000	\$3,500.00
\$10,000,000	to \$20,000,000	\$5,500.00
\$20,000,000	and up	\$6,000.00

for each twenty-four (24) hour calendar day, including weekends and holidays, the Work remains incomplete over the specified completion time. **(THE CITY RESERVES THE RIGHT TO ADJUST THE SCHEDULE OF LIQUIDATED DAMAGES, PRIOR TO ADVERTISING FOR BIDS, BASED ON THE SCOPE AND URGENCY OF THE PROJECT.)**

The City shall have the right to deduct said liquidated damages from any moneys in its hands, otherwise due or to come due, to the Contractor, or to sue for and recover compensation for damages for nonperformance of this Contract.

#### GC-47 BONDS

Contractor shall after Notice of Award furnish City the Performance, Maintenance, and Statutory or Labor and Material Payment Bond as required by the Instructions to Bidders. Failure to furnish such Bonds within the time specified in the Notice of Award may, at the City's option, be the basis for declaring Contractor in default and pursuing such legal rights as the City deems in its best interest, including, but not limited to, enforcement of the City's rights as to Bid security.

#### GC-48 EASEMENTS AND RIGHTS-OF-WAY

Permanent and temporary (construction) easements and rights-of-way will be provided by the City as shown on the Plans. The Contractor shall confine its operations to the easements provided and shall carefully note where buildings, structures or other obstructions will limit its working space. In the event that easements and rights-of-way are not available or if they have not been secured, or if entry to property is denied by court order, injunction, litigation or any other reason, the Contractor shall cease operations in such area and confine its Work to other areas approved by the City. In the event of any delay arising from delays in securing easements and rights-of-way, the Contractor shall have no claim against the City for damages arising from such delay but may request an extension of time under Article GC-27.

#### GC-49 UNDERGROUND FACILITIES AND UTILITIES

Underground Facilities and utilities, including sewer, water, gas, sprinkler systems, etc. damaged by the Contractor within or outside the right-of-way shall be restored at the Contractor's expense and at no cost to the City. The Contractor shall make every effort to locate these lines and protect them.

#### GC-50 USE OF PREMISES

(a) Contractor shall confine its operations to limits indicated by law, ordinances, rules, regulations, permits of City or directions of Consulting Engineer and shall not unreasonably encumber the premises and/or site.

(b) Contractor shall not load or permit any part of any structure, streets or highways to be loaded with a weight that exceeds load limits which will endanger their safety.

(c) Contractor shall comply with federal, state and local laws and ordinances, as well as any specific instructions regarding signs, advertisements, fires and smoking from Consulting Engineer.

(d) A laydown area or staging area will be provided at the site and shall be chosen by Consulting Engineer. Contractor will furnish its own weather protection if required.

(e) No City equipment will be taken out of service or put into service without approval of City.

#### GC-51 ALLOWANCES

Contractor agrees that the Contract Price includes all allowances required by the Contract Documents. Contractor declares that the Contract Price includes all other sums for expenses and overhead and fee on account of allowances as it deems proper. No demand for expenses or overhead and fee other than those included in the Contract Price shall be allowed.



#### GC-52 CUTTING, PATCHING AND DIGGING

(a) Contractor shall do all cutting, fitting or patching of its Work that may be required to make its several parts come together properly and fit it to receive or be received by Work of others shown upon or reasonably implied by the Contract Documents.

(b) Contractor shall not endanger any property of City or any other individual or entity, or the Work by cutting, digging or otherwise and shall not cut or alter the work of others except with the written consent of City.

(c) Contractor shall assume responsibility for the patching or repairs, by the proper trade, of damages caused by Work under this Contract.

(d) Contractor shall comply with all local ordinances dealing with cutting, patching and digging and shall obtain all necessary permits.

#### GC-53 CLEANING UP

Contractor shall at all times keep the premises/site free from accumulations of waste material or rubbish caused by its employees or Work; and at the completion of the daily Work it shall remove all its rubbish from and about the premises/site and all its tools, scaffolding and surplus materials, and shall leave its Work "broom clean" or its equivalent unless more exactly specified. In case of dispute, City may remove the rubbish and charge the cost to Contractor.

#### GC-54 TEMPORARY FACILITIES

(a) Except where special permission has been granted by City to use existing toilet facilities belonging to City, Contractor shall provide and maintain sanitary temporary toilet facilities located where directed by Consulting Engineer for accommodation of all persons engaged on the Work. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each twenty workers. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

Temporary toilets shall be enclosed and weatherproof and kept in sanitary and approved condition at all times. After use for same has ceased, Contractor shall remove the temporary toilet facilities from City's premises and disinfect and fill any vaults.

(b) Contractor shall provide and maintain any necessary temporary offices, storerooms, roadways, etc., as may be required for its Work. Same shall be located and constructed in an approved manner acceptable to Consulting Engineer. Upon completion of Work or when requested by Consulting Engineer, Contractor shall remove same from City's premises and leave the area in a clean and orderly condition.

(c) Contractor shall provide and maintain temporary heat as required to protect all Work and material against injury from dampness and/or cold to the satisfaction of Consulting Engineer.

(d) Unless otherwise specified in the Contract Documents, Contractor shall provide, at its cost and expense, temporary power, wiring and lights from City's provided source as may be required for its operations.

#### GC-55 SANITARY REGULATIONS AND WATER

The operations of the Contractor shall be in full conformity with all of the rules and regulations of boards and bodies having jurisdiction with respect to sanitation. The Contractor shall supply safe and sufficient drinking water to all of its employees. The Contractor shall obey and enforce all sanitary regulations and orders, and shall take precautions against infectious diseases and the spread of same.

All water used in the course of the Work shall be hauled in or purchased from the local water company's distribution system at the Contractor's own cost and expense.

#### GC-56 COMPLIANCE WITH LAWS

The Contractor shall be fully familiar with all City, county, state and federal laws, ordinances or regulations which would in any way control the actions or operations of those engaged in the Work under this Contract or which would affect the materials supplied to or by them. It shall at all times observe and comply with all ordinances, laws and regulations and shall protect and indemnify and defend the City and the City's officers and agents against any claims or liability arising from or based on any violation of same.

#### GC-57 UNFAVORABLE CONSTRUCTION CONDITIONS

During unfavorable weather, or other unfavorable conditions for construction operations, the Contractor shall pursue only such portions of the Work as will not be damaged thereby. No portions of the Work, the satisfactory quality or efficiency of which will be affected by any unfavorable conditions, shall be constructed while these conditions exist, unless, by special means or precautions approved by the Consulting Engineer, the Contractor shall be able to perform the Work in a proper and satisfactory manner.

#### GC-58 CONTRACTOR'S RISK

The Contractor shall assume full responsibility for the Work and shall bear any loss and repair any damage at his/her own cost occasioned by neglect, accident, vandalism or natural cause, whether foreseen or unforeseen, during the progress of the Work and until the Work is completed and accepted by the City.

#### GC-59 SAFETY RULES

(a) Contractor shall be responsible for enforcing safety rules to ensure protection of the employees and property of City, to assure uninterrupted production and to assure safe working conditions for Contractor and Subcontractors and their employees and to assure the safety of the general public. In addition to any other rights the City might exercise, Contractor and/or any Subcontractor failing to follow safety rules shall be subject to eviction from the job site and may be refused reentry.

(b) Contractor is expected to establish and enforce a comprehensive safety program on this Project for the protection of its personnel, its Subcontractors' personnel, City's employees and all other persons exposed to hazards resulting from Contractor's operations. As a minimum requirement, Contractor shall review and discuss the details of its program with Consulting Engineer at the first project meeting. The items to be covered shall include, but not necessarily be limited to,

- (1) Personal protective equipment;

- (2) First aid - personnel and facilities;
- (3) Arrangements for medical attention;
- (4) Sanitary facilities;
- (5) Fire protection;
- (6) Signs, signals and barricades;
- (7) Security regulations;
- (8) Safety inspections;
- (9) Designation of persons responsible for the program;
- (10) Reporting forms and procedures;
- (11) Material handling and storage;
- (12) Lines of communication;
- (13) Determination of potential hazards;
- (14) Personnel safety meetings and education;
- (15) Access to work areas;
- (16) Subcontractors involvement in the program;
- (17) Inspections and corrective action.

Contractor is fully responsible for the safety program and any and all methods and procedures provided for therein whether or not City or Consulting Engineer shall have reviewed and/or accepted such program.

#### GC-60 WEEKENDS, HOLIDAY AND NIGHT WORK

No Work shall be done between the hours of 6:00 p.m. and 7:00 a.m., nor on weekends or City holidays, without the written approval or permission of the City forty-eight (48) hours in advance in each case, except such Work as may be necessary for the proper care, maintenance and protection of Work already done or of equipment, or in the case of an emergency.

Night Work may be established by the Contractor, as a regular procedure, with the written permission of the City; such permission, however, may be revoked at any time by the City.

#### GC-61 APPROVAL OF EQUALS

"Approved Equals," where permitted by the Contract Documents or otherwise made feasible by market conditions, shall be considered for approval as follows:

(a) Contractor shall notify City in writing if it wishes to use an approved equal specifically named in the Contract Documents.

(b) If Contractor desires to use an "equal" not specifically named in the Contract Documents, it must first inform City and receive written approval for such substitutions. City has no obligation to approve such request and is not responsible for any delay or cost incurred caused by Contractor's making such request.

The Contractor shall be solely responsible for design risks, delays and other claims arising out of any approved alternates.

#### GC-62 TEST OF MATERIALS OFFERED BY CONTRACTOR

All specified and required tests for approval of material shall be made at the expense of the Contractor by a properly equipped laboratory of established reputation, whose work and testing facilities shall be approved by the Consulting Engineer. Approval of materials based on acceptable tests will apply only while such materials as furnished equal or exceed the tested samples or test

specimens in quality and minimum requirements. Any change in origin, method of preparation or manufacture of such materials will require new tests and approval thereof. Reports of all tests shall be furnished to the Consulting Engineer in as many certified counterparts as may be required by the Consulting Engineer.

#### GC-63 TESTING OF COMPLETED WORK

Before Final Acceptance, all installed and constructed equipment, devices and other work which is to be tested under the Contract Documents shall be tested and each part shall be in good condition and working order or shall be placed in such condition and order at the expense of the Contractor. All tests of such completed Work required under this Contract shall be made under the direction of the Consulting Engineer.

#### GC-64 BORROW AND WASTE AREAS

All borrow materials shall be obtained by the Contractor at its own cost and expense. The borrow area and materials shall be approved by the Consulting Engineer and shall be friable material suitable for compaction.

All waste areas shall be located off the site and arrangements and payment for use of such areas shall be the sole responsibility of the Contractor. All waste disposal shall be in compliance with federal, state and local laws, ordinances and regulations.

#### GC-65 PARKING AREAS, DRIVES AND WALKS

All existing parking areas, drives and walks within the Project limits shall be adjusted to conform to the lines and grades shown on the Plans. Any of the above structures that are removed or damaged during construction shall be reconstructed at Contractor's expense of materials that will create a quality equal to or better than the condition of the existing facility prior to construction operation.

#### GC-66 STREET SIGNS AND TRAFFIC AIDS

The Contractor shall be responsible for all preexisting traffic control devices at the Project site, including installation, maintenance, removal and storage of such devices. All temporary and permanent traffic control devices supplied by the Contractor shall comply with and be installed in accordance with the Manual on Uniform Traffic Control Devices, current edition as revised, and the Traffic Control Devices Handbook.

#### GC-67 PLACING WORK IN SERVICE/PARTIAL UTILIZATION

If desired by the City, portions of the Work may be placed in service when completed for Partial Utilization by the City, and the Contractor shall give proper access to the Work for this purpose; but such use and operation shall not constitute an acceptance of the Work, and the Contractor shall be liable for defects due to faulty construction until the entire Work under this Contract is finally accepted and for such periods of time as designated in the Contract Documents or otherwise permitted by law.

#### GC-68 NON-DISCRIMINATION/OTHER LAWS

- (a) The Contractor agrees that:

- (1) The Contractor shall observe the provisions of the Kansas Act Against Discrimination and shall not discriminate against any person in the performance of work under the present contract because of race, religion, color, sex, disability, national origin, ancestry or age;
- (2) In all solicitations or advertisements for employees, the Contractor shall include the phrase, "equal opportunity employer," or a similar phrase to be approved by the Kansas Human Rights Commission ("Commission");
- (3) If the Contractor fails to comply with the manner in which the Contractor reports to the Commission in accordance with the provisions of K.S.A. 44-1031 and amendments thereto, the Contractor shall be deemed to have breached the present Contract and it may be cancelled, terminated or suspended, in whole or in part, by the City;
- (4) If the Contractor is found guilty of a violation of the Kansas Act Against Discrimination under a decision or order of the Commission which has become final, the Contractor shall be deemed to have breached the present contract and it may be cancelled, terminated or suspended, in whole or in part, by the City; and
- (5) The Contractor shall include the provisions of Subsections (1) through (4) in every subcontract or purchase order so that such provisions will be binding upon such Subcontractor or vendor.

The provisions of this Article shall not apply to a contract entered into by a Contractor:

- (A) Who employs fewer than four employees during the term of such contract; or
  - (B) Whose contracts with the City cumulatively total \$5,000 or less during the fiscal year of the City.
- (b) The Contractor further agrees that the Contractor shall abide by the Kansas Age Discrimination In Employment Act (K.S.A. 44-1111 et seq.) and the applicable provision of the Americans With Disabilities Act (42 U.S.C. 12101 et seq.) as well as all other federal, state and local laws, ordinances and regulations applicable to this Project and to furnish any certification required by any federal, state or local governmental agency in connection therewith.

#### GC-69 FEDERAL LOBBYING ACTIVITIES

31 USCS Section 1352 requires all subgrantees, contractors, subcontractors and consultants who receive federal funds via the City to certify that they will not use federal funds to pay any person for influencing or attempting to influence a federal agency or Congress in connection with the award of any federal contract, grant, loan or cooperative agreements.

In addition, contract applicants, recipients and subrecipients must file a form disclosing any expenditures they make for lobbying out of non-federal funds during the Contract period.

Necessary forms are available from the City Engineer and must be returned to the City with other Contract Documents. It is the responsibility of the general Contractor to obtain executed

forms from any Subcontractors who fall within the provisions of the Code and to provide the City with the same.

#### GC-70 RECORDS

Contractor shall maintain copies of records pertaining to the construction of this Project for a period of five (5) years from the date of final payment. Such records shall be made available to the City for audit and review purposes upon written request therefor from City or its authorized agent(s) during the construction period and the five (5) year period following final payment.

#### GC-71 TITLES, SUBHEADS AND CAPITALIZATION

Titles and subheadings as used herein and other Contract Documents are provided only as a matter of convenience and shall have no legal bearing on the interpretation of any provision of the Contract Documents. Some terms are capitalized throughout the Contract Documents, but the use of or failure to use capitals shall have no legal bearing on the interpretation of such terms.

#### GC-72 NO WAIVER OF RIGHTS

No waiver of any breach of this Contract shall be construed to be a waiver of any other or subsequent breach.

#### GC-73 SEVERABILITY

The parties agree that should any provision of the Contract Documents be determined to be void, invalid, unenforceable or illegal for whatever reason such provision(s) shall be null and void but that the remaining provisions of the Contract Documents shall be unaffected thereby and shall continue to be valid and enforceable.

#### GC-74 GOVERNING LAW

This Agreement shall be governed by, and construed in accordance with, the laws of the State of Kansas.

#### GC-75 VENUE

Venue of any litigation arising in connection with this Agreement shall be the State courts of Johnson County, Kansas.



**CITY OF OVERLAND PARK**  
**METCALF AVENUE BRIDGE REDECKING**  
**METCALF AVENUE OVER THE BLUE RIVER**

**PROJECT SPECIAL PROVISIONS**

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**CITY OF OVERLAND PARK**

**METCALF AVENUE BRIDGE REDECKING  
METCALF BRIDGE OVER THE BLUE RIVER**

**PROJECT SPECIAL PROVISIONS**

**1 - GENERAL REQUIREMENTS**

**1.1 SCOPE OF WORK**

The work provided for in these Specifications shall consist of furnishing all labor, materials, appliances, and equipment, and performing all work and operations in connection with the construction of items and all other incidental and related work as set forth in these Specifications and as directed by the Engineer to make a complete and finished job.

**1.2 CONTRACT SPECIFICATIONS**

The Specifications that shall govern the materials furnished and work performed in the construction of the work covered by the Contract or Contracts based thereon, are divided, classified, designated, and arranged as shown in the PROJECT SPECIAL PROVISIONS, TABLE OF CONTENTS attached hereto. No attempt has been made in the foregoing designated Specifications to segregate work to be performed by any trade, subcontract, or proposal item, under any one specification. Any segregation between trade or craft jurisdiction limits, and the establishment of subcontract limits, will be solely a matter of agreement between the Contractor and his employees and his subcontractors. The Specifications will govern the construction of the entire work, and the provisions thereof will govern each item and unit of work to which such provisions apply.

When reference is made to Engineer, it shall have the same meaning as consulting engineer as set forth in Paragraph GC-2 of the General Conditions.

**1.3 STANDARD SPECIFICATIONS**

The work shall conform to these Specifications and to the "Standard Specifications" where reference is made herein. Where reference is made in the Specifications and Contract Documents to "Standard Specifications," it shall mean that the reference is made to the current edition of the Standard Specifications for State Road and Bridge Construction, Kansas Department of Transportation, Chapters 13.02, 13.03, 13.08, and 15.08 of the Overland Park Municipal Code, current edition of City of Overland Park Traffic Signal Specifications, current edition of the Manual On Uniform Traffic Control Devices, and The City of Overland Park Traffic Control Handbook for Street Maintenance and Construction Operations with such revisions, amendments, and supplements as are contained herein.

Sanitary Sewer construction shall be in accordance with the "Construction and Materials Specification" as prepared by the Johnson County Unified Wastewater Districts, and on file with the State of Kansas, Department of Health and Environment, Permit No. 20969.

All sanitary sewer service line work shall conform to requirements of the Johnson County Unified Wastewater Districts Service Line Design and Construction Standards, and the most recent edition of the BOCA National Plumbing Code.

#### **1.4 CONTRACT DRAWINGS**

The Contract Drawings or "Plans" on which the proposals and contracts are to be based, and which are to be supplemented by additional shop and dimension drawings of material and equipment and other drawings, where specified, are shown in the "Index of Sheets" on the cover sheet of the Plans.

#### **1.5 MEASUREMENT AND PAYMENT**

##### **a. Method of Measurement**

The completed work shall be measured by the units described in the Proposal under each bid item that is satisfactorily completed by the Contractor. At monthly intervals, beginning one month after the Notice to Proceed, the Contractor shall submit to the City Engineer an accurate record of the work completed.

##### **b. Basis of Payment**

The amount of completed work, measured as set forth above, shall be paid for at the contract unit price bid per item described in the Proposal and shall be full compensation for furnishing all materials, labor, equipment, tools, supplies and incidental related items necessary to complete the work in accordance with the Specifications. Work not measured separately for payment is subsidiary to the item to which it pertains.

#### **1.6 MOBILIZATION OF EQUIPMENT**

All equipment used by the Contractor having metal tracks shall not be driven over City streets other than those streets being constructed. Such equipment must be transported from one work area to the next work area.

Observe legal load restrictions when operating equipment, hauling equipment, or hauling materials on public roads; newly constructed/reconstructed base, pavement, and structures; and any existing base, pavement or structures that will remain in place. Assume responsibility for changes in legal load restrictions that occur after the project was let. Obtain the Engineer's written approval and a special permit to exceed legal load restrictions on the City street system and on newly constructed/reconstructed portions of the project.

Protect roadways and structures within project limits from damage. Observe curing periods before operating equipment or hauling loads on newly constructed pavement, reconstructed pavement, or structures. Do not haul loads of any size on pavement base, except when operations require equipment on pavement base to place material. The Contractor shall assume all responsibility for damages to roadways and structures caused by the Contractor from operating equipment or hauling loads.

#### **1.7 INSPECTION OF WORK**

The Contractor shall not commence placing concrete or backfilling of pipe/structures until such time as the City Engineer or his authorized representative has made inspection. Form location, grades, slopes and subgrade shall have been approved prior to placing any concrete.

#### **1.8 BRACING AND SHORING**

It shall be the contractor's responsibility to brace and shore existing structures during construction. Any additional damage to or collapse of existing structures during the contract period shall be the sole responsibility of the Contractor.

The Contractor shall brace and shore all trenches in full accordance with Occupational Safety and Health Standards - Excavations; Final Rule 29 CFR Part 1926.

Bracing and shoring shall not be paid for directly but shall be considered subsidiary to other bid items. No additional payment shall be considered for increased quantities of earthwork, asphalt removal and replacement, or increases in other items as a result of compliance with this specification.

### **1.9 TRENCH BACKFILL**

Flowable Fill is required for all trenches within all paved portions of the ROW including future paving, if they are known, per the Manual for Infrastructure Standards For Right of Way Restoration and City of Overland Park Standard Details.

### **1.10 SAMPLING AND TESTING**

All sampling and testing deemed necessary by the Engineer shall be performed by a Testing Laboratory selected by the City, except that all Asphaltic Concrete mix design and tests shall be performed by a Certified Testing Laboratory selected by the Contractor, as stated in specification section "Asphaltic Concrete Surface and Intermediate Course". The costs of all such tests, showing compliance with the Specifications, shall be paid by the City, except that all Asphaltic Concrete mix design and testing costs shall be paid by the Contractor. However, in the event that any test indicates non-compliance with the Specifications, additional testing will be paid for by the Contractor to determine acceptability of the material or methods. City reserves the right to weigh any selected truck as determined by the Engineer. The City shall only pay weighing costs and any additional costs shall be at the Contractor's expense.

### **1.11 TRAFFIC SAFETY**

When working in the traveled way, the Contractor shall provide adequate and suitable barriers, signs, warning lights, flaggers, and all other equipment necessary to direct and reroute traffic and protect the public from moving or stationary vehicles, equipment, and materials, and other obstructions. Also, adequate protective warning lights and signs shall be provided to warn of any obstruction or excavation in the street, and easement area. All barricades, signs, lights and other protective devices in public right-of-way and easements shall be installed and maintained in conformity with applicable statutory requirements, the latest edition of the "Manual on Uniform Traffic Control Devices", and the "Overland Park Traffic Control Handbook for Street Maintenance and Construction Operations".

The Police Department, Fire Department, and Med-Act shall be notified prior to closing a street with the approval of the City Engineer.

### **1.12 NOTIFICATION OF PROPERTY OWNERS**

The Contractor shall provide advance notification to the adjacent property owners on all phases of the operations.

### **1.13 TREE AND PLANT PROTECTION**

All trees and other vegetation which must be removed to perform the work shall be removed and disposed of by the Contractor; however, no trees or cultured plants shall be unnecessarily removed unless their removal is indicated on the drawings. All trees and plants not removed shall be protected against injury from construction operations.

The Contractor shall take extra measures to protect trees designated to be preserved, such as erecting barricades or fences around the drip line, and trimming low hanging branches to prevent damage from construction equipment. Barricade or fence shall not be removed without consent of the Engineer. When installing a pipe, or any other work that may damage the tree, hand excavating or tunneling methods shall be used. Where encroachment by vehicles or equipment is expected within the drip line of the tree, the contractor will be required to place at least a 6 inches layer of organic mulch on top of the affected area to offset possible compaction. Such trees shall not be endangered by stockpiling excavated material or storing equipment within the drip line of the tree. No backfill material exceeding 4 inches in depth shall be placed within the drip line area of any tree designated to be preserved without prior consent from the Engineer.

When excavation is required within the drip line of any protected tree, the contractor shall take extra measures to protect as many roots as possible. All roots to be cut or removed shall be "cut" with a chain saw, trencher, or other methods as approved by the engineer that will leave a smooth cut surface. All roots

exposed during excavation shall be protected to prevent the roots from drying out by covering the exposed area with canvas or burlap, peat moss, or mulch, and kept damp until the area has been backfilled. Where shown on the plans, trees requiring root removal of one third or more of the circumference of the root system, may require the pruning of limbs on the opposite side of the root removal or thinning the entire tree equally as directed by the Engineer. All pruning, repair, and replacement of trees and plants shall be performed by qualified nurserymen or arborists. Trees requiring trimming are as noted on the plans. This work shall not be paid for directly but shall be considered subsidiary to other bid items.

When the injury or removal of trees designated to be preserved cannot be avoided; each tree injured beyond repair or removed shall be replaced with a similar tree, or provide compensation to the City as determined by the Engineer.

#### **1.14 WEEDS**

The Contractor shall restrict the excessive growth of weeds, grasses, and other uncultivated vegetation within the project limits in accordance with the Overland Park Municipal Code. The Contractor shall cut down any excessive growth by mowing or trimming or as directed by the engineer.

No direct payment will be made for this work as it shall be considered subsidiary to other bid items in the contract.

#### **1.15 RESTORATION**

##### **Pre-Restoration Meeting**

The Contractor shall be responsible for scheduling a pre-restoration meeting within 1 (one) week prior to beginning final grading, select soil placement, and restoration of the sodded areas in the project. The time and location of the meeting shall be approved by the Project Engineer, with required attendance by the Contractor's superintendent and any/all subcontractors involved in the restoration. The purpose of this meeting is to discuss in detail the requirements of sod restoration in the Specifications. At this meeting the Contractor shall provide:

- 1) A complete schedule of operations and proposed methods for soil preparation, sod placement, and watering.
- 2) A list of the equipment to be used for soil preparation and compaction, fertilizer distribution, sod delivery, placement and rolling, and watering.
- 3) The proposed source or sources of the sod, select soil, and water.
- 4) A list or set of "marked up" plans indicating the proposed location of each type of sod.
- 5) A list of at least 3 locations that the sod crew to be used on this project has placed sod within the previous 2 weeks.

#### **1.16 UTILITY MEETINGS AND UTILITY ADJUSTMENT**

It shall be the duty of the Contractor to notify the serving utility companies of pending construction operations and the schedule of same, prior to any work being done on this project. The Engineer will furnish plans to the utility companies for their records. These companies will relocate and adjust their own facilities at no cost to the Contractor, except for sanitary and storm sewers. The Contractor shall be responsible for the adjustment and protection of all sanitary and storm sewer facilities. Some minor grading and backfill work may be required of the Contractor at locations of utility adjustments. This work shall be considered subsidiary to other items of work.

The Contractor shall be responsible for holding periodic utility meetings with the City, the Engineer, and utility companies during the relocation of utility lines. The frequency of meetings will initially be bi-weekly (or more frequently if necessary) and then, as relocation work begins to diminish, will be held more infrequently. The Contractor shall keep minutes of the meetings and send copies to all those in attendance.

### **1.17 EXCELLENCE IN CONSTRUCTION CONTRACTOR EVALUATION**

The City will conduct an Excellence in Construction Contractor Evaluation on this project. The purpose of this program is to recognize contractors who perform well during construction projects, provide a mechanism to assist contractors in improving their performance on future projects, and establish expectations of contractors who contract with the City of Overland Park.

Copies of the Excellence in Construction Contractor Evaluation guidelines are available in the office of the City Engineer or on the City of Overland Park web site at [www.opkansas.org](http://www.opkansas.org).

### **1.18 RIGHT-OF-WAY**

Right-of-way and easements are currently available for this project.

The Contractor shall confine his construction operations to the right-of-way limits and easements provided for the project. Equipment or materials shall not be stored beyond these limits without the express approval of the owner of such property. The Engineer shall be informed as to any arrangements that Contractor makes on his behalf in these matters.

### **1.19 CONSTRUCTION LIMITATIONS**

The construction sequence for the required work shall be in accordance with the traffic control as shown on the plans. The following limitations shall apply as well:

- A. The Notice to Proceed is anticipated to be no sooner than July 16, 2013.
- B. The undersigned further agrees to complete all work and punch list items by November 1, 2013.

### **1.20 ADDITIONAL INDEMNIFICATION AND INSURANCE REQUIREMENTS**

The Project Contractor shall defend, indemnify and save the BOARD OF COUNTY COMMISSIONERS OF JOHNSON COUNTY, KANSAS ("BOARD") harmless from and against all liability for damages, cost and expenses arising out of any claim, suit, action or otherwise for injuries and/or damages sustained to persons or property by reason of the negligence or other actionable fault of the Project Contractor, his or her subcontractors, agents, or employees in the performance of this contract. See Instructions to Bidders Section IB-8 for insurance requirements.

The BOARD shall each be named as an additional insured on all policies of insurance issued to the Project Contractor and required by the terms of his/her agreement with the CITY.

### **1.21 CONSTRUCTION SCHEDULE**

After being awarded the contract, the Contractor shall immediately prepare a Critical Path Method (CPM) schedule for approval by the City Engineer that will ensure completion of the project within the contract time. This schedule shall be submitted and approved by the City Engineer before a Notice to Proceed is issued. No work on this contract shall begin until said schedule is approved. The City reserves the right to adjust the Contractor's schedule to coordinate with any other projects in the same area.

- A. General Requirements

A computerized network diagram shall be included in the CPM schedule and shall serve as the 'Master Construction Schedule' for the Project, giving mathematical analysis (printout) of that network, which verifies and validates logic and planning and defines critical path. The approved schedule shall be kept on site with the superintendent and reviewed with Subcontractors each week. The CPM schedule shall be utilized for planning, organizing, and directing the work, for reporting progress, and requesting payment for work completed. The schedule shall be reviewed each week as part of the progress meeting. Abbreviations used in CPM schedules shall be clearly explained in a

legend of symbols, either separate or attached. Scheduling software shall be compatible with Microsoft Project 2007.

**B. Schedule Requirements**

The CPM schedule shall clearly show sequential interdependencies, with activity duration and float clearly represented. Sequence(s) of activities with no float shall be clearly identified as Critical Path(s). The scheduling system shall be capable of baseline comparison analysis. Upon development and approval of the schedule, the Contractor shall 'freeze' the initial schedule as the baseline schedule. As work progresses, Contractor shall provide graphics displaying actual progress bars versus baseline or target bars. Activity durations shall be in calendar days.

The CPM schedule shall include pre-construction tasks, construction tasks (bid items), shop drawing submittal and approval process, material and equipment ordering and delivery, submittal of as-built drawings, clean up and punchlist, inspection coordination activities, utility relocation, final inspection and certificate of completion, and final payment. Submittal activities shall be scheduled to allow sufficient time for materials and equipment to be procured and installed, even if the submittal is unacceptable and resubmittal is required. The CPM schedule shall reflect anticipated delays, such as weather delays.

Contractor shall submit the initial schedule, complete revisions, and periodic reports in three hard copies, one reproducible and two prints or plots, and one copy digitally on CD or DVD. This schedule shall include the completed network program consisting of GANTT chart and mathematical analysis within 10 days of the executed contract. Allow 5 days for the City Engineer to review. Contractor shall submit the schedule of submittal activities extracted from the master schedule within 10 days after receipt of Notice to Proceed. During the preparation period, Contractor shall review this information with the City Engineer.

Submittals to the City Engineer of initial and monthly CPM schedule charts shall include three sets of all reports as outlined below. Plots shall be color, blue-line, printed or photocopied prints and, if segmentally generated, fully assembled. Highlight the critical path when the critical path is not clearly defined.

The Contractor will participate in the Engineer's review and evaluation of submitted network diagrams and mathematical analysis of diagrams. Resubmit revisions necessary due to review within 5 days after the review. Contractor and major Subcontractors shall review the network CPM schedule before final submittal.

**C. Report Formats –**

Standard set of reports submitted each month including initial submittals shall consist of a GANTT chart of entire project. Progress bar chart shall include target or baseline comparison bars. Bar positions shall be early start/early finish with float clearly defined. GANTT charts shall include a tabulation of each activity. For each activity on the GANTT charts furnish the following:

- Initial/submittal schedule shall include a list of responsible contractors and suppliers, task description, duration, start date, end date, latest start date, latest end date, total slack or float time in calendar days and current schedule bar in Gantt view.
- Progress schedule updates shall include a list of responsible contractors and suppliers, task description, duration, actual start date, actual finish date, percentage completion, remaining duration in calendar days and current schedule bar in Gantt view.

Graphics outlined above shall comply with the following criteria unless noted otherwise:

1. Sheet size of diagram shall be 11 by 17 inches minimum and time scaled in month as the major timescale and weeks as the minor timescale unless approved otherwise.
2. On each page include a title block containing at a minimum the following information –
  - a. Project Title
  - b. Project Number
  - c. Contractor's Business Name
  - d. Date of Submittal and Revision (The Date shown must clearly show the current preparation date and separately the revision date of the current schedule - this is a hard date entered and not an auto or status date)
  - e. Submit a separate Legend Page of Symbols and Abbreviations as applicable.
3. Prepare and submit to the City Engineer upon request additional charts, reports, and current copy on disk of Project program.

**D. CPM Schedule Implementation and Monitoring**

Monthly CPM schedule charts and reports shall accompany the Contractor's pay request for work completed. Where the Contractor is shown to be behind schedule, provide accompanying written summary, cause, and explanation of planned remedial action. CPM schedules shall reflect those instances, modifications or other alterations to the schedule, which have an impact on the final completion or interim target dates within the schedule. Payments or portions of payments may be withheld by the City Engineer, upon failure to maintain scheduled progress of the work as shown on the approved CPM schedule. Failure to prepare, submit and maintain a CPM schedule as specified shall be cause for rejection of other schedules submitted and for possible delay of payment. Float time belongs to the project, not to the Contractor or to the City Engineer, and may be utilized by both parties.

**E. Schedule Changes And Updates**

At a minimum the Contractor shall update and submit the CPM Schedule for review weekly. A weekly update is required unless agreed upon by the City Engineer. Monthly submittal of the CPM schedule and approval by the City Engineer is required prior to payment for work completed. Activities added to the CPM schedule shall be submitted by the Contractor on schedule charts. It is the City Engineer's intent that the project be managed and operated according to the CPM schedule. Payment requests may be held up until the CPM schedule is brought back into compliance with the contract documents.

Once the CPM schedule is submitted and approved by the City Engineer Contractor shall identify any modifications to activity durations, logic, values, or descriptions resubmit for approval. Such adjustments shall not impact the contracted completion date. Requests for time extensions are addressed in the General Conditions of these contract documents.

## **2 - MAINTENANCE BOND**

### **2.1 BOND REQUIREMENTS**

Before entering into a Contract and within 10 business days of the notice of the award of the Contract, execute a maintenance bond on the form included in these Contract Documents. Provide the maintenance bond in an amount equal to 100% of the construction cost. Execute the maintenance bond with a surety authorized to do business in Kansas by the Kansas Commissioner of Insurance.

Keep the Maintenance Bond in full force for the bond period. If the surety fails or becomes financially insolvent, file a new bond within 5 days of such failure or insolvency that complies with the requirements of these Contract Documents

## **2.2 MEASUREMENT AND PAYMENT**

The City will pay the premium portion of the lump sum price after the Contractor submits the surety's invoice depicting the actual premium costs owed. The City will pay the remaining portion of the lump sum price after issuing final acceptance of the Project.

Payment for "Maintenance Bond" at the contract lump sum price bid is full compensation for providing the maintenance bond, paying the maintenance bond premium, and performing any work required under the maintenance bond.

## **3 - CONSTRUCTION VIDEO AND PHOTOGRAPHY**

### **3.1 DESCRIPTION**

Furnish all labor, materials and equipment necessary to provide high quality color digital audio/video recording and digital photographs of the Project site surface conditions as specified herein.

Furnish to the Owner an original and one copy of a continuous high quality color audio/video DVD recording of surface conditions along the entire route of the proposed Work. Furnish to the Owner two prints of the high quality color digital photographs and one copy of each data storage media device. The Contractor may keep a copy for his/her own records.

The video recording and photographs shall be taken:

- 1) Prior to any construction activity.
- 2) After completion of all construction activities.

The Owner reserves the right to reject audio/video DVD recordings and digital photographs which do not conform to the project specifications. This includes, but is not limited to, poor quality, unintelligible audio or uncontrolled pan or zoom. Any DVD recording or digital photographs rejected by the Owner will be re-recorded/re-photographed at no cost to the Owner. Under no circumstances shall construction begin until the Owner has received and accepted the audio/video DVD(s) and photographs.

A qualified, established audio/video recording firm knowledgeable in construction practices and experienced in audio/video recording and photographing of construction projects shall perform the video. If requested, the videographer/photographer shall provide examples of prior work and/or references.

### **3.2 CONSTRUCTION REQUIREMENTS**

The Contractor shall submit the required photos and video prior to the issuance of a Notice to Proceed, during construction as directed by the Engineer, and immediately prior to acceptance of the project. Final payment for the project will not occur until the Contractor has completed this item.

#### **a. Color Audio/Video and Digital Photography Survey**

- (1) Coverage shall include, but not be limited to, all existing roadways, sidewalks, fences, curbs, driveways, buildings and structures, ditches, above ground utilities, traffic signal and street light cabinets, landscaping, trees, culverts, headwalls, retaining walls, signage and other physical features located within the zone of influence of the construction. Particular and detailed attention shall be given to any defects noted, such as cracks, disturbed areas, damaged items, or as Owner may direct. The coverage may be expanded if Owner so directs.
- (2) All filming or photography will be done during daylight hours. No filming or photography shall be performed if weather is not acceptable, such as rain, fog, snow, etc.
- (3) It is the intent of this coverage to accurately and clearly document and define pre-existing, post-construction and/or construction conditions to minimize potential construction claims.



Physically mark the excavation areas with highly visible fluorescent paint prior to audio/video recording and photography. The markings shall include stationing information.

(4) The Owner will have the opportunity to accompany the videographer/photographer.

(5) Sufficient time will be allowed for the Owner to review the Audio/Video recording and the digital photographs prior to construction.

**b. Audio and Color Video Recording [Viewable on Windows media]**

(1) Audio/Video DVDs shall be commercial grade in a standard write protected format. Video system shall have capability of producing hard copy prints of selected individual still frames. Video may be captured originally in Digital Video format, but must be transferred to DVD disc for delivery to the Owner, and shall be formatted to be played in the Standard Install Windows Media player.

(2) Video recordings shall be divided into multiple segments, and a field log listing those segments shall be provided with the original tapes and DVD discs of all recordings. A visual recording of the field notes and log (listing the videotape segments) shall be included at the end of each respective original recording tape. Items to note on the field log include, but are not limited too, the tract number, street or road viewed, filming start- and stop-times, side (of street) being viewed, point starting from, traveling direction and ending destination point. Written documentation must coincide with the information on the disk so as to make easy retrieval of locations sought for at a later date. All original video field notes and logs (signed by the photographer) shall be released to the owner.

(3) Audio/Video recordings shall begin with a verbal description of the current date and time, the Owner's name, Project or Contract name and number, Contractor's name, and location information such as street name, direction of travel, viewing side, etc. Translucent information consisting of the month, day, year and time of recording must appear on the viewing screen on all video recordings, by electronic means. Information appearing on the DVD must be continuous and run simultaneously by the computer generated translucent digital information. No editing or overlaying of information at a later date will be acceptable.

(4) Audio shall be recorded at the same time as the video recording and provide the same information as on the video log sheet. Recordings shall include "continuous" narration identifying the viewing direction, street address or station number location, direction of progress, description of features and the existing condition of improvements or damage within the zone of influence shown on the viewing screen. Identify houses and buildings by house number, when visible, in such a manner that structures of the proposed construction, (i.e. manholes, etc.) can be located by reference. Special commentary will be given for unusual conditions of buildings, sidewalks and curbing, foundations, trees and shrubbery, etc.

(5) The zone of influence shall be defined as an area within the temporary construction easement or public right-of-way as Drawings indicate, or within 35 feet of the proposed Work. The Contractor shall obtain permission from the owners of private property prior to entering private property for the purpose of filming.

(6) The rate of speed in the general direction of travel during the recording shall not exceed 100 feet per minute. Panning rates and zoom-in and zoom-out rates shall be controlled sufficiently such that during playback, the picture shall be in focus and maintain clarity at all times.

(7) Adequate lighting, to produce the proper detail and perspective, will be required to fill in the shadow area caused by trees, structures, utility poles, road signs, and other such objects in residential areas, or as directed by the Owner's Representative.

(8) Engineering station numbers recorded, if applicable, must be continuous, be accurate and correspond to Project stationing. The symbols should be the standard engineering symbols (i.e. 16+64).

(9) All DVDs and cases shall bear labels with the following information:

- (a) Disk Number
- (b) Owner's Name
- (c) Date of Recording
- (d) Project Name and Number
- (e) Location of Recording

**c. Digital Photography**

- (1) Photographs shall be captured on digital camera equipment with at least 6-mp memory and delivered on CD-ROM. Original digital image files shall have dimensions of 1500 x 2100 pixels or greater and delivered in TIFF format or JPEG format WITHOUT added compression. Each image must be assigned a unique filename that includes the date of photography.
- (2) All digital image files shall be printed on color photographic paper in a size no smaller than 2-1/4 x 3-1/4 inches and two printed copies shall be delivered to the Owner, bound into labeled three-ring binders.
- (3) Each digital image file must be delivered with matching descriptive information that accurately describes the direction and location of the individual photograph, plus notation of any noteworthy damage that is not readily visible in the image. This information may not be provided as the (editable) image filename, but must be delivered in a permanent form.
- (4) Sufficient digital photographs shall be taken to document existing features such as roadways, sidewalks, fences, curbing, driveways, buildings and structures, ditches, above ground utilities, traffic signal and street light cabinets, landscaping, subdivision monuments, trees, culverts, headwalls, retaining walls, signage and other physical features located within the zone of influence of the construction. Particular and detailed attention shall be given to any defects noted, such as cracks, disturbed areas, damaged items, or as Owner may direct. The coverage may be expanded if Owner so directs.
- (5) The zone of influence shall be defined as an area within the temporary construction easement or public right-of-way as Drawings indicate, or within 35 feet of the proposed Work. The Contractor shall obtain permission from the owners of private property prior to entering private property for the purpose of taking photographs.
- (6) Adequate lighting, to produce the proper detail and perspective, will be required to fill in the shadow area caused by trees, structures, utility poles, road signs, and other such objects in residential areas, or as directed by the Owner's Representative.
- (7) Engineering station numbers recorded (in the image or as a descriptor), if applicable, must be accurate and correspond to Project stationing. The symbols should be the standard engineering symbols (i.e. 16+64).
- (8) All CD-ROMS and cases shall bear labels with the following information:
  - (a) CD Number
  - (b) Owner's Name
  - (c) Date of Recording
  - (d) Project Name and Number
  - (e) Location of Recording

**3.3 MEASUREMENT AND PAYMENT**

The Engineer will not measure the specified work for separate payment.  
Payment for the audio/video recordings and photographs shall be subsidiary to the other contract items.

## **4 - FORCE ACCOUNT**

### **4.1 DESCRIPTION**

This work shall cover miscellaneous extra work required during the course of construction.

### **4.2 MEASUREMENT AND PAYMENT**

Before the extra work is performed, the Contractor shall submit a proposed price in accordance with Paragraph (e) of "Changes in the Work" in the General Conditions for approval by the Engineer, and shall have received the written approval of the Engineer prior to commencing the proposed extra work.

The Engineer will measure each Force Account item as defined in the proposed price approved in accordance with Paragraph (e) of "Changes in the Work" in the General Conditions.

Payment for each Force Account item will be in accordance with the pre-approved proposed price.

Payment for Force Account (SET) shall be paid for on an extra work basis not to exceed the contract set price.

## **5 - CLEARING AND GRUBBING**

### **5.1 DESCRIPTION**

This work shall consist of clearing, grubbing, removing and disposing of all vegetation and debris as shown on the plans and in accordance with Section 201 of the Standard Specifications, except as otherwise modified herein.

### **5.2 CONSTRUCTION REQUIREMENTS**

Erosion control measures shall be in place prior to the commencing of any work on the site in accordance with the "Temporary Erosion and Pollution Control" section. If the erosion control measures are not effective or are not approved by the City Engineer, all clearing, grubbing, and other site work shall be halted until such time as the erosion control measures are approved.

All cleared vegetation and debris including sod, stumps, shrubs, trees, and roots located within the grading limits in cut or fill sections shall be completely removed from the project site and disposed of in accordance with all applicable Federal, State and local ordinances.

Clearing shall consist of removal to the ground surface of all trees, shrubs, and stumps, down timber, snags, brush, rubbish, and other obstructions which are objectionable in the opinion of the City Engineer. In areas to receive more than four (4) feet of embankment, trees, stumps, and brush shall be cut off no more than eight (8) inches above the original ground surface or low water level. Clearing operations shall be conducted so as to prevent damage to trees left standing, to existing structures, to structures under construction, as well as to provide for the safety of employees and others.

Areas within the limits of rights-of-way, construction limits, easements, and side street approaches shall be cleared. Individual trees, groups of trees, and other vegetation within the above limits shall be left standing and undamaged as directed by the City Engineer.

Grubbing shall consist of the removal of all stumps, logs, roots larger than three (3) inches in diameter, matted roots, and other debris, to a depth not less than 18 inches below the excavated surface.

Except in areas to be excavated, stump holes and other holes from which obstructions are removed, shall be backfilled with suitable material and compacted in accordance with the "Compaction of Earthwork" section.

Material shall be disposed of off the site of the public improvements, except in the case in which permission from a private property owner is obtained. If the disposal is on private property, the Contractor shall obtain written permission of the property owner on whose property the material is placed. Copies of all agreements with property owners are to be submitted to the City Engineer.

### **5.3 MEASUREMENT AND PAYMENT**

The Engineer will measure the clearing and grubbing as a lump sum.

Payment for “Clearing and Grubbing” at the contract lump sum price is full compensation for the specified work.

## **6 - REMOVAL OF EXISTING STRUCTURES**

### **6.1 DESCRIPTION**

This work shall conform to Section 202 of the Standard Specifications except as otherwise modified herein and shall include the removal of subsurface structures such as all existing drainage structures, head walls, pipe, inlets, manholes, retaining walls, conduits, foundations, cables, and other obstructions which are encountered during construction. This item shall include any items which may not be specifically listed in the Plans but are in conflict with the new construction and which would normally be encountered upon a careful examination of the site of the work. This includes repair, plugging, or removal of existing pipe after removal of structures.

The work shall also include removal and wasting of surface structures such as concrete curb, pavement of all types, sidewalk, signs and markers, fencing, and abandoned utilities as directed by the Engineer. Excluded are utilities currently in service and structures for which other provisions are made for removal.

### **6.2 CONSTRUCTION REQUIREMENTS**

Erosion control measures shall be in place prior to the commencing of any work on the site in accordance with the “Temporary Erosion and Pollution Control” section. If the erosion control measures are not effective or are not approved by the City Engineer, all removal of existing structures shall be halted until such time as the erosion control measures are approved.

Fences that have portions of the fence removed and not replaced shall be left in a useable condition. The remaining fencing shall be terminated at an existing post, or a new corner post shall be set as shown on the plans or at the direction of the City Engineer.

Existing pavement shall be removed to provide match points as directed by the City Engineer.

Unless otherwise provided, all pipe designated for removal shall be removed and every precaution taken to avoid breaking or damaging those pipes which are to remain. The Contractor shall be held responsible for the repair of any damaged pipe and any such pipe will be replaced at the Contractor’s expense. All damaged drainage pipe shall be replaced with the same type, grade and class as exists prior to the damage.

### **6.3 MEASUREMENT AND PAYMENT**

The Engineer will measure the removal of existing structures by the lump sum.

Payment for “Removal of Existing Structures” at the contract lump sum price is full compensation for the specified work.

## **7 - EXCAVATION**

### **7.1 DESCRIPTION**

Excavation of the specified materials shown on the plans shall be done in accordance with Section 204 and 205 of the Standard Specifications except as otherwise modified herein.

### **7.2 CONSTRUCTION REQUIREMENTS**

Erosion control measures shall be in place prior to the commencing of any work on the site in accordance with the “Temporary Erosion and Pollution Control” section. If the erosion control measures

are not effective or are not approved by the City Engineer, all excavation and other site work shall be halted until such time as the erosion control measures are approved.

**a. Rough grading**

Areas to be graded shall be cut to the approved subgrade elevations. The graded area shall have adequate drainage at all times. All ditches and channels shall be kept free of debris or obstructions. Erosion control measures shall be taken to protect downstream drainage systems from pollution, sedimentation or erosion caused by grading operations. Any pollution or damage occurring shall be the responsibility of the contractor.

**b. Excavation**

Excavation to the finish graded section for construction shall be considered Unclassified Excavation.

All stable and suitable materials from excavation shall be used as far as practicable for fills as shown on the drawings.

Suitable materials shall be defined as entirely imperishable material with that portion passing the No. 40 Sieve having a liquid limit not exceeding 40 and a plasticity index not exceeding 25 when tested in accordance with ASTM D 4318.

For privately funded street improvements, the Engineer shall provide a geotechnical report for approval by the City Engineer. The geotechnical report shall analyze proposed subgrade materials and make recommendations for fly ash or other soil modification as required to meet the soil stability requirements in this specification.

Unsuitable material encountered in the subgrade during construction shall be removed, wasted, and suitable backfill placed in accordance with "Compaction of Earthwork". All waste sites shall be provided by the Contractor and approved by the City Engineer.

Unstable material is considered to be material that has moisture content above the plastic limit of the soil. Suitable material with excess moisture caused by the Contractor's negligent operations is not classified as unstable excavation. Excavate and use unstable material in accordance with Subsection 205.4.d.

Where rock, shale or similar material is found, the excavation shall be carried 15 inches below the subgrade for the full width of the paved area, plus an additional width for form work for curbs, catch basins, curb inlets, etc. The excavated area shall be backfilled to the subgrade and shoulder elevations with suitable materials, and compacted as described in "Compaction of Earthwork".

No separate payment will be made for undercutting and overbreakage in rock excavation and for backfilling and compacting this area with the materials as shown in the plans.

**7.3 MEASUREMENT AND PAYMENT**

Payment for this work shall be based on plan quantity and will be paid for at the contract unit price bid per cubic yard for "Unclassified Excavation" and "Class I Excavation".

The Engineer will measure excavation of unstable and unsuitable material by the cubic yard. The Contractor shall conduct his operation in such a way that the Engineer can take the necessary cross sectional measurements before the backfill is placed.

Payment for Excavation ("Unsuitable") and Excavation ("Unstable") at the contract unit prices bid is full compensation for the specified work. No additional payment will be made for backfilling and compacting these areas with suitable material.

**8 - EMBANKMENT (CONTRACTOR FURNISHED)**

**8.1 DESCRIPTION**

If required borrow is needed to complete the earthwork, the Contractor shall furnish from an off-site source as approved by the Engineer.

## **8.2 MEASUREMENT AND PAYMENT**

The Engineer will measure contractor furnished embankment by the cubic yard. The Engineer will measure quantities for the embankment by cross-sectioning the area and compute the volume by the average end area method. Where it is impractical to measure material by the cross section method, the Engineer may use 3-dimensional measurements or other methods agreed to by both the Engineer and Contractor. No payment will be made for quantities beyond the limits of the Contract Documents.

Payment for "Embankment (Contractor Furnished)" at the contract unit price bid is full compensation for the specified work.

Payment for compaction of the "Embankment (Contractor Furnished)" will be paid for at the appropriate contract unit price bid.

## **9 - COMPACTION OF EARTHWORK**

### **9.1 DESCRIPTION**

All subgrade shall be uniformly compacted as indicated on the plans and in accordance with Section 205 of the Standard Specifications.

### **9.2 CONSTRUCTION REQUIREMENTS**

The embankment fill area shall be cleared and grubbed prior to placing the fill layers. Suitable materials, as specified in "Excavation", shall be used within the top three feet of subgrade. Where the fill is less than four feet below the subgrade, all sod and vegetable matter shall be removed from the surface upon which the fill is to be placed. The cleared surface shall be completely broken up by plowing, scarifying or stepping to a minimum depth of six inches. The material shall be recompacted. The fill shall be spread in layers not to exceed eight inches loose, free from clods, bladed or disced to an even surface, and compacted. In no case shall rocks, larger than three inches in any dimension be deposited within one foot of subgrade elevation. In no instance shall any lift or layer exceed six inches of compacted thickness. The entire embankment fill shall be spread in layers and compacted as hereinafter specified.

After each fill layer has been spread as outlined above, the entire area shall be compacted as set forth in these specifications. The Contractor shall have available adequate hand or mechanical compaction equipment to accomplish the compaction.

All fill areas outside the limits of pavement shall be uniformly compacted to a minimum of Type B, MR-90, in accordance with Section 205 of the Standard Specifications.

Filling and compacting operations shall continue alternately until the fill conforms with the lines, grades, and typical cross-sections shown on the approved drawings.

### **9.3 MEASUREMENT AND PAYMENT**

No separate payment will be made for water required for compaction of subgrade.

The amount of completed and accepted work shall be paid for based on plan quantity at the contract unit price bid per cubic yard for "Compaction of Earthwork" of the specified type and moisture range.

## **10 - ROCK EXCAVATION AND BLASTING**

### **10.1 DESCRIPTION**

Where solid rock, shale, or similar material is found, the excavation shall be as shown in the plans or as directed by the Engineer. The excavated areas shall be backfilled to the subgrade and shoulder elevation with materials shown in the plans. **ABSOLUTELY NO BLASTING OF ANY KIND WILL BE ALLOWED ON THIS PROJECT.**

## 10.2 MEASUREMENT AND PAYMENT

No separate payment will be made for rock excavation as it will be considered subsidiary to "Unclassified Excavation".

## 11 - OVERLAND PARK SUPERPAVE ASPHALTIC CONCRETE SURFACE AND INTERMEDIATE COURSE

Revision Date: 1/30/12

### 11.1 GENERAL

The 2007 Standard Specifications for State Road and Bridge Construction, Sections 109, 601, 611 (Class A), 1201, 1202, and 1203 shall govern the asphaltic concrete work except as otherwise modified herein. All testing required by this specification including mix design and field verification of the mix shall be the responsibility of the Contractor. The mix design shall be modified or redesigned whenever a material source changes or a quarry starts producing from a different geological unit or a major change is made to the asphalt plant. This work shall be subsidiary to other bid items.

### 11.2 ASPHALT CEMENT

Asphalt cement shall conform to the requirements of AASHTO-MP 1a-04<sup>1,2</sup> Performance Graded Asphalt Binder PG 64-22. The grade of the asphaltic binder shall not be changed without a laboratory remix design. It shall also comply with Sections 1201 and 1202. **Each shipment of asphalt to the asphalt plant shall have a bill of lading stating the asphalt cement meets the specifications referenced above. Copies of the bill of lading shall be submitted to the City Engineer.** Asphalt cement shall not be paid for directly but shall be considered a subsidiary bid item.

#### a. Anti-Stripping Agent

All bituminous mixtures shall contain an anti-stripping agent. AD-here<sup>®</sup> LOF 65-00 LS as manufactured by ARR-MAZ Products, L.P. shall be added to the asphalt cement at the rate of 0.75% by weight of the total added asphalt cement. Other asphalt anti-stripping additives and their application rate may be used when proven equal after testing as specified in Paragraph "Resistance of Compacted Bituminous Mixture to Moisture Induced Damage AASHTO T 283-03" and approved by the City Engineer.

### 11.3 AGGREGATES GENERAL

**The total aggregate (coarse aggregate, fine aggregate, and the material passing the No. 200 sieve) shall contain not less than 85 percent crushed material for intermediate course and surface course.** The Coarse Aggregate Angularity for all coarse aggregates including RAP or FRAP shall be 85% or higher. The job mix formula (JMF) shall be within the control points shown below. It shall be noted that when the gradation of extracted plant produced mix varies appreciably from JMF, the test properties of the mix will be out of specifications.

The contractor may use Reclaimed Asphalt Pavement (RAP) or Fractionated Reclaimed Asphalt Pavement (FRAP) as an aggregate source. FRAP is defined as having two or more stockpiles, where Reclaimed Asphalt Pavement (RAP) is processed into coarse and fine fractions. The fine FRAP stockpile will contain only material passing the ¼ inch screen. The coarse FRAP stockpile will contain milled material retained on the ¼ inch screen and passing the ¾ inch screen. The maximum percentage of RAP is 25% and the maximum combined percentage of FRAP is 40%. FRAP may be comprised of coarse or fine FRAP or a combination thereof. Utilize a separate cold feed bin for each stockpile of FRAP used. Do not blend coarse and fine FRAP either in the stockpile or in a cold feed bin. Add RAP or FRAP to the mix through the RAP collar. RAP may not be used in surface courses regardless of mix designation.

Sources and types of RAP or FRAP must be recorded and submitted to the City Engineer upon request.

The RAP or FRAP used in production shall be similar in composition (extracted gradation and asphalt content) to the source used for design.

The contractor shall submit a copy of current aggregate quality and consensus tests for aggregates used in the mix. The quality test must have been run within 6 months of the date of a mix design submission or a volumetric test report.

**a. Aggregate for Asphaltic Concrete Surface Course**

The exact gradation shall be determined by the contractor's laboratory.

Sieve Size	Percent Passing	
	12.5 mm Nominal Size Control Points	
19mm (3/4 inch)	_____	100%
12.5 mm (1/2 inch)	90	100%
9.5 mm (3/8 inch)	80	95%
4.75 mm (No. 4)	_____	_____
2.36 mm (No. 8)	36	48%
1.18 mm (No. 16)	_____	_____
600 µm (No. 30)	_____	_____
300 µm (No. 50)	_____	_____
150 µm (No. 100)	_____	_____
75 µm (No. 200)	2	8%

**Surface mixtures for streets designated thoroughfares by the city shall contain the following:**

Fifteen percent of the minus No. 4 sieve material and 15 percent of the total aggregate shall be chat, crushed sandstone, crushed gravel, crushed steel slag, or crushed porphyry (rhyolite, basalt, granite, and Iron Mountain Trap Rock are examples of crushed porphyry).

**b. Aggregate for Asphalt Concrete Intermediate or Leveling Course**

The exact gradation shall be determined by the contractor's laboratory.

Sieve Size	Percent Passing	
	12.5 mm Nominal Size Control Points	
19 mm (3/4 inch)	_____	100%
12.5 mm (1/2 inch)	85	100%
9.5 mm (3/8 inch)	75	90%
4.75 mm (No. 4)	_____	_____
2.36 mm (No. 8)	34	44%
1.18 mm (No. 16)	_____	_____
600 µm (No. 30)	_____	_____
300 µm (No. 50)	_____	_____
150 µm (No. 100)	_____	_____
75 µm (No. 200)	2	8%



#### **11.4 SUPERPAVE ASPHALTIC CONCRETE MIX DESIGN METHOD**

The finished mixture shall meet the requirements described below when prepared in accordance with AASHTO T 312-04 (using 6 inch nominal size molds) and the volumetric properties of compacted paving mixtures as calculated using Chapter 4 of Superpave Mix Design, Superpave Series No. 2 (SP-2), Third Edition 2001 Printing, Published by the Asphalt Institute referred hereafter as "SP-2", unless otherwise specified. The procedure shall be as specified in Chapter 5 and 6 of the SP-2. The Theoretical Specific Gravity (G<sub>mm</sub>) shall be determined following AASHTO T 209-99 (2004) and the Bulk Specific Gravity of the Compacted Asphalt Mixture (G<sub>mb</sub>) shall be determined following AASHTO T166-00. The material for the theoretical specific gravity (G<sub>mm</sub>) and the material for the Gyratory Compactor specimens (pucks) shall be cured at 140+/-3° C (285+/-5° F) for four hours in a closed oven after the mix is produced in the laboratory.

Also, the plant-produced mixture shall be tested when the mix is four hours old. The mixture shall be transported to the laboratory in an insulated container and then stored in a laboratory oven at 140 +/-3° C (285 +/-5° F) minimum temperature for the remainder of the curing period. The curing oven shall be the forced air type and may be operated at a temperature not to exceed the maximum temperature at which the mixture may be discharged from the plant as specified in paragraph "Mixing Plants". This procedure shall be used when the water-absorption as determined by ASTM C 127-04 and ASTM C 128-04a of any aggregate in the mixture exceeds 1.25 percent. The mixture shall be compacted at 140 +/-3° C (285 +/-5° F). The theoretical specific gravity (G<sub>mm</sub>) shall be performed using the Type E-A 4500ml metal vacuum pycnometer with a clear polymethyl methacrylate PMMA lid. The vacuum shall be applied for 15 minutes to gradually reduce the residual pressure in the vacuum vessel to 28 mm Hg. The bulk specific gravity of the Fine Sand Chat shall be determined using the standard Cone Test for Surface Moisture as stated in ASTM C-128-04a unless otherwise directed by the City Engineer. The G<sub>se</sub> of the RAP or FRAP material shall be used as aggregate G<sub>sb</sub> in volumetric calculations provided that the asphaltic cement content of the RAP or FRAP fraction is determined through the use of ASTM D-6307-05 Standard Test Methods for Asphalt Content of Hot Mix Asphalt by the Ignition Method. **The AASHTO Specification shall be used when this specification references the AASHTO number.**

## 11.5 SUPERPAVE DESIGN AND TESTING PROPERTIES

	Required Density (% of Theoretical Maximum Specific Gravity (Gmm) Number of Gyration (Average of 2-6 inch specimens)	
$N_{\text{initial}}$	6	85 - 91%
$N_{\text{design}}$	60 (Mix Design Only)	96%
Percent Air Voids, in compacted mixture 0% RAP	Mix Design Only Field	4.0% 3.0-5.0%
Percent Air Voids, in compacted mixture 5-25% RAP or FRAP	Mix Design Only Field	3.7% 2.8-4.5%
Percent Air Voids, in compacted mixture 26-40% FRAP	Mix Design Only Field	3.4% 2.6-4.1%
$VEA\%^1$	(0% RAP) (5-25% RAP/FRAP) (26-40% FRAP)	10.0% 10.3% 10.6%
The ratio of minus 75 $\mu\text{m}$ (No. 200) material to % effective asphalt control (Pbc) based on the weight of the aggregate from the extraction test	Mix Design Field (0-25% RAP/FRAP) Field (26-40% FRAP)	0.6-1.2 0.6-1.6 0.5-1.5

<sup>1</sup>VEA% = Volume of Effective Asphalt (%) which is the numerical difference between VMA and Air Voids.

**When the aggregate absorption is high, the produced mixture will be tender until the asphalt is absorbed into the aggregate. Therefore, it may be beneficial to silo the mixture at the plant for a time before delivering to the project site. This is more important when the truck haul is short.**

## 11.6 RESISTANCE OF COMPACTED BITUMINOUS MIXTURE TO MOISTURE INDUCED DAMAGE

### AASHTO T 283-03

The index of retained strength must be greater than 80 percent as determined by AASHTO T 283-03 (using a 4 inch nominal size mold). Specimens shall be conditioned by freezing and thawing. When the index of retained strength is less than 80 the amount of anti strip may have to be adjusted. No additional payment will be made to the Contractor for addition of anti-stripping agent required. The mix shall contain the anti-stripping agent specified in paragraph "Anti-Stripping Agent" and tested by AASHTO T 283.

**a. Method of determining the retained strength of plant-produced mixtures. Sample the plant produced mixture at the plant site in accordance with ASTM D 979 or behind the paver using the procedure specified herein. Transport the mixture to the laboratory and determine the theoretical specific gravity as specified in paragraph "Asphaltic Concrete Mix Design Method". Prepare the specimens for the AASHTO T 283 test using the same four-hour cured material and compact to  $7 \pm 0.5$  percent air voids. Allow the samples to cool and cure overnight at room temperature and proceed with testing by determining the thickness and bulk specific gravity, then separating the specimens into**

**subsets and preconditioning as specified herein. Then proceed with the testing as specified in AASHTO T 283.**

**b. Test for AASHTO T 283**

One set of tests for each mix design from each plant shall be made as the final verification of the plant produced mix design by the contractor's laboratory.

(1) One set of tests for each mix produced for Public Works Department Contracts shall be taken during the initial production each year and one set of tests for each 10,000 tons produced that year. Sampling frequency shall be adjusted when the Contractor has multiple contracts with the Public Works Department so that tests are taken every 10,000 tons of production. The City Engineer may take an additional test at his expense. Any test that fails will require the contractor to adjust the JMF and take additional test at the contractor's expense.

(2) One set of tests shall be made and approved by the City Engineer at contractor's expense when any of the material sources change or when requested by the City Engineer.

**11.7 CONTRACTOR'S LABORATORY**

Asphaltic Concrete Mix Design shall be the responsibility of the Contractor's Laboratory. The laboratory shall be a commercial testing laboratory meeting the requirements of ASTM D 3666-05a. The manager of the laboratory shall submit a signed certificate stating that the laboratory has a current certificate stating that the laboratory meets the ASTM D 3666-05a requirements. The laboratory shall have past experience in testing materials and making Superpave Asphaltic Concrete mix designs. The laboratory shall be approved by the City Engineer. The laboratory shall establish the mix design using the criteria specified herein. Certified test results of the mix design and materials shall be submitted 30 days prior to commencing construction for review by the City Engineer. The test results shall include all detailed raw calculations for the composition of the mix design and shall include all specific gravity calculations. The calculations must be legible but not necessarily typed.

**11.8 VERIFICATION OF THE PLANT PRODUCED MIX DESIGN BY THE CONTRACTOR'S LABORATORY**

All test properties of the mix shall be verified by sampling and testing the uncompacted mix placed behind the paver. The test shall be performed in accordance with paragraph "Superpave Asphaltic Concrete Mix Design Method" and shall indicate the test properties of the mix shown in paragraph "Superpave Design and Testing Properties". Also, an extraction and gradation test shall be made using the ignition oven. The contractor's laboratory shall adjust the mix design entering the plant to obtain the test properties behind the paver.

**a. The properties of the plant produced mix shall be determined using uncompacted mix sampled behind the paver. The properties shall be determined at Ndesign from the average of two 6 inch nominal size samples gyrated to Nmax.**

**b. Material for the sample shall be from the following locations**

One from each side of the placed bituminous mat and one from the center of the mat. A square, pointed shovel shall be used for taking the sample and for evenly laying material back into the disturbed mat. Care shall be taken not to get foreign material or tack oil into the sample.

**c. A test shall be taken at least daily, or as directed by the engineer when the plant has produced a minimum of 200 tons.**

- (1) The test shall also consist of one gradation test ASTM C-136-96a of hot bin material for conventional plants, or total aggregate material from the final feed belt for dryer-drum plants.
- (2) **NOTE: The result of the gradation test is very important in determining how to adjust the mix. After the gradation or the bitumen content has been adjusted to obtain the properties of the mix, this verified mix design becomes the Job Mix Formula (JMF). The plant settings may have to be adjusted again whenever the gradation of the materials change. When a change is made it shall be reported on the Superpave Asphaltic Concrete Test Report form.**
- (3) Gradation and asphalt content of the mix shall be performed using ASTM D-6307-05 Standard Test Methods for Asphalt Content of Hot Mix Asphalt by the Ignition Method and ASTM D 5444-05. The initial temperature setting of the Ignition Oven shall not exceed 525° C (975° F). If RAP or FRAP is used, an additional gradation and asphalt content test shall be performed for the combined RAP or FRAP sampled from the RAP cold feed into the plant.
- (4) Laboratory test results shall be shown on the test report form “Asphaltic Concrete Test” shown at the end of this specification section. Test results shall be received by the contractor and the City Engineer field representatives within approximately 7 hours after the samples are taken. The laboratory shall determine the Percent Voids, VMA and VEA as soon as possible and evaluate in accordance with paragraph below: **“Corrective action to be taken when Asphaltic Concrete Test indicates the mix is out of specification.” Whenever the Percent Voids or VEA is out of specification the laboratory shall contact the Contractor and the City Engineer immediately.** The Contractors testing laboratory shall send the test results directly to the Contractor and the City immediately upon completion of the test. Signed checked copies may be sent later. The Contractors laboratory shall furnish the City’s laboratory other items such as the JMF mix gradation, plant setting, the bulk specific gravity of the aggregate  $G_{sb}$  and the specific gravity of the asphalt  $G_b$ . Laboratories shall compare final test results when the mix is out of specification. The test results shall indicate whether the plant needs adjusting and recommendations shall be provided on correcting the problem.
- (5) The most recent Asphalt Concrete Test that indicates the mixture meets the specifications is the current mix design.

**d. Corrective action to be taken when Asphaltic Concrete Test indicates the mix is out of specification.**

(1) Asphaltic Concrete Surface and Asphaltic Concrete Intermediate or Leveling Course

The mix should be adjusted when consecutive tests show the percent voids in the compacted mix are getting close to being the minimum or the maximum field values.

Paving shall stop and the mixture shall be redesigned whenever any of the following occurs: three consecutive sets of tests show the percent voids in the compacted mix are less than the minimum field value or more than the maximum field value; or two consecutive sets of tests show the percent voids in the compacted mix are less than 0.5 percent below the minimum field value or 0.5 percent greater than the maximum field value.

Also paving shall stop and the mix shall be redesigned whenever three consecutive sets of tests show the VEA is more than 1.0% greater or 1.0% less than the VEA specified in paragraph S-1.5.

(2) Asphaltic Concrete mixtures with a test indicating the VEA is 2.0% above the value specified in paragraph S-1.5 shall be removed unless directed otherwise by the City Engineer.

**e. Pre-Construction test strips**

Test strips shall be constructed by the Contractor off city property at the contractor’s expense. However, the city shall observe the sampling and testing. The contractor may negotiate the construction of a test strip on the project with the engineer. In that event, asphalt not meeting specification shall be removed at contractor’s expense. Asphalt meeting specifications will be paid for at unit prices.

- (1) The Contractor's laboratory shall test the final belt gradation if the plant is a dryer-drum plant or the hot bin material if the plant is a conventional plant, and adjust the feeds to insure the plant is producing the gradation of the mix design, before hot mix production begins for the tested strip.
- (2) Test strips shall contain at least 85 tons of asphaltic concrete. A test sample shall be taken behind the paver at 80 tons. The paver shall be set 12 feet wide and at plan depth when the sample is taken. Care shall be taken not to get foreign material or tack oil into the sample.
- (3) If the laboratory test results indicate the mix can be adjusted to meet the properties stated in paragraph "Superpave Design and Testing Properties", project paving may begin. However, this has to be agreed upon by the Contractor's laboratory, the Contractor, and the City Engineer. Otherwise, another test strip shall be constructed. Test strips will not be required on other projects which use this mix design. However, all materials have to be from the same sources and geological units. Also, the mix has to be produced by the same plant.

#### **11.9 VERIFICATION TESTING OF THE PLANT PRODUCED ASPHALTIC CONCRETE BY THE CITY.**

The City Engineer will take verification tests at random times, at the City's expense.

#### **11.10 MIXING PLANTS**

Mixing plants shall meet the requirements of KDOT's latest specification in effect when this project's bids are received by the City, except the mixture discharged from the plant shall not exceed 157.2°C (315°F).

#### **11.11 ASPHALT MIXTURES HAVING TEMPERATURES LESS THAN 113°C (235°F), WHEN DUMPED INTO THE MECHANICAL SPREADER WILL BE REJECTED.**

- a. All bituminous mixtures shall be delivered to the paver at a temperature sufficient to allow the material to be placed and compacted to the specified density and surface tolerance.
- b. All delivery trucks shall be totally covered with a water proof tarpaulin at the asphalt plant and shall not be uncovered until they are next in line to unload.

#### **11.12 PLACING**

Asphaltic concrete intermediate and surface courses shall not be placed in compacted lifts greater than 3 inches deep except when otherwise indicated on maintenance project plans. Asphaltic concrete surface course shall not be placed thinner than 2 inches deep. Asphaltic concrete intermediate course used as surface shall not be placed thinner than 2 inches. Interim layers of intermediate course shall not be left uncovered by the subsequent course for more than 5 days, weather permitting. Material trucks hauling materials other than asphaltic concrete or tack coat shall not travel on previously constructed layers of asphaltic intermediate course until the final course of the intermediate is constructed.

- a. The Contractor shall schedule and route his hauling operation to minimize hauling over a final course as much as feasible.

#### **b. Bituminous-Materials Spreaders**

Bituminous-materials spreaders shall be the self-propelled type equipped with hoppers, tamping, or vibrating devices, distributing screws (augers), adjustable screeds operated either manually or automatically, equipment for heating the screeds and equalizing devices. The spreader shall be capable of spreading hot bituminous mixtures without leaving indented areas, tearing, shoving, or gouging and capable of confining edge of strips to true lines without use of stationary side forms and capable of placing the course to the required thickness. It shall also be capable of producing a finished surface conforming to the smoothness requirements specified. Spreaders shall be designed to operate forward at variable speeds and in reverse at

traveling speeds of not less than 100 feet per minute. If an automatic grade control device is used on the spreader for two-lane paving operations, it shall consist of sensing device for control of one end of the screed and a slope-control mechanism for control of the other end of the screed, or a sensing device on each side of the paving machine. Where the paver is used on multiple paving lanes (more than two paving lanes), sensing devices shall be used on each side of the spreader for control of the screed. The slope-control mechanism shall not be used for grade control in multiple paving lane operations.

(1) When the contractor chooses to pave lanes through the project wider than 12 ft. the spreader (paver) shall be equipped with auger extensions.

**(2) Through lanes shall be paved before left turn lanes and side street intersections. Through lane pavers shall not stop for other areas to be paved.**

#### **c. Special Procedures to Prevent Segregation**

The wings of the spreader hopper shall not be emptied (flipped) between truck loads. The depth of the material in the screed auger chamber shall be kept approximately three-fourths (3/4) full - all the way out to the end gate. The augers should be running automatically and the vibrating screed turned on. The hopper conveyor shall always have approximately 6 inches of material covering it and not be allowed to run out of material. Whenever the paver is run empty (conveyor exposed) the area behind the paver should be checked for a segregated spot. If a spot exists the paver should be stopped and the segregated spot repaired before it is rolled.

#### **d. Joints General**

Joints between old and new pavements or between successive day's work shall be cut back vertical with a saw. Other joints shall be sawed vertical as directed by the City Engineer. All joints shall be tacked and shall be made carefully to insure continuous bond between old and new sections of the course. All joints shall have the same texture, density, and smoothness as other sections of the course. The tack shall be overlapped onto the previous pavement 1 inch to 2 inches. Contact surfaces of previously constructed pavements, curbs, gutters, manholes, etc., shall be tacked. Surfaces that have become coated with dust, sand, or other objectionable material shall be cleaned by brushing or cut back with an approved power saw, as directed. The surface against which new material is to be placed shall be sprayed with a thin, uniform coat of bituminous material conforming to the requirements of paragraph TACK COAT stated hereinafter. The material shall be applied far enough in advance of placement of the fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of the sprayed surface.

(1) Edges of previously placed pavement that have cooled and are irregular, honeycombed, poorly compacted, damaged, or otherwise defective unsatisfactory sections shall be cut back to expose a clean, sound surface for the full thickness of the course as directed by the City Engineer.

(2) Transverse Joints

The roller shall pass over the unprotected end of freshly placed mixture only when placing of the course is discontinued or when delivery of mixture is interrupted to the extent that unrolled material may become cold. In all cases, the edge of the previously placed course shall be cut back to expose an even, vertical surface the full thickness of the course. In continuing placement of the strip, the mechanical spreader shall be positioned on the transverse joint so that sufficient hot mixture will be spread to obtain a joint after rolling which conforms to the required density and smoothness specified herein.

A string line shall be used to set pavement elevations twenty-five feet after a beginning at a transverse joint or twenty-five feet before an ending at a transverse joint.

(3) Offsetting Joints in Intermediate and Surface Courses

The surface course shall be placed so that longitudinal joints of the surface course will not coincide with joints in the intermediate course by approximately 9 inches. Care shall be taken when possible to offset

longitudinal joints in a manner that the final surface course joint is in the center of the pavement or at the location shown on the plans. Transverse joints in the surface course shall be offset by at least two feet from transverse joints in the intermediate course.

**(4) Special Requirements for Placing Paving Lanes Succeeding Initial Lanes**

In placing each succeeding lane after the initial lane has been placed and compacted as specified hereafter, the screed endgate of the mechanical paver shall overlap the previously placed lane slightly and shall be approximately 1.25 times thicker than the existing compacted lane to allow for compaction roll down and produce a smooth compacted joint with the specified density. Mixture placed on the edge of the previously placed lane by the mechanical paver shall be pushed back (tucked) to the edge of the lane being placed by use of a lute (rake). The pushed back material shall form a ridge on the uncompacted lane along the edge of the previously placed lane. The height of the ridge above the uncompacted lane should be approximately equal to the thickness being allowed for roll down during compaction. These procedures shall be used to facilitate getting a smooth joint with density. Excess mixture shall be removed and wasted. Excess material shall not be spread over the uncompacted mat.

**e. Steel-Drum Rollers**

Steel-drum rollers shall be self-propelled, tandem (two-axle) with both drums the same size, powered by both drums, vibratory types, weighing not less than 20,000 pounds static weight and not less than 150 lb/in of drum. Drums shall be equipped with adjustable scrapers, water tanks, and sprinkling apparatus for keeping the drums wet, thereby preventing the bituminous mixture from sticking to the wheels. Rollers shall be capable of reversing without backlash and free from worn parts. Roller drums with flat and pitted areas or projections that leave marks in the pavement will not be permitted.

**f. Heavy Pneumatic-Tired Rollers**

Heavy pneumatic-tired rollers shall be self-propelled and shall consist of two axles on which are mounted an odd number of pneumatic-tired wheels. The roller shall have at least nine pneumatic-tired wheels in such manner that the rear group of wheels will not follow in the tracks of the forward group, but spaced to give essentially uniform coverage with each pass. Axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. Tires shall be smooth, inflated to 90 p.s.i.. Construction of the roller shall be such that each wheel can be loaded to a minimum of 2,300 pounds.

**g. Blowers and Brooms**

Blowers and brooms shall be power type and suitable for cleaning the surface to be paved. Open faced brooms may only be used when approved by the City Engineer.

**11.13 COMPACTION OF MIXTURE**

The contractor is responsible for the development of a compaction procedure that will obtain the required density. The following paragraphs describe a procedure that generally obtains density. **The contractor shall determine the exact amount of rolling (coverages needed) to obtain a density meeting paragraph: "Density and Density Test". The ideal density is an average density between 92% and 94%.**

**a. General**

The surface of the placed material shall be corrected if necessary before compaction begins. Compaction of the mixture shall be accomplished using a minimum of two steel-drum rollers and a pneumatic-tired roller as specified above. Breakdown rolling shall be as close behind the paver as possible. The break down roller shall be a steel-drum and operated in the vibratory mode on the first forward pass and may be operated in vibratory mode on subsequent passes either forward or back. Delays in rolling freshly spread mixture will not be permitted. The pneumatic-tired roller shall be used as an intermediate roller; however, it shall also roll closely behind the break down roller. The pneumatic-tired roller shall always be

kept moving in order to keep its tires warm. The second steel-drum roller shall be used as a final finish roller. Rollers shall not travel faster than 3 mph. Steel-drum rollers shall not be used in the vibratory mode except for initial breakdown rolling. When steel-drum rollers are used in the vibratory mode they shall be operated at maximum frequency and minimum amplitude. Rolling shall be continued until density is obtained in all portions of each course.

The speed of rollers shall be slow enough at all times to avoid displacement of the hot mixture. Displacement of the mixture resulting from reversing the direction of the roller or from any other cause shall be corrected at once by raking or removing and replacing fresh mixture when necessary. Alternate passes of the roller shall be varied slightly in length. During rolling, the wheels of steel-drum rollers and plates of vibro plate compactors shall be moistened to prevent adhesion of the mixture to the drums or plates, but excess water will not be permitted. Tires of heavy pneumatic roller shall be moistened with soapy water when required to prevent mixture from sticking to tires during rolling. Rollers shall not be permitted to stand on finished courses until the courses have thoroughly cooled. The contractor shall supply ample rollers to obtain the specified density. Places inaccessible to rollers shall be thoroughly compacted with hot hand-tampers or vibro plate compactors.

#### **b. Break Down Rolling**

Rollers shall be operated as specified above. The unconfined edge or low side edge of the paving lane shall be broken down first. The other edge shall be broken down second and the middle broken down last. **This is considered one coverage.** Steel-drum break down rollers shall not hang over the free edge of the mat or stay back from it even though they are going to back up for the adjoining lane. The entire lane shall be broken down at the same temperature.

##### (1) Intermediate Rolling

The rubber tired roller shall be close behind the break down roller after the mat has cooled a few degrees. The rubber tired roller shall roll the same pattern making the same coverage as the breakdown. The rubber tired roller should stay the thickness of the lift from the free edge.

**The number of coverages shall be determined by the contractor. This will change with temperature, humidity and thickness of the lift.**

##### (2) Longitudinal Joint Break Down Rolling of Paving Lanes Succeeding Initial Lanes

The break down roller in the vibratory mode shall lap over the tucked joint approximately six inches (6") on to the previously placed compacted lane.

As part of the break-down rolling and immediately after the break-down roller completes its first passes, the longitudinal joint shall be pinched to ensure compaction with the pneumatic-tired roller. The rubber tired roller shall make at least one complete pass (forward and backward) operated on the hot lane with the outside tire pinching the joint.

After the rubber tired roller rolls the joint, it shall make at least one pass over the rest of the mat and then drop back to its intermediate rolling. The steel drum roller in static mode shall immediately smooth out the rubber tired marks.

##### (3) Finish Rolling

Finish rolling should start when the mat has cooled down 20°F to 40°F below the intermediate rolling (This could be approximately 225°F). The steel wheeled roller in static mode shall immediately smooth out the rubber tired marks using the same pattern making the same type coverages as the breakdown roller. Do not roll until cracks appear, let it cool. Finish rolling can continue until the temperature reaches 175°F to 150°F.

**The finish rolling shall continue until the pavement is smooth and has the density specified above.**



#### 11.14 SAMPLING PAVEMENTS FOR DENSITY

Samples of finished pavement shall be obtained by the contractor or the contractor's laboratory. A minimum of one test (three cores) shall be taken for each tonnage lot represented by a Superpave Asphaltic Concrete test. Lots larger than 1200 tons shall have one set of (three cores) for each 1000 tons placed or as directed by the Engineer. The cores samples shall be taken at locations throughout the tonnage lot. The locations shall not be previously marked. The core locations shall be marked by the City Engineer after each tonnage lot placement is completed. Cores shall be at least 4 inches in diameter. Sample holes shall be backfilled by the contractor using Quikrete, Rapid Road Repair manufactured by The Quikrete Companies, Atlanta Georgia, 30329, Crystex manufactured by L&M Construction Chemicals Inc., Omaha Nebraska, 68152 or approved equal. The top of the patch shall be sprayed black with paint. The samples shall be tested by the contractor's laboratory to determine conformance to density and thickness. The City Engineer may require the contractor to take more samples at the contractor's expense if the density is marginal.

#### 11.15 DENSITY AND DENSITY TEST

Density of the compacted mixture of the surface or intermediate course shall be determined by tests made on specimens taken from the compacted course in accordance with the requirements of the previous paragraph: SAMPLING PAVEMENTS FOR DENSITY. The density shall be the average of the three cores 92% to 96% of max theoretical specific gravity of the Superpave Asphaltic Concrete test for the lot. No core shall be less than 90%.

#### 11.16 WEATHER LIMITATIONS

Weather limitations in Section 611.3(b) of the Standard Specifications shall apply except that the following table shall be used.

<b>Asphalt Placement Temperature Limitations</b>			
Paving Course	Compacted Thickness (inches)	Air Temperature (°F)	Road Surface Temp. (°F)
Surface	All	55	60
Subsurface	< 1.5	50	55
Subsurface	≥ 1.5 and < 3	40	45
Subsurface	≥ 3	30	35

#### 11.17 ROAD SURFACE PREPARATION

When the bituminous mixture is placed on an existing bituminous surface, the surface shall be cleaned of all foreign material and broomed as necessary to remove dust. Areas shown on the plans or designated by the City Engineer to be patched shall be excavated to a depth directed by the City Engineer, filled with bituminous mixture and compacted. When the contract does not provide for a patching item, an amount two and one-half times the unit price for the bituminous mixture shall be used. The excavation required will not be paid for directly but will be considered subsidiary. In addition to brooming, a high pressure type water truck, capable of washing all fines, dirt, and debris from the surface, may be required prior to overlaying as directed by the City Engineer. Equipment compliance with this specification shall be visual observation by the City Engineer at the commencement of washing operations. Unless specified, no direct payment shall be made for this item, as it shall be considered subsidiary to other bid items.

#### 11.18 TACK COAT

Emulsified Asphalt CSS-1h meeting the requirements of Section 1203 of the Standard Specifications shall be used for tack coat. All existing and new asphaltic concrete surfaces shall receive a tack coat not more than six hours prior to placing an asphaltic concrete paving course. Surfaces previously tack coated and not covered with new asphaltic concrete for more than six hours shall be retacked. The rate of application shall be 0.05 gal./sy to 0.12 gal./sy, or as otherwise directed by the City Engineer. At locations where asphalt is

being placed on top of existing concrete pavement, or for night work where temperatures warrant, the emulsified asphalt shall be diluted 10 percent with water versus the normal 50 percent dilution with water. Tack coat shall not be paid for directly but shall be considered subsidiary to other bid items.

#### **11.19 SURFACE SMOOTHNESS**

The surface course, upon completion of final rolling, shall be smooth and true to grade and cross-section. When a 12-foot straightedge is laid on the surface parallel with the centerline, the surface shall not vary more than 1/8 inch from the straightedge. When the 12-foot straightedge is laid on the surface transverse to the centerline between the crown and edge of pavement, the surface shall not vary more than 1/4 inch from the straightedge. Low or defective areas shall be immediately corrected by cutting out the faulty areas and replacing with fresh hot mixture and compacting the area to conform to the remainder of the pavement. Testing for plan grade conformance and surface smoothness shall be performed by the Contractor in the presence of a representative of the City Engineer. Tests shall be made at intervals as directed by the City Engineer. The City Engineer may direct the contractor to diamond grind areas that are out of tolerance in lieu of above replacement.

#### **11.20 MEASUREMENT**

Measurement shall be in accordance with Section 109.01 of the Standard Specifications and as modified herein after. The asphalt mixture shall be weighed on approved, certified scales at the contractor's expense. Scales shall be inspected and sealed at least annually by an approved calibration laboratory. The City Engineer will verify the weights at random times, at the City's expense.

#### **11.21 PAYMENT**

Payment will be made at the contract unit price bid per ton for "Asphaltic Concrete Intermediate Course" and "Asphaltic Concrete Surface Course". This shall be considered payment for all items of work specified in this section. No separate payment will be made for tack coat and asphalt cement.

**SUPERPAVE ASPHALTIC CONCRETE TEST (Verified Mix Design)**

Description:			
LAB I.D.:		<b>TIME</b>	<b>TONS</b>
Sample Date:		Belt	
Sample I.D.:		Hot Mix	
Supplier:			

**GRAIN SIZE DATA – ASTM D5444, C136, C117**

Sieve Size	Belt Sample	RAP/FRAP Sample*	Hot-Mix Sample*	Master Grade Limits	Cal. Single Point
19mm (3/4")					
12.5mm (1/2")					
9.5mm (3/8")					
4.75mm (No. 4)					
2.36mm (No. 8)					
1.18mm (No. 16)					
600µm (No 30)					
300µm (No 50)					
15 µm (No 100)					
75µm (No 200)					

\*EXTRACTION DATA-ASTM D6307

%AC, total mix basis	Sample	RAP/FRAP	Plant Setting	*from uncompacted mat

Aggregate Type	%**	Aggregate Type	%**

\*\*total aggregate basis

**VOLUMETRIC DATA 6" NOMINAL SIZE Gyratory Specimens**

Gyrations (average of 2 specimens) @ 280-290 deg F – AASHTO T312 - 01  
 | Ndes = 60 | Nini = 6

Sample*	Specifications	
Mix bulk specific gravity @ Ndes, Gmb	--	
%Voids @ Ndes	3.0-5.0/2.8-4.5/2.6-4.1	AASHTO T T-169 0%/5-25%/26-40% RAP
%VMA @ Ndes, Gsb basis		
%VEA @ Ndes	9.0-11 9.3-11.3 9.6-11.6	=%VMA-%Voids (0-5% 5-25% 26-40% RAP)
%Gmm @ Nini	85-91	AASHTO T 166-00
Ratio (-) 75µm (No. 200) to % Eff Binder	0.6-1.6/0.5-1.5	0-25%/26-40% RAP
Tensile Strength Ratio, %	80 minimum	AASHTO T 283-03
Max Theoretical Specific Gravity Gmm	--	AASHTO T 209-99(04)
Max Theo. Density, pcf	--	
Effective specific gravity Agg. Gse	--	
Bulk Specific Gravity of Total Agg., Gsb	--	ASTM C128, C127

Specific Gravity of Asphalt, Gb		--	
Shale or shale-like (virgin aggregates only)		1.0% maximum	KT-8
<b>COMMENTS:</b>			

## 12 - METHODS OF MILLING OPERATIONS

### 12.1 DESCRIPTION

This work will consist of the removal of the existing surface to the depth and limits shown on the Plans or established by the Engineer and in accordance with Section 612 of the Standard Specifications except as otherwise modified herein. It shall also include the loading and stockpiling, if required, of the milled material and the cleaning of milled surfaces prior to applying a tack coat.

### 12.2 CONSTRUCTION REQUIREMENTS

#### a. Milling Operations

The nature and condition of the milling equipment and the manner of performance of the work shall be such that the finished milled surface of the pavement is not torn, gouged, shoved, broken, oil coated or otherwise injured by the milling operation.

The milling operation shall provide for a windrowing of cuttings, pick-up and elevation into dump trucks, all in a single lane operation. Use of front-end loaders as the primary means of pick-up will not be construed as a single lane operation, nor will side loading of dump trucks be permitted.

All side streets shall have a butt joint of 1 inch unless otherwise specified on the plans. All driveways greater than 1 inch after milling shall be ramped.

#### b. Milling Machine and Equipment

The milling machine to be used in this contract shall be designed and built for cold milling work; shall be self-propelled; and shall have a means of milling the old pavement surface. The drum patterns shall leave a grooved surface finish. The milling machine drum shall have its teeth in a triple turn type pattern. The drum shall be totally enclosed to prevent discharge of any loosened material on adjacent work areas. A dust suppression system must be part of the equipment. Maximum width of the milling machine shall be 12'-6"; drum widths shall be minimum to maximum. Smaller machines may be used for auxiliary purposes only. A milling machine attached and powered by a unloader capable of a 3-1/2 inch to 4 inch deep cut shall be used for asphalt repair work.

The cold milling machine shall have adequate power to force the cutting edge(s) of the drum teeth to the desired depth below the surface of the pavement without causing undue irregularities in the surface of the planned pavement.

The surface shall be milled flush to all curbs, inlets, manholes or other similar obstruction within the paved area.

#### c. Joints

All areas with 1 inch in depth or greater not replaced within the work day limitations, or as directed by the City Engineer, shall have temporary material placed to allow traffic full access. The temporary material shall be hot mixed asphalt.

#### d. Milling (Total Width Cut)

Sufficient passes or cuts shall be made at a depth and width as shown on the plans. The milling operation shall provide a smooth profile and cross section that does not require a leveling course prior to the overlay operation. Prior to opening to two-lane traffic, no unevenness within a lane shall exist. The maximum tolerance for Milling (Total Width Cut) in a longitudinal direction shall be 1/2 inch under a 10 foot straight edge and shall be 3/8 inch under an 8 foot straight edge in a transverse direction. "Milling (Total Width Cut)" shall be paid for at the contract unit price per square yard, for the depths indicated on the plans.

**e. Special Cleaning of Milled Surfaces**

Milled surfaces shall be cleaned with a street sweeper immediately prior to applying tack coat. The sweeper shall remain on the project during application of tack. Each lane shall be cleaned to the satisfaction of the City Engineer. Open faced brooms may only be used in conjunction with the sweeper when approved by the City Engineer.

(1) Street Sweeper Brooms

- (a) The sweeper shall have right and left gutter brooms.
- (b) Speed of broom shall be independent of pickup broom speed.
- (c) Gutter brooms shall be adjustable from inside cab for down pressure and wear. Both gutter brooms tilt angle shall be controlled from inside the cab.
- (d) Gutter brooms shall be protected from impact with automatic return to work position.
- (e) Pickup broom shall have hydraulic pickup for transport.
- (f) Pickup broom down pressure shall be manually adjusted.
- (g) Minimum sweep path of 125”.

(2) Pickup brooms adjustments

The pickup broom shall be adjusted to have a heavy sweeping (5” to 7” pattern) (this is the longitudinal contact of the broom with the roadway shall be between 5” and 7”). Each side of the broom shall have the same contact with the roadway.

**Additional cleaning may be required using compressed air as directed by the City Engineer.**

**12.3 MEASUREMENT AND PAYMENT**

The Engineer will measure the total width cut for intersection by the square yard of milled area at the depth indicated on the plans.

Payment for “Milling (Total Width Cut - Intersection)” at the contract unit price bid is full compensation for the specified work.

The Engineer will measure street sweeping by lump sum.

Payment for “Special Cleaning of Milled Surfaces” at the contract lump sum price is full compensation for the specified work.

**13 - AB-3 OVERLAND PARK MODIFIED**

**13.1 DESCRIPTION**

AB-3 Overland Park Modified shall be supplied in accordance with Section 1104 of the Standard Specifications, except as otherwise modified herein.

**13.2 MATERIALS**

Paragraph 1104.2(a) composition shall be modified so that the AB-3 Overland Park modified shall consist of 100% limestone or dolomite produced by mechanical crushing.

Table 1104-1: Gradation and Plasticity of Aggregates for Aggregate Base Construction shall be modified so that the AB-3 Overland Park modified shall have the gradation shown on line AB-3; however, the P.I. shall be between 0 and 5 and the liquid limit shall be 25 maximum.

The material shall be mixed with water in a stationary plant, before delivery to the project site, to obtain the moisture content as directed by the City Engineer.

**13.3 CERTIFICATION OF THE MATERIAL**

The Contractor shall submit with the delivery of the material to the project, a certificate indicating the gradation, plasticity index, and the moisture-density relationships of the material using ASTM D698 complies with the above material specification.

### **13.4 MEASUREMENT AND PAYMENT**

The Engineer will measure the aggregate base course (AB-3 Overland Park modified) by the square yard of placed material.

Payment for “Aggregate Base Course (Ab-3 Overland Park Modified)” at the contract unit price bid is full compensation for the specified work.

## **14 - CONCRETE CONSTRUCTION**

### **14.1 DESCRIPTION**

All concrete construction shall meet the requirements of Section 401 of the Standard Specifications except as otherwise modified herein.

### **14.2 MATERIALS**

#### **a. Mix Designs**

The mix designs shall be approved by the Kansas City Metro Materials Board as meeting the designation “KCMMB 4K” or “KCMMB 5K”.

#### **b. Ready-mixed Concrete**

Ready-mixed concrete shall be mixed and placed in accordance with the requirements of the Standard Specifications, except that ready-mixed concrete shall be transported with agitation, and such concrete shall not be used when the cement has been in contact with the water more than one hour before it is placed. All concrete shall meet the slump requirements specified. Any addition of water shall be in accordance with the KCMMB specification and prior approval of the Engineer. A diligent effort shall be made by the Contractor and the ready-mix concrete producer to deliver concrete at regular intervals, and to maintain a uniform mix throughout each concrete pour. Concrete shall be delivered at intervals frequent enough to prevent any cold joints.

#### **c. KCMMB 4K Construction**

All concrete used in construction on this project shall be classified as KCMMB 4K. The actual mixed proportions of cement, aggregates and water shall be determined by the Contractor.

#### **d. Curing**

Wet covering and waterproof covering shall conform to KDOT Sections 1405- 1407 of the Standard Specifications. Liquid membrane-forming compound shall conform to the requirements for Type 2 White Pigmented Compound as specified in AASHTO M148. Clear liquid membrane-forming compound shall not be used.

#### **e. Reinforcing Steel**

(1) Reinforcing bars shall be in accordance with “Reinforcing Steel”.

(2) Welded wire fabric shall conform to the requirements of ASTM A 185, Grade 60 and shall be supplied in sheets. Rolls shall not be used.

#### **f. Water**

Water shall be clean and free from deleterious substances.

### **14.3 CONSTRUCTION REQUIREMENTS**

#### **a. Placement and Curing**

The Contractor shall provide 24 hour notice of his intention to place concrete to allow for adequate supervision.

Table 710-1 of the Standard Specifications shall be modified to require a minimum curing period of 5 days for Other Formed Surfaces.

#### **b. Admixtures**

KCMMB Concrete shall not be supplied with any admixtures designated as (Optional) in the Mix Design Testing Data without prior approval of the City Engineer.

Concrete admixtures will not be added to concrete after leaving the batch plant without approval of the City Engineer.

**c. Forms**

Forms shall be of steel or wood, free from warp and shall be sufficiently strong and rigid and securely staked and braced to obtain a finished product correct to the dimensions, lines and grades required. All forms must be cleaned and oiled before each use. In no case shall forms obstruct the waterways of the storm sewer system.

**d. Special Weather Conditions**

(1) Cold Weather

The Contractor shall comply fully with the provisions of ACI 306.1-90 as modified below:

(a) Average daily temperatures as defined in ACI 306.1-90 will be determined and recorded by the City Engineer.

(b) Concrete temperatures will be determined through the use of high-low thermometers placed and operated by the City below insulated blankets, or where the concrete is uncovered, by checking air temperatures. Uncovered concrete, which has been subjected to freezing temperatures of any duration during the first 24 hours will be considered “frozen,” and shall be rejected.

(c) The months of December, January and February will be considered “Cold Weather” and will require concrete protection, regardless of temperature.

(d) Concrete shall reach 75% of its design strength prior to backfilling. This strength can be determined through the use of field-cured cylinders, made and tested at contractor’s expense. Concrete must have 5 days where the average daily temperature is above 50 degrees F prior to backfilling unless field cured cylinders are taken. These days do not need to be consecutive.

(2) Concrete operations in hot weather shall conform to Section 402.07 (a) of the Standard Specifications.

**e. Backfill**

Backfill of concrete structures shall be in accordance with Section 204.3.f of the Standard Specifications.

**f. Strength Acceptance Requirements**

Cylinders used for determination of concrete strength shall be sampled and field cured in accordance with KT-22, and tested in accordance with ASTM C39. Testing frequency shall be in accordance with the City Sampling and Testing Frequency Chart. All KCMMB 4K concrete shall have a minimum compressive strength of 4000 psi at 28 days. All KCMMB 5K concrete shall have a minimum compressive strength of 5000 psi at 28 days. Concrete not meeting these strength requirements as determined by ACI 318-11 Section 5.6.3.3 shall be removed and replaced at the contractor’s expense.

**14.4 MEASUREMENT AND PAYMENT**

The Engineer will measure the KCMMB 4K structural concrete construction by the cubic yard.

Payment for “KCMMB 4K Concrete” at the contract unit prices bid is full compensation for the specified work.

**15 - REINFORCING STEEL**

**15.1 DESCRIPTION**

All fabrication and placement of reinforcing steel shall be in conformance with Section 711 of the Standard Specifications. All reinforcing shall be as shown on the drawings and shall be held in place and positioned by pins or bar chairs or other approved devices or methods.

## **15.2 MATERIALS**

Reinforcement shall be new billet ASTM A615 Grade 60 for KCM MB 5K concrete construction, or as shown on the plans. Reinforcing shall be new billet ASTM A615 Grade 40 for all other construction, or as shown on the plans.

## **15.3 CONSTRUCTION REQUIREMENTS**

Reinforcing steel shall not be inserted into fresh concrete.

## **15.4 MEASUREMENT AND PAYMENT**

The Engineer will measure the reinforcing steel of the specified grade and coating by the pound.

Payment for "Reinforcing Steel" at the contract unit price bid is full compensation for the specified work. Reinforcing steel used in structures other than bridges shall be considered subsidiary to other bid items.

# **16 - STEEL PILES**

## **16.1 DESCRIPTION**

This work shall consist of furnishing and driving of steel piles at the locations and to the elevations shown on the plans. Steel piles shall be furnished and driven in accordance with Sections 704 and 1609 of the Standard Specifications except as otherwise modified herein.

## **16.2 SUBSURFACE DATA**

The geotechnical investigations were prepared for the guidance of the Contractor as to what soil and water conditions may be expected at the site. They are not guaranteed as representing all the conditions which may be encountered. Each bidder is cautioned that it is your responsibility to examine the boring logs and to determine if the information provided in the report is adequate for your method of construction. The Owner will not assume responsibility for variations in soil and water conditions at locations or times other than indicated.

## **16.3 CONSTRUCTION REQUIREMENTS**

Pile cut-offs shall be made at the plan designated pile elevations shown on the plans with the following exception. In the event that an acceptable top of pile driven to design bearing value falls no more than 6 inches below the plan designated pile elevation, no pile splice will be required.

All pile cut-off material shall be the property of the contractor.

## **16.4 MEASUREMENT AND PAYMENT**

The Engineer will measure completed steel piles of the specified size based on the plan length. If it is determined by the engineer that longer piles are required than those shown on the plans to achieve design bearing values, measurement will be made based on the total length of piling driven subject to payment adjustment for "Pile Splices".

The Engineer will measure pre-drilled pile holes by the linear foot. The length of pre-drilled pile hole to be included for measurement will be computed using the bottom of footing or abutment elevation as shown on the Plans and the bottom of pre-drilled hole elevation as determined in the field. If the Contractor's method of construction requires additional drilling, this additional drilling length shall be subsidiary.

The Engineer will measure cast steel pile points by each.

Payment for "Steel Piles", Pre-Drilled Pile Holes, and Cast Steel Pile Points at the Contract unit prices bid is full compensation for the specified work.

Payment for each splice of "Steel Piles" not shown on the plans shall be one times the Contract unit price per vertical foot. No separate payment shall be made for pile cut-offs as this shall be subsidiary to this item.



## **17 - ABUTMENT DRAINAGE SYSTEMS**

### **17.1 DESCRIPTION**

This work shall consist of furnishing and installing a geocomposite drainage system behind abutment backwalls, wing walls, and retaining walls as shown on the plans and in accordance with Section 725 of the Standard Specifications. .

### **17.2 MEASUREMENT AND PAYMENT**

The Engineer will measure the abutment strip drain by the square yard of horizontally projected drain in place and accepted.

Payment for "Abutment Strip Drain" at the Contract unit price bid is full compensation for the specified work. No separate payment shall be made for geotextile fabric, tubing, pipe connections, outlet pipe, backfill, and compaction as these items shall be considered subsidiary to this item.

## **18 - BRIDGE BACKWALL PROTECTION SYSTEM**

### **18.1 DESCRIPTION**

This work shall consist of preparing the concrete surface and applying a bridge backwall protection system to the face of the concrete abutment as shown on the plans and in accordance with Section 724 of the Standard Specifications.

### **18.2 MEASUREMENT AND PAYMENT**

The Engineer will measure bridge backwater protection systems by the square yard to the limits shown in the Contract Documents.

Payment for "Bridge Backwall Protection System" at the Contract unit price bid is full compensation for the specified work.

## **19 - TEMPORARY SHORING**

### **19.1 DESCRIPTION**

This work shall consist of installing temporary shoring, in accordance with the requirements of Section 701 of the Standard Specifications except as otherwise modified herein and as indicated on the construction plans or as directed by the Engineer.

### **19.2 MEASUREMENT AND PAYMENT**

The Engineer will measure each location of temporary shoring designated in the Contract Documents by the lump sum. Temporary Shoring shown to be used in multiple locations in conjunction with a structure will be considered as one location for lump sum payment. Unless shown as a bid item in the Contract Documents, the Engineer will not measure for payment any temporary shoring needed to comply with safety standards or due to the Contractor's methods of operation.

Payment for "Temporary Shoring" at the contract unit price is full compensation for the specified work.

## **20 - GUARDRAIL, STEEL PLATE (GALVANIZED)**

### **20.1 DESCRIPTION**

Steel plate guardrail and guardrail end terminals shall be furnished and installed in accordance with Section 827 of the Standard Specifications.

## **20.2 MATERIALS**

Material for steel plate guardrail and guardrail end terminal shall be in accordance with Division 1600 and Division 2300 of the Standard Specifications. The Contractor shall file with the City Engineer a Brand Registration and Guarantee. The brand registration and guarantee shall show the brand name or designation, the manner in which it will appear on the fabricated beams, the typical mechanical properties, the class and type of guardrail, and typical weights of galvanized coating on the rails and end sections.

All steel plate guardrail shall have retroreflective delineators mounted on the face of the rail at 25 foot spacings. Mounting brackets shall be galvanized after fabrication and delineators shall be mounted to face oncoming traffic in the adjacent lane. Delineators shall be white Sate-Lite 35 or approved equal.

## **20.3 MEASUREMENT AND PAYMENT**

The Engineer will measure steel plate guardrail by the linear foot.

The Engineer will measure each guardrail end terminal of specified type.

Payment for "Guardrail, Steel Plate" and "Guardrail, End Terminal" at the Contract unit prices bid is full compensation for the specified work. No separate payment will be made for guardrail posts, accessories or attachment hardware.

## **21 - SLOPE PROTECTION**

### **21.1 DESCRIPTION**

Construct slope protection on bridge berms, fill slopes and channel banks as shown in the Plans. Slope protection shall be placed to reasonably conform to the lines and grades shown on the plans and in accordance with Section 830 of the Standard Specifications, except as otherwise modified herein.

### **21.2 MATERIALS**

Stone for riprap shall be sound durable limestone free from cracks, seams, shale partings, and overburden spoil. Deleterious substances which include soft friable particles, objectionable materials, and other foreign matter shall not exceed 5 percent by weight. Geotextile, if specified, shall meet the requirements of Subsection 1710 of the Standard Specifications, unless modified on the plans.

Stone for riprap shall conform to the requirements of Section 1114, for the designation as indicated on the plans.

### **21.3 CONSTRUCTION REQUIREMENTS**

#### **a. Placement**

Slope protection work shall not begin until all construction within the channel and all channel grading is complete and approved by the Engineer. In a designated FEMA floodplain the approval shall be based on a survey of the channel to insure that the grading complies with the lines and grades shown on the Drawings.

Slope protection shall be placed to its full layer thickness in one operation and in such a manner as to minimize segregation and avoid displacing the underlying material. The finished surface of slope protection shall blend smoothly into surrounding slope lines.

Slope protection placing procedures shall result in a reasonable distribution of the stone from the largest to the smallest sizes, free from clusters of the large stones and pockets of the small stones. Placement shall begin at the bottom and proceed up the slope in a progressive manner. Dumping of stone at the top of the slope and rolling into place will not be permitted. Moving stone by drifting and pounding of rock into place will not be permitted. Final finishing of the slope shall be done as the material is being placed. Hand placing shall be employed to the extent necessary to secure the results specified herein.

The contractor shall maintain the slope protection until accepted by the Engineer and any material displaced by any cause shall be replaced at his expense to the requirements specified herein.

## **21.4 MEASUREMENT AND PAYMENT**

The Engineer will measure slope protection by the cubic yard of materials acceptably placed as computed from the neat lines and grades shown on the plans. No measurement will be made of any excavation, backfill, filter fabric, or other appurtenances necessary to complete the work.

Payment for "Slope Protection" at the contract unit price bid is full compensation for the specified work.

## **22 - BRIDGE NUMBER PLAQUE**

### **22.1 DESCRIPTION**

This work shall consist of furnishing and installing a bridge number plaque as shown on the plans designating the Overland Park structure number and year completed.

### **22.2 MATERIALS**

Bridge number plaques shall be made from materials that conform to Section 1625 of the Standard Specifications.

### **22.3 CONSTRUCTION REQUIREMENTS**

#### **a. Location on Bridges**

For bridges with one way traffic, such as thoroughfares, the plaque shall be placed facing traffic on the inside face of the outside bridge corral rail and located at the approaching traffic end of the bridge.

For north/south bridges with two way traffic the plaque shall be placed facing traffic on the inside face of the west bridge corral rail and located at the north end of the bridge.

For east/west bridges with two way traffic the plaque shall be placed facing traffic on the inside face of the north bridge corral rail and located at the east end of the bridge.

#### **b. Location on Box Culverts**

For box culverts meeting the definition of a bridge, the plaque shall be placed in the northwest inside barrel corner.

### **22.4 MEASUREMENT AND PAYMENT**

No direct payment shall be made for this work as it shall be considered subsidiary to other bid items.

## **23 - BRIDGE DECK CONSTRUCTION**

### **23.1 DESCRIPTION**

All concrete construction shall meet the requirements of the "Concrete Construction" specification and Section 710 of the Standard Specifications and as hereafter presented.

### **23.2 MATERIALS**

#### **a. Mix Designs**

The mix designs shall be approved by the Kansas City Metropolitan Materials Board as meeting the designation "KCMMB 4K" with the following additional requirements:

Maximum water/cementitious ratio = 0.40

Silica fume = 3.0% by weight, of combined cement and slag

### **23.3 CONSTRUCTION REQUIREMENTS**

Concrete shall be cured in accordance with Section 710.3.e of the Standard Specifications

## **23.4 MEASUREMENT AND PAYMENT**

The Engineer will measure bridge deck concrete by cubic yard.

Payment for “KCMMB 4K Concrete” at the contract unit price bid is full compensation for the specified work.

## **24 - PERMANENT TRAFFIC CONTROL SIGNING**

### **24.1 DESCRIPTION**

The Contractor shall furnish and install permanent traffic control signing materials at the locations shown on the plans, in conformance with the details, and the material specifications included herein. Permanent traffic control signing materials shall include, but not be limited to, sign sheeting, aluminum sign blanks, sign posts, breakaway base assemblies, mounting brackets and hardware.

The permanent traffic control signing shall be installed before the roadway is open to construction unless prior approval is received by the Engineer or City Inspector. The installation of all regulatory signs is the first priority. If the permanent signs cannot be installed and thus the roadway would be unsigned overnight, temporary regulatory signs shall be installed and remain until the permanent signs can be installed. The contractor shall make every possible effort to remove the temporary signs and install permanent signs within 48 hours. Only under extreme circumstances and at the approval of the signing inspector or the engineer, will the duration of the temporary signs be extended. All temporary and permanent traffic control signs shall be in conformance with the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) Part II. The temporary signs shall be removed prior to installation of the permanent signs.

### **24.2 MATERIALS**

The material for permanent traffic control signs shall be in accordance with this specification.

#### **a. Applicable Documents**

The following documents form a part of this specification to the extent specified herein:

ASTM B209 Specification for Aluminum and Aluminum Alloy Sheet and Plate

ASTM D523 Standard Method for Test for Specular Gloss

ASTM D4956-09 Standard Specification for Retroreflective Sheeting for Traffic Control

ASTM E284 Terminology of Appearance

ASTM E308 Practice of Computing the Colors of Objects by Using the CIE System

ASTM E810 Test Method for Coefficient of Retroreflection of Retroreflective Sheeting Utilizing the Coplanar Geometry

ASTM E1164 Practice for Obtaining Spectrophotometric Data for Object-Color Evaluation

CIE Publication Number 39-2 Recommendation for Surface Colours for Visual Signaling

FP-03 Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects

#### **b. Approved Manufacturer’s List**

All material for permanent traffic control signs used by the Contractor shall be from the City’s approved list of vendors. It is important that users be completely knowledgeable of all application requirements and procedures prior to product application. It is the responsibility of the installer to contact the supplier of all permanent traffic control sign materials if questions regarding application procedures or conditions arise.

#### **c. Super-High Efficiency Full Cube Retroreflective Sign Sheeting**

This specification covers flexible white or colored, Super-High Efficiency Full Cube Retroreflective Sheeting, tape and related processing materials designed to enhance nighttime visibility of traffic control signs and objects. The sheeting shall consist of full cube prismatic lens elements with a distinctive interlocking diamond or hexagonal seal pattern visible from the face of a smooth surface. The sheeting shall have a pre-

coated adhesive protected by an easily removable liner. This sheeting shall be used for all permanent traffic control signs as listed in the "Sign Information Table" on the Overland Park Standard Details.

(1) Classification and Conformance

The sheeting shall conform to ASTM D 4956-09 as modified by this specification for a Type XI classification.

(2) Colors

The manufacturer of the sheeting shall manufacture and offer a single line of standard traffic colors recommended for the sheeting to meet the performance requirements of this specification.

No process color inks, or silk screenings are allowed. All signs shall be made from a combination retroreflective sheeting background with electronic cuttable film applied to the surface..

(3) Test Panels and Test Conditions

Unless otherwise specified herein, sheeting shall be applied to test panels in accordance with ASTM D 4956-09, section 7.2 and test conditions shall conform to ASTM D 4956-09 section 7.1.

(4) Color Requirements

Color shall be as specified and shall conform to the requirements of ASTM D 4956-09, Table 11. Luminance factors shall conform to ASTM Type XI.

(5) Color Processing

The sheeting shall be heat resistant and permit force curing without staining of applied or unapplied sheeting at temperatures recommended by the sheeting manufacturer.

(6) Shrinkage

The retroreflective sheeting shall comply with the shrinkage requirements contained in ASTM D 4956-09 section 6.6.

(7) Adhesive

The retroreflective sheeting shall comply with the liner removal and adhesion requirements contained in ASTM D 4956-09 sections 6.8 and 6.9 respectively.

(8) Coefficient of Retroreflection

Conformance to minimum requirements for Retroreflectance is determined as follows:

(a) Three 8 in. x 8 in. samples spaced evenly across and down a representative piece of sheeting shall be taken. The Coefficient of Retroreflection shall be determined for each of the three samples per ASTM E810. The average of the three values shall comply with the stated minimum table value and no single sample shall be less than 80% of the table value.

(b) The observation angles shall be 0.2°, 0.5°, 1.0°. The entrance angles shall be -4° and 30°. For transparent colored overlay films on white sheeting, the coefficients of retroreflection shall not be less than the minimum requirements of ASTM D 4956-09 Table 10.

(9) Fungus resistance

The retroreflective sheeting shall comply with the supplementary requirements contained in section S1 of ASTM D 4956-09.

(10) General Characteristics and Packaging

The retroreflective sheeting as supplied shall be of good appearance, free from ragged edges, cracks and extraneous materials and shall be furnished in either rolls or sheets.

When furnished in continuous rolls, the number of splices shall not be more than two per 50 yards (45.7 m) of material, with a maximum of three pieces in any 50-yard (45.7 m) length. Splices shall be butted or overlapped and shall be suitable for continuous application as furnished.

The sheeting shall be packaged in accordance with commercially accepted standards. Each carton shall clearly stipulate the brand, quantity, size, lot or run number, color and type adhesive. Stored under normal conditions the retroreflective sheeting as furnished shall be suitable for use for a minimum period of one year.

(11) Durability

The retroreflective sheeting shall comply with the supplementary requirements contained in section S3 of ASTM D 4956-09. It shall be weather resistant and show no appreciable cracking, scaling, pitting, blistering, edge lifting or curling when tested in accordance with section 7.6 of ASTM D4956-09, and shall meet the minimum coefficient of retroreflection after weathering as specified in ASTM D 4956-09 Table 12.

(12) Certifications

The sheeting manufacturer shall submit with each lot or shipment, a certification that states the material supplied will meet all the requirements listed herein.

(13) Field Performance Requirements for Permanent Signing – Ordinary Colors

(a) Sheeting manufactured of standard colors and processed and applied to sign blank materials in accordance with sheeting manufacturer's recommendations, shall perform effectively for at least 12 years. The retroreflective sheeting will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that: (1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions; or (2) the coefficient of retroreflection is less than the minimum specified for that sheeting during that period listed as follows:

80% of values listed in ASTM D 4956-09 Table 10 up to 7 years and

70% of values listed in ASTM D 4956-09 Table 10 up to 12 years

(b) Failure of overlay films provided and/or sold for use on recommended sheeting shall constitute a failure of entire sign and shall be replaced.

(c) For transparent colored overlay films on white sheeting, the coefficients of retroreflection shall not be less than 70% of the values for the corresponding integral color. All measurements shall be made after sign cleaning according to sheeting manufacturer's recommendations.

(d) Natural causes include effects of exposure to weather. Natural causes exclude (without limitation) damage from exposure to chemicals, abrasion and other mechanical damage (such as from fasteners used to mount the sign, collisions or mishandling), vandalism, or malicious mischief.

(14) Field Performance Requirements for Permanent Signing – Fluorescent Colors

Fluorescent colored sheeting processed and applied to sign blank materials in accordance with sheeting manufacturer's recommendations shall perform effectively for at least 10 years. The retroreflective sheeting will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that: (1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions; or (2) the coefficient of retroreflection is less than the minimum specified for that sheeting during that period listed as follows:

80% of values listed in ASTM D 4956-09 Table 10 up to 7 years and

70% of values listed in ASTM D 4956-09 Table 10 up to 10 years

(a) Failure of overlay films provided and/or sold for use on recommended sheeting shall constitute a failure of entire sign and shall be replaced. All measurements shall be made after sign cleaning according to sheeting manufacturer's recommendations.

(b) Natural causes include effects of exposure to weather. Natural causes exclude (without limitation) damage from exposure to chemicals, abrasion and other mechanical damage (such as from fasteners used to mount the sign, collisions or mishandling), vandalism, or malicious mischief.

(15) Sheeting Manufacturer's Replacement Obligation for Ordinary Colors

(a) Where it can be shown that retroreflective signs, supplied and used according to the sheeting manufacturer's recommendations, have not met the field performance requirements as indicated above, the sheeting manufacturer shall cover restoration costs as follows for sheetings shown to be unsatisfactory:

(b) For the entire 12 years, the sheeting manufacturer will replace the sheeting required to restore the sign surface to its original effectiveness. In addition, during the first seven years the sheeting manufacturer will cover the cost of restoration of the sign surface to its original effectiveness at no cost to the City of Overland Park for materials and labor. Replacement sheeting shall carry the unexpired warranty of the sheeting it replaces.

(16) Sheeting Manufacturer's Replacement Obligation for Fluorescent Colors

(a) Where it can be shown that retroreflective signs, supplied and used according to the sheeting manufacturer's recommendations, have not met the field performance requirements as indicated above, the sheeting manufacturer shall cover restoration costs as follows for sheetings shown to be unsatisfactory:

(b) If the failure occurs within the first 7 years from the date of fabrication, the sheeting manufacturer shall, at its expense, restore the sign surface to its original effectiveness. If the failure occurs in the 8<sup>th</sup> through the 10<sup>th</sup> year from the date of fabrication, the sheeting manufacturer will furnish the necessary amount of sheeting to restore the sign surface to its original effectiveness. Replacement sheeting shall carry the unexpired warranty of the sheeting it replaces.

(17) City of Overland Park Obligation

The City of Overland Park shall be responsible for requiring the dating of all signs at the time of application. That date constitutes the start of the field performance obligation period.

**d. Electronic Cuttable Film**

This specification covers flexible, transparent, durable, acrylic films designed to be applied to retroreflective materials for the creation of traffic control signs and devices. The electronic cuttable film shall have a match component warranty equivalent to the retroreflective sheeting and be from the same manufacturer. Mixing one electronic cuttable film product with another manufacturer's retroreflective sheeting shall not be allowed.

(1) Description

Electronic cuttable films shall consist of transparent, durable, acrylic, colored films coated with a transparent pressure sensitive adhesive protected by a removable liner. The films are designed to be cut on knife over roll (sprocket fed or friction fed) and flat bed electronic cutting machines. The films shall be available in standard traffic colors, be dimensionally stable, and be designed to optimally cut, weed, lift, and transfer. Use of electronic cuttable films will not release any volatile organic compounds.

(2) Test Conditions

Unless otherwise specified herein, all applied and unapplied test samples and specimens shall be conditioned at the standard conditions of  $73^{\circ} \pm 3^{\circ}\text{F}$  ( $23^{\circ} \pm 1.5^{\circ}\text{C}$ ) and  $50 \pm 5\%$  relative humidity for 24 hours prior to testing.

### (3) Test Panels

Unless otherwise specified herein, when tests are to be performed using test panels, the specimens of retroreflective and / or overlay films shall be applied to smooth aluminum cut from ASTM B-209 Alloy 5052-H36, 5052-H38, 5154-H38, or 6061-T6 sheets on 0.020 inch (0.051cm), 0.040 inch (0.102cm) or 0.063 inch (0.160cm) thicknesses. The aluminum shall be degreased and lightly acid etched before the specimens are applied. The specimens shall be applied in accordance with the recommendations of the reflective sheeting and electronic cuttable film manufacturer.

### (4) Color Requirements

When electronic cuttable film is applied to retroreflective sheeting, the resulting color of the composite sheeting will conform to Federal Specification FP-03, Section 718.01 and ASTM D 4956.

### (5) Color Test

Conformance to color requirements shall be determined by instrumental method in accordance with ASTM E1164 on sheeting applied to aluminum test panels. The values shall be determined on a HunterLab Labscan 6000 0/45 Spectrocolorimeter with option CMR 559. Computations shall be done in accordance with ASTM E308 for the 2 degree observer

### (6) Coefficient of Retroreflection

When electronic cuttable film is applied to retroreflective sheeting, the composite will conform to the percentage retained of the minimum coefficient of retroreflection specified by these specifications and the manufacturer for the retroreflective sheeting when the retroreflective sheeting is screen processed. The coefficient of retroreflection shall be determined in accordance with ASTM E810.

Coefficients of retroreflection shall be specified in units of candelas per foot candle per square foot (candelas per lux per square meter). The observation angles shall be 0.2° and 0.5° unless otherwise specified. The entrance angles shall be -4° and 30° unless otherwise specified. Retroreflective sheetings with datum marks shall be tested in the orientation specified by the manufacturer. If no datum mark is supplied, the sheeting shall be rotated to determine the minimum coefficient of retroreflection which shall be reported without averaging.

### (7) Specular Gloss

The electronic cuttable film shall have an 85° specular gloss of not less than 50 when tested in accordance with ASTM D523.

### (8) Processing and Cuttability

The electronic cuttable film shall permit cutting, weeding, masking with transfer tape, lifting, and application to retroreflective sheeting when used in accordance with manufacturer's recommendations at temperatures between 65° and 95°F (18.3° and 35.0°C) and relative humidities between 30% and 70%. The film shall lay flat with minimal edge curl and be dimensionally stable.

### (9) Adhesive Liner

The protective liner attached to the adhesive shall be removable by peeling without soaking in water or other solutions, without breaking, tearing, or removing any adhesive from the electronic cuttable film. The liner shall have a controlled release from the adhesive coated film sufficient to allow cutting without the film popping off from the liner while still allowing the liner to easily be peeled from the film. Film with punched edges for use on sprocket fed knife over roll cutters shall be edge scored and weeded to remove film in the punched area as a means of eliminating adhesive build up on the sprockets.

### (10) Resistance to Accelerated Outdoor Weathering

When electronic cuttable film is applied to retroreflective sheeting, the surface of the film shall be weather resistant and show no appreciable cracking, blistering, crazing, or dimensional change after 2 years unprotected outdoor exposure, facing the equator and inclined 45° from the vertical. Following weather exposure, panels shall be washed in a 5% HCl solution for 45 seconds, rinsed thoroughly with clean water, blotted dry with a soft clean cloth and brought to equilibrium at standard conditions. After cleaning, the coefficient of retroreflection shall not be less than the value specified for the retroreflective sheeting when the retroreflective sheeting is screen processed.



It shall show no appreciable evidence of cracking, scaling, pitting, blistering, edge lifting or curling or more than 1/32" (0.08cm) shrinkage or expansion. It shall show good color fastness or better when tested as in S-1.2.4.1.1. The retained reflectivity shall be the same as that specified for screen processed retroreflective sheeting of the type being tested. The film shall not be removable from the retroreflective sheeting without damage.

Retroreflective performance measurements made after weather exposure shall be made only at angles of 0.2° observation and -4° entrance. Where more than one panel of a color is measured, the coefficient of retroreflection shall be the average of all determinations.

(11) Colorfastness

One specimen, exposed and prepared as specified herein shall be wet cut with a mild detergent and water solution and compared with a similarly treated unexposed specimen under natural daylight or artificial daylight having a color temperature of 7600°K. The colorfastness shall be evaluated as follows:

Excellent	- No perceptible change in color
Good	- Perceptible but no appreciable change in color
Fair	- Appreciable change in color

Appreciable change in color means a change that is immediately noticeable in comparing the exposed specimen with the original comparison specimen. If closer inspection or a change of angle of light is required to make apparent a slight change in color, the change is not appreciable.

(12) General Characteristics and Packaging

When supplied as roll goods, the electronic cuttable film shall be of good appearance, free from ragged edges, cracks and extraneous materials. The maximum number of splices in each roll shall be three per 50 yards of material. Splices shall be butted. The sheeting shall be packed snugly in corrugated fiberboard cartons, in accordance with commercially accepted standards. Each carton shall clearly stipulate the brand, quantity, size, lot or run number, and color. Stored under normal conditions, the film shall be suitable for use for a minimum period of one year.

When supplied as a finished sign face or mounted sign, the sign face, made of electronic cuttable film and retroreflective sheeting, shall comply with the appearance, specification, and good workmanship for sign faces constructed of a screen processed retroreflective sheeting of the same type.

(13) Certification

The film manufacturer shall, upon request, submit with each lot or shipment, a certification which states that the material supplied will meet all of the requirements listed herein.

(14) Field Performance Requirements

The electronic cuttable film applied to retroreflective sheeting, both materials applied in accordance with the manufacturer's recommendations, shall as a composite perform with the same effective performance life as specified for that type of retroreflective sheeting when screen processed. The composite sign will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that: (1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions; or (2) the coefficient of retroreflection is less than the minimum specified for that sheeting when screen processed.

**e. Aluminum Sign Blanks**

This specification covers aluminum sign blanks for flat sheet signs for permanent traffic control signs.

(1) Material

Sign blanks shall be manufactured from aluminum ASTM B209(H) alloy 6061-T6 or 5052-H38. The aluminum blank shall be degreased and lightly acid etched.

(2) Thickness

All sign blanks for overhead street name signs shall be 0.125" thick. All other traffic control signs shall be 0.08" thick unless otherwise specified in the standard details.

(3) Mounting Holes

Mounting holes in the sign blanks shall be the size and location as stipulated in the standard detail drawings.

**f. Steel Sign Posts**

This specification covers steel sign posts, post anchors, and breakaway anchor sleeves in accordance with the standard details.

(1) Material

Steel posts shall conform to the standard specification for hot rolled carbon sheet steel, structural quality, ASTM designation A570, Grade 50. Yield strength after cold-forming is 60,000 psi minimum.

(2) Shape

The cross section of the sign post shall be square tube formed of 12 gauge (0.105` U.S.S. gauge) steel. The cross section of the post anchor and anchor sleeve shall be square tube formed of 12 gauge (0.105 U.S.S. gauge) steel. All posts, post anchors and anchor sleeves shall be carefully rolled to size and shall be welded directly in the corner by high frequency resistance welding and externally scarfed to agree with corner radii. All ends shall be cut square.

(3) Finish

Sign posts, post anchors and anchor sleeves shall be manufactured from hot-dipped galvanized steel conforming to ASTM A653, G90, Structural Quality, Grade 50, Class 1. The corner weld is zinc coated after scarfing operation. The steel is also coated with a chromate conversion coating and a clear organic polymer topcoat. Both the interior and the exterior of the post shall be galvanized.

(4) Cross Section

Perforated sign posts, post anchors and anchor sleeves shall be of the following sizes:

Description	Size	U.S.S. Gauge	Weight (lbs./foot)
Sign Post	1 3/4" x 1 3/4"	12	2.06
Post Anchor	2" x 2"	12	2.42
Anchor Sleeve	2 1/4" x 2 1/4"	12	2.77

(5) Telescoping Properties

The finished posts, post anchor and anchor sleeve shall be straight and have a smooth, uniform finish. It shall be possible to telescope all consecutive sizes of square tubes freely and for not less than ten feet of their length without the necessity of matching any particular face to any other face.

(6) Tolerances

Tolerances shall be as indicated in the following table:

Tolerance Description	1 3/4" x 1 3/4"	2" x 2"	2 1/4" x 2 1/4"
Outside Tolerances at Sides at Corners <sup>1</sup>	± 0.008"	± 0.008"	± 0.010"
Wall Thickness Tolerances	± 0.0011", -0.005	+ 0.011", -0.005	+ 0.011", -0.005
Convexity and Concavity Tolerances <sup>2</sup>	± 0.010"	± 0.010"	± 0.010"
Squareness of Sides Tolerances <sup>3</sup>	± 0.010"	± 0.012"	± 0.014"
Permissible Twist in 3' Length	0.062"	0.062"	0.062"
Straightness Tolerances in 3' Length	1/16"	1/16"	1/16"
Corner Radii	5/32" ± 1/64"	5/32" ± 1/64"	5/32" ± 1/64"

Notes:

<sup>1</sup>Measurements from outside dimensions shall be made at least 2 inches from the end of tube.

<sup>2</sup>Measured in the center of the flat sides determined at the corner.

<sup>3</sup>A sample shall be considered to fail if its sides are not 90 degrees to each other within the squareness tolerance listed above.

(7) Holes

Holes shall be  $7/16'' \pm 1/64''$  in diameter on one inch centers on all four sides down the entire length of the post, post anchor and anchor sleeve. Holes shall be on centerline of each side in true alignment and opposite each other directly and diagonally. All holes shall be drilled or punched and all welds, cuts, burrs, and sharp edges are to be smoothed off before application of finish.

(8) Post Length

Posts shall be ordered in 2' increments and cut to length. One single sign post long enough to support all signs shall be installed. Two separate lengths of post joined with a sleeve to achieve the necessary post length shall not be allowed.

(9) Breakaway Performance

The breakaway base design shall meet the requirements of the National Cooperative Highway Research Program Report (NCHRP) No. 350.

**g. Mounting Brackets, Hardware and Banding**

This specification covers various mounting brackets, hardware and banding for sign installation as indicated by the standard details.

(1) Steel Banding, Brackets and Buckles on Tubular Supports

Banding for signs mounted on tubular posts shall be  $3/4''$  wide by 0.030'' Type 201 stainless steel. Buckles shall also be Type 201 stainless steel with ear-lock design and teeth for maximum clamping strength.

The mounting bracket shall be stainless steel with a flared leg, supplied with stainless steel hex head bolt and stainless steel washer. The bracket shall be fully threaded and shall require no nuts to fasten. A flat, plastic washer shall be installed contacting the sign face prior to the installation of the stainless steel washer.

(2) Hardware for Steel Post Mounted Signs

Bolts for fastening the telescoping sign post, post anchor and anchor sleeve shall be a stainless steel corner bolt with hex head jam nut and zinc plated flat washers as dimensioned in the standard details. The corner bolt is designed to prevent distortion of the opposite wall of the sign posts which can occur when conventional through-bolts are over-tightened.

Bolts for fastening the sign to the  $1\ 3/4'' \times 1\ 3/4''$  sign post shall be a straight stainless steel hex head bolt with stainless steel washer and hex head jam nut. A flat, plastic washer shall be installed contacting the sign face prior to the installation of the stainless steel washer.

All bolts, nuts, and washers shall comply with section 1616 of the Kansas Department of Transportation Standard Specifications for State Road and Bridge Construction (current edition).

(3) Astro Sign-Brac

The Astro Sign-Brac cable mount system shall be used to mount R10 Series MUTCD designated signs to signal pole mast arms. It shall consist of a high tensile aluminum alloy clamp kit, 5/16''-18 U-bolts, 1 1/2'' Schedule 10 aluminum tube (length based on sign length) and saddle, and high strength galvanized aircraft cable and stainless steel swaged fittings. It shall be supplied complete with all necessary attaching hardware including 5/16''-18 x 1'' stainless steel hex head bolt, hex nut, split lock washer and flat washer.

(4) Tubular Support Street Name Sign Wing Bracket

The wing bracket shall be used to mount street name signs to tubular supports such as light poles. The bracket shall be a single piece L-shaped cantilever of T-beam frame made from 380-3 aluminum alloy construction as indicated in the standard details. The length shall be as specified in the standard details based on the length of the sign. The mounting plate shall have set screws for sign attachment.

**24.3 CONSTRUCTION REQUIREMENTS**

The proposed permanent traffic control signs shall be fabricated and installed by the contractor in conformance to the plans, standard details and these specifications. The signs shall meet all applicable requirements of the "Manual on Uniform Traffic Control Devices for Streets and Highways," U.S. Department of Transportation, Federal Highway Administration, latest revision as adopted, hereinafter referred to as "MUTCD", except as modified on the Plans and as described herein.

### **a. Preparation of Aluminum Sign Blanks**

This specification covers the preparation of aluminum sign blanks prior to application of retroreflective sheeting.

#### (1) Size and Tolerances

Signs shall be of the length and width as specified on the plans or standard details. The tolerance for the length and width of the sign blank shall be within  $\pm 1/8$ " from that shown on the plans or standard details. The sign blanks shall be free from buckles, warp, dents, cockles, burrs and other defects caused by fabrication.

#### (2) Cleaning

Following fabrication, the aluminum to which the sheeting is to be applied shall be cleaned of all aluminum oxide and prepared with a class 2 chromate conversion coating as outlined in ASTM B449, "Standard Recommended Practice for Chromate Treatments on Aluminum" or ASTM B-921 to resist corrosion and aluminum oxide. It should be a consistent weight (nominally 10-35 mg/sq ft.) and no darker than pale yellow. The coating should be well bonded to the metal and coherent within itself showing no dusting of the surface.

#### (3) Etching

Etching shall be performed using specially designed chemical conversion tanks and either an acidic or alkaline etch solution. Time, temperature, and concentration may vary depending on the type of solution. Contact the solution manufacturer for details. Always rinse thoroughly using a high pressure wash with clean water and allow complete drying.

#### (4) Blank Handling

The aluminum shall not be handled except by a mechanical device or with clean canvas gloves between the cleaning and etching operation and the application of retroreflective sheeting. There shall be no opportunity for the aluminum to come in contact with greases, oils, or other contaminants prior to the application of sheeting or film. Immediately prior to the application of the sheeting, should it be necessary to remove any residue wipe the surface of the substrate with a solvent in the following manner

(a) Saturate a clean cloth with an alcohol based solvent, mineral spirits, or a similar commercial solvent making sure the solvent is absolutely clean. Continual use from the same solvent container can result in contamination.

(b) Wipe the surface thoroughly, including areas near the edges where handling occurs.

(c) With a dry, clean, lint-free cloth wipe the surface clean before the solvent evaporates.

#### (5) Cleanliness Tests

There are two types of tests to verify that the aluminum substrate has not become soiled during handling prior to application of the sheeting. The tests should be conducted as follows:

(a) Tape Snap Test — Press onto the surface a 3"- 5" length of common transparent self-adhesive tape. After several seconds, lift it off quickly at a right angle and inspect for evidence of transferred material or indications of a contaminated surface for metal substrates.

(b) Water-Break Test — Minute traces of grease, oil or wax can be detected by pouring clean water onto the surface. On a clean surface, water tends to hold a uniform film. On a contaminated surface, the water beads up into many small droplets.

### **b. Application of Sheeting**

(1) Retroreflective sheeting shall not be applied when the ambient air temperature, the temperature of the aluminum sign blank and the sheeting is below 65° F (18.3°C).

#### (2) Pressure Sensitive Adhesive

The retroreflective sheeting material shall be applied according to the manufacturer's recommendations. The sheeting shall be applied to the sign substrate by mechanical squeeze roll applicator, hand squeeze roll applicator or hand application.

#### (3) Screen Processing

Screen processed signs are not allowable.

#### (4) Electronic Cuttable Film

Cutting of film and fabrication of the sign shall conform to manufacturer's recommended practices. The film may be applied to the sheeting either before or after the sheeting has been applied to the substrate. Use of a hand squeeze roll laminator is recommended to ensure satisfactory results. Use the "split liner method" starting in the middle of the sheet and remove half the liner to ensure proper alignment.

#### **c. Sign Installation**

This specification covers the field installation of permanent traffic control signs, consisting of retroreflective sheeting mounted on an aluminum substrate. Signs will either be installed on a square, steel, breakaway sign post assembly as herein specified or streetlight or traffic signal pole or mast arm according to the plans.

#### (1) General Requirements

(a) The Contractor shall locate the signs in the field in accordance with the Plans, the Manual on Uniform Traffic Control Devices (latest edition), and subject to the approval of the Engineer. Dimensions on the detailed drawings on the Plans shall take precedence. The Contractor will be responsible for orientation, elevation, offset and level of all signs erected. All sign posts shall be plumb. Any post that is leaning shall be replaced. The Contractor shall verify, prior to erecting any sign, that underground utilities will not be damaged as a result of placing the sign post.

(b) Ground mounted signs shall be erected so the sign face is truly vertical and at 93 degrees away from the center of the lane(s) which the sign serves, and the direction of travel unless otherwise shown on the Plans or directed by the Engineer. Signs mounted on the mast arm of a traffic signal pole shall be angled down 3 degrees toward the pavement surface.

(c) The height of the sign, measured from the finished ground surface or pavement to the bottom of a single sign, shall be 7'-0" unless otherwise indicated in the standard details. Exceptions would be for object markers which should be mounted 4'-0" above the finished ground surface or pavement to the bottom of the sign. If a secondary sign is mounted below another sign, the height, measured from the finished ground surface to the bottom of the secondary sign may be 6'-0". In the case where a sign is located in a pedestrian walkway or the sign face extends more than 4'-0" into a pedestrian walkway, the height to the bottom of the lowest mounted sign shall not be less than 80" measured from the finished surface of the walkway.

#### (2) Sign Installation on a Square, Steel, Breakaway Sign Post

(a) The sign post anchor shall be driven partially into the ground using a drive cap with sledge hammer or power equipment. The method of driving shall not substantially alter the cross-sectional dimensions of the posts or materially damage the coating. All areas where the galvanizing has been removed or damaged shall be cleaned and painted with zinc rich paint. Battered tops will not be permitted. The anchor sleeve shall then be slipped over the anchor and driven into the ground together with the sign post anchor. The sign post should then be slipped into the post anchor and bolted in place using the corner bolt as indicated in the detail drawings. The first hole above the finished grade level in all three post components shall be lined up in order to correctly insert the corner bolt. One single sign post long enough to support all signs shall be installed. Two separate lengths of post joined with a sleeve to achieve the necessary post length shall not be allowed.

(b) The sign shall generally be installed on the post with the top of the sign one inch above the top of the sign post. Exceptions to this would be when street name signs are installed above the traffic sign as indicated in the standard details. The mounting holes in the sign shall be located 3" in from the top and bottom of the sign face. Signs should be mounted on the square post with a hex head bolt extending through the entire post cross section and fastened with a stainless steel washer and hex head jam nut as indicated in the standard details. Signs shall require both a flat

- plastic washer and a stainless steel washer with the plastic washer being placed against the sign face
- (3) Sign Installation on Round Signal or Streetlight Poles
- (a) Signs located on signal poles or streetlight poles shall be attached with flared leg stand-off brackets and 3/4" stainless steel banding and buckle as indicated in the standard details. The number of brackets and banding is based on the size of the sign. Refer to the standard details for more information. The mounting holes in the sign face for attachment to the mounting brackets shall be offset from the edge of the sign a minimum of 2". Exceptions for ground mounted street name signs and overhead mounted street name signs are indicated in the following section. Signs located on the mast arm of traffic signal poles shall have the holes in the sign face located such that the sign is level.
- (b) All R10 series signs as designated by the MUTCD shall be mounted to mast arms with cable mount AstroBrac sign brackets as detailed in the standard details and specified herein. Signs shall require both a flat plastic washer and a stainless steel washer with the plastic washer being placed against the sign face. The sign mounting hardware on the back side of the sign shall include a flat stainless steel washer, stainless steel lock washer and stainless steel hex head jam nut.
- (4) Installation of Overhead Street Name Signs
- (a) Overhead street name signs shall be attached to traffic signal mast arms with two or three flared leg stand-off brackets depending on the length of sign. Overhead street name signs shall have mounting holes placed along the horizontal dimension of the sign blank. Holes should be located at least 12" in from the edge of the sign and placed such that the sign, when mounted on a mast arm with an upward rake, is level with the horizon. For signs longer than 60", an additional mounting hole shall be mounted along the horizontal dimension of the sign blank at the midpoint of the sign.
- (b) Overhead street name signs shall generally be located on the mast arm between the vertical pole shaft and the first through vehicle signal head on the mast arm, according to the standard details. The location of the overhead street name sign and the vehicle pre-emption device shall be coordinated during construction such that the pre-emption device is not located behind the sign.
- (5) Installation of Ground Mounted Street Name Signs
- (a) Ground mounted street name signs shall be attached either to square steel tubular posts or round street light poles as indicated in the plans and according to the standard details. The street name sign for the major street shall be mounted above the street name sign for the minor street.
- (b) When installed on square, steel tubular posts, two signs shall be provided and mounted on opposite sides of the post and be fastened with a hex head bolt that extends through the post and both signs and terminated with a hex head jam nut. A stainless steel washer and a flat plastic washer shall be installed on each side of the post with the flat plastic washer installed adjacent to the finished sign face. The mounting holes shall be located at the center of the sign and placed 1" from the top and bottom edge of the sign. Holes shall also be located on each end of the sign 1/2" in from the edge of the sign for a tubular PVC spacer and aluminum pop rivet to provide stability for the dual sign blanks. At skewed intersections, the contractor shall install two "round to square" post couplers and indicated in the standard details and orient the signs at the appropriate angle to match each street. The minimum mounting height, measured from the finished ground surface to the bottom of the lowest street name sign shall be 8'-0" or as indicated in the standard details. One single sign post long enough to support all signs shall be installed. Two separate lengths of post joined with a sleeve to achieve the necessary post length shall not be allowed.
- (c) When installed on a round street light pole, the sign blank shall be fabricated with sheeting on both sides and installed with a L-shaped wing bracket as indicated in the standard details. The wing bracket shall be mounted to the round pole by two 3/4" stainless steel bands and buckles. One wing bracket shall be installed per each sign. Cross brackets shall not be permitted.

**d. Existing Signs**

The Contractor shall preserve all existing traffic control signs in useful condition so as to provide traffic control during construction. All existing signs shall be maintained in order to provide proper warning, guidance or regulatory information to the traveling public until new signs are erected according to the plans. All existing traffic signs except those signs to be removed shall be reused and relocated, as shown on the plans, after construction. All existing signs that are to be removed after construction shall be carefully protected and shall be returned to the City according to the “Instructions for Disassembly and Return of Traffic Sign Equipment” as listed in the standard details. There will be no direct measurement or payment for this work.

**e. Pre-Qualification**

Manufacturers interested in pre-qualifying material under this specification shall submit a sample of the material along with a complete materials specification for each item to be considered. The sample will be reviewed for compliance with all requirements of this specification. No material shall be used unless the material has been pre-qualified. A complete list of pre-qualified materials is maintained by the Traffic Engineering Division of the Department of Public Works.

**24.4 METHOD OF MEASUREMENT**

Measurement for Permanent Traffic Control Signing shall be based on plan quantities as listed in the bid proposal, which includes all labor, materials, tools and equipment necessary to fully complete the installation according to the plans and specifications. No separate measurement will be made for the removal of or reinstallation of existing signs to maintain traffic during construction prior to installing new signs in approximately the same location.

The Engineer will measure each permanent traffic control sign. Payment for “Object Marker (Type 3)” at the contract unit prices bid is full compensation for the specified work.

No separate payment will be made for any mounting brackets, banding, sign posts, sign post anchors, anchor sleeves or miscellaneous hardware.

**25 - TRAFFIC CONTROL**

**25.1 DESCRIPTION**

Traffic Control shall conform to Part VI of the Manual on Uniform Traffic Control Devices (MUTCD), latest adopted revision, the Overland Park Traffic Control Handbook for Street Maintenance and Construction Operations, the City of Overland Park standard details for traffic control and the plans. Construction operations shall be coordinated to result in the least practicable delay to traffic.

**25.2 CONSTRUCTION REQUIREMENTS**

The Contractor shall furnish and maintain adequate signs, barricades, warning lights, pavement markings as applicable and all other equipment necessary to direct and reroute traffic in a safe and effective movement through and around the work area. The Contractor shall furnish all flaggers and other personnel necessary to provide the required traffic control.

**a. Placement**

Traffic control devices, barricades, and signs shall be installed at the inception of construction. The traffic control devices, barricades, and signs shall be properly spaced and properly maintained and/or operated during the time construction and/or special conditions exist on the project. Appropriate traffic control shall be provided for all aspects of work, including work by any sub-contractor.

**b. Access**

Streets with no other outlet shall be open to traffic at all times. Access to private driveways shall be maintained insofar as possible. Businesses with two driveways shall have only one driveway closed at one time. Contractor shall provide access to businesses and residents with only one driveway at all times.

**c. Changes**

The City Engineer shall approve any variations from the traffic control plans.

**25.3 METHOD OF MEASUREMENT**

The Engineer will measure traffic control by the lump sum, including all signs, barricades, warning lights, flaggers, temporary pavement markings and all other equipment necessary to safely direct and control traffic.

Payment for “Traffic Control” at the contract lump sum price bid is full compensation for the specified work.

**26 - PERMANENT PAVEMENT MARKINGS**

**26.1 DESCRIPTION**

The Contractor shall furnish and install white and yellow permanent retro-reflectorized pavement marking materials at the locations shown on the plans, in conformance with the details, and the material specifications included herein.

The permanent pavement markings shall be installed immediately after overlaying unless prior approval is received by the Engineer or City Inspector. The installation of the yellow markings (as required) is the first priority. If the permanent markings cannot be installed and thus the roadway would be unmarked overnight, interim removable markings shall be installed and remain until the permanent markings can be installed. The contractor shall make every possible effort to remove the interim pavement markings and install permanent pavement markings within 48 hours. Only under extreme circumstances and at the approval of the pavement marking inspector or the engineer, will the duration of the interim pavement markings be extended. Under no circumstance should the interim pavement markings be in place for more than 2 weeks. If permanent markings cannot be installed within the specified time then temporary markings shall be installed following the guide lines as set forth in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) Part VI, Sections 6F.78 and 6G.02. The interim removable markings shall be removed prior to installation of the permanent markings.

**26.2 MATERIALS**

The material for permanent pavement markings shall be in accordance with this specification. All material for permanent pavement marking material used by the Contractor shall be from the City’s approved list of vendors. It is important that users be completely knowledgeable of all application requirements and procedures prior to product application. It is the responsibility of the installer to contact the supplier of all permanent pavement marking materials if questions regarding application procedures or conditions arise.

**a. Pre-Qualification**

Manufacturers interested in pre-qualifying material under this specification shall submit a sample of the material along with a complete materials specification for each color of marking material to be considered. The sample will be reviewed for compliance with all requirements of this specification. No material shall be used unless the material has been pre-qualified. A complete list of pre-qualified materials is maintained by the Traffic Engineering Division of the Department of Public Works.

**b. Pre-Mix Glass Spheres**

Pre-mix glass spheres shall be uncoated and conform to AASHTO M247 Type 1. The glass spheres used in the formulation shall be lustrous, free from film, scratches, and pits. The glass spheres shall also meet the following requirements:

- (1) Roundness

The roundness of the spheres shall be minimum of 70% when tested in accordance with ASTM D-1155.



(2) Gradation

The gradation when tested in accordance with the method provided in ASTM D-1214 (by use of U.S. Standard Sieves) shall be:

Size of Sieve	Mass % Passing
1.18 mm (No. 16)	100
0.85 mm (No. 20)	95-100
0.60 mm (No. 30)	75-95
0.30 mm (No. 50)	15-35
0.15 mm (No. 100)	0-5

(3) Refractive Index

When tested by a liquid immersion method at 25 degrees C (77 degrees F), the refractive index of the spheres shall be a minimum of 1.50.

**c. Drop-On Glass Spheres**

The spheres shall be manufactured from glass of a composition designed to be highly resistant to traffic wear and to the effects of weathering. The particles shall be spherical in shape, containing not more than thirty percent (30%) of irregularly shaped particles. They shall be essentially free of sharp angular particles, and particles showing milkiness or surface scoring or scratching. They shall meet the requirements of AASHTO M247 Type 1.

(1) Gradation

The gradation when tested in accordance with the method provided in A.S.T.M. D-1214 (by use of U.S. Standard Sieves) shall be that as specified above for AASHTO M247 Type 1.

(2) Refractive Index

When tested by a liquid immersion method at 25 degrees C (77 degrees F), the refractive index of the spheres shall be within the range of 1.50 to 1.60.

(3) Moisture Proof Requirements

The spheres shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. The spheres shall flow freely from dispensing equipment at any time when surface and atmospheric conditions are satisfactory for application.

**d. Thermoplastic Pavement Markings**

This specification covers a white and yellow thermoplastic reflectorized pavement marking material of a type that is applied to asphalt road surfaces. The material shall be applied in a molten state by mechanical means to receive a surface application of glass spheres, and which upon cooling to normal pavement temperature, produces an adherent reflectorized stripe of specified thickness and width and is capable of resisting deformation.

(1) Characteristics

The material shall not exude fumes that are toxic, obnoxious or injurious to person or property, when it is heated to the temperature range specified by the manufacturer for application. It shall remain stable when held for 4 hours at this temperature, or when subject to 3 reheatings after cooling to ambient temperature. The temperature-viscosity characteristics of the plastic material shall remain constant throughout repeated reheatings, and shall show like characteristics from batch to batch. There shall be no obvious change in color of the material neither as a result of repeated reheatings nor from batch to batch.

The thermoplastic material shall easily extrude from the equipment to produce a cross-section of line 90 to 125 mil thick, which shall be continuous and uniform in shape, and have clear and sharp dimensions.

(2) Serviceability

The compound shall resist deterioration by contact with sodium chloride, calcium chloride or other chemicals used to prevent roadway ice, or because of the oil content of pavement materials or from oil

droppings or other effects of traffic. The markings shall remain intact under normal traffic conditions at temperatures below 60 degrees C (140 degrees F).

(3) Specific Gravity

The material's specific gravity shall not be less than 1.8 nor exceed 2.15 referred to water at 25 degrees C (77 degrees F) when determined by a water displacement method at 25 degrees C (77 degrees F).

(4) Set Time

When applied at the specified temperature and thickness, the material shall set to bear traffic in not more than 2 minutes when the air temperature is  $10 \pm 2$  degrees C ( $50 \pm 3$  degrees F) and not more than 10 minutes when the air temperature is  $32 \pm 2$  degrees C ( $90 \pm 3$  degrees F).

(5) Composition

The thermoplastic pavement marking material shall be homogeneously composed of pigment, filler, resin binder and glass reflectorizing spheres. The solid resin shall be a "maleic-modified glycerol ester resin" (alkyd binder) comprising at least one-third of the binder compositions and be no less than eight (8) percent by weight of the entire material formulation. The alkyd binder shall consist of a mixture of synthetic resins (at least one of which is solid at room temperature), and high boiling point plasticizers. The material shall not contain any petroleum derived ingredients. Yellow pigment shall be heat stabilized encapsulated lead chromate. The thermoplastic pavement marking material shall contain the following ingredients:

INGREDIENT (Percent by Weight)	WHITE	YELLOW
Binder (See Note A below)	18.0 min.	18.0 min.
Titanium Dioxide	10.0 min.	--
Glass Spheres	20.0-50.0	20.0-50.0.
Lead Chromate	--	2.0-4.5
Inert Fillers	42.0 max.	50.0 max.

The material shall be thoroughly mixed and furnished in a free flowing granular form. The material shall meet the requirements of this specification for a period of one year. The material shall readily melt in a uniform mixture. The material shall be free from all skins, dirt, and foreign objects. It shall be of such composition that it will not bleed, stain or discolor when applied to bituminous pavement. The manufacturer shall replace material not meeting the above requirements.

(6) Color

The color of the thermoplastic material after heating for 4 hours  $\pm 5$  minutes at  $218 \pm 2$  degrees C ( $425 \pm 3$  degrees F) and cooled to  $25 \pm 2$  degrees C ( $77 \pm 3$  degrees F) shall conform to the following when tested by Federal Test Method Standard 141 Method 4252:

White:	Federal Color Chip No. 17875 (Fed. Std. No. 595)
Yellow:	Federal Color Chip No. 13538 (Fed. Std. No. 595)

(7) Reflectance

The daylight luminous reflectance of the white material shall be not less than 75% when tested according to A.S.T.M. E1347. The yellow shall have a minimum brightness of 45% relative to magnesium oxide, and shall be within the green and red tolerance of the "Standard Color Chips for Highway Signs (January 1939)" obtainable from the United States Bureau of Public Roads, Washington, D.C. (TT-P-115a).

(8) Softening Point

After heating the thermoplastic material for 4 hours  $\pm 5$  minutes at  $218 \pm 2$  degrees C ( $425 \pm 3$  degrees F) and testing in accordance with ASTM D36, the material shall have a softening point  $102 \pm 9.5$  degrees C ( $215 \pm 15$  degrees F).

(9) Flowability

After heating the thermoplastic material for 4 hours  $\pm$  5 minutes at  $218 \pm 2$  degrees C ( $425 \pm 3$  degrees F) and testing for flowability, the white thermoplastic shall have a minimum percent residue of 18 percent and the yellow thermoplastic shall have a maximum residue of 21 percent.

After heating the thermoplastic material for 8.5 hours  $\pm$  5 minutes at  $218 \pm 1.4$  degrees C ( $425 \pm 3$  degrees F) and testing for flowability, the thermoplastic shall have a maximum percent residue of 28 percent.

(10) Indentation Resistance

Hardness shall be measured by a Shore Durometer, Type A2, as described in A.S.T.M. D-2240, except that the Durometer and the panel shall be at 25 degrees C (77 degrees F), and a 2 kg (4.4 lb.) load applied. After 15 seconds, the reading shall be not less than 55.

(11) Abrasion Resistance

The material shall not show a maximum loss of 0.5 g (0.02 ounces) subjected to 200 revolutions on a Taber Abraser at 25 degrees C (77 degrees F), using H-22 calibrate wheels, weighted to 500 g (17.6 ounces). The wearing surface should be kept wet with distilled water throughout the test. The panel for this test shall be prepared by forming a representative lot of material at a thickness of 3 mm (125 mil) on a 100 mm (4") square panel (thickness  $1.3 \pm 0.025$  mm) [thickness  $0.050 \pm 0.001$  inch] on which a suitable primer has been previously applied.

(12) Low Temperature Impact Resistance

The materials shall not fracture when subjected to an impact of 7.23 N-m at  $-20$  degrees C (64 inch pounds at  $-4$  degrees F), for at least 3 hours. The panel is then placed in an instrument also maintained at  $-20$  degrees C ( $-4$  degrees F), consisting of a 4.7 kg (10.5 pound) freely falling weight controlled to drop vertically for 150 mm (6") onto the surface of the panel, which it strikes with a hemispherical indent or having a radius of 7 mm (0.28 inches).

(13) Water Absorption

Materials shall have a maximum of 0.5 percent by weight of retained water when tested by ASTM designation D-570, "Water Absorption of Plastics", procedure (A).

(14) Yellowness Index

The white thermoplastic material shall not exceed a yellowness index of 0.12.

(15) Flash Point

The thermoplastic material shall have a flash point not less than 475 degrees F when tested in accordance with ASTM D92.

(16) Cracking Resistance

After heating the thermoplastic material for 4 hours  $\pm$  5 minutes at  $218 \pm 2$  degrees C ( $425 \pm 3$  degrees F); applying to concrete blocks, and cooling  $-9.4 \pm 1.7$  degrees C ( $15 \pm 3$  degrees F), the material shall show no cracks. Properly applied, the material shall show less than six stress cracks per three lineal meters (ten lineal feet) of markings independent of pavement fracturing and faulting, for at least six months.

**e. Preformed Thermoplastic Pavement Markings**

This specification is for the furnishing of retroreflective preformed thermoplastic pavement marking materials that can be adhered to asphalt pavements by means of heat fusion. The applied markings shall be very durable, oil and grease impervious and provide immediate and continuing retroreflectivity.

(1) Characteristics

The preformed marking material shall consist of a resilient white and yellow polymer thermoplastic with uniformly distributed glass spheres throughout its entire cross section.

Preformed words and symbols shall conform to the applicable shapes and sizes as prescribed in the latest revision of the Manual on Uniform Traffic Control Devices for Streets and Highways.

The preformed markings shall be fusible to asphalt concrete by means of the normal heat of a propane type of torch. No adhesives, primers or sealers shall be used prior to the preformed marking application when applying to asphalt concrete pavements.

The preformed markings shall conform to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics and be capable of fusing to itself and previously applied worn hydrocarbon and/or alkyd thermoplastic pavement markings.

The preformed markings shall be capable of application on new, dense and open graded asphalt concrete wearing courses during the paving operation in accordance with the manufacturer's instructions. After application, the markings shall be immediately ready for traffic. The preformed markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's recommendations.

The preformed thermoplastic markings shall not be brittle and must be sufficiently cohesive and flexible at temperatures exceeding 10 degrees C (50 degrees F) for one person to carry without the danger of fracturing the material prior to application.

(2) Composition

The retroreflective pliant polymer thermoplastic pavement markings shall consist of a homogeneous mixture of high quality polymeric thermoplastic binders, pigments, fillers and glass spheres. The thermoplastic material must conform to AASHTO designation M-249 with the exception of the relevant differences due to the material being supplied in a preformed state.

(3) Glass Spheres

The markings shall contain 30% glass spheres which shall conform to AASHTO M247 Type 1, except that glass spheres shall have a minimum of 70% true spheres on each sieve and 80% true spheres overall.

The glass spheres must be homogeneously blended throughout the material with a securely bonded protruding exposed layer of spheres that provide immediate and continuous retroreflectivity; no additional glass spheres shall be dropped on the material during application. Curved arrows must be available without protruding glass spheres if reversibility is needed.

(4) Retroreflectivity

The preformed marking shall upon application, exhibit uniform adequate nighttime retroreflectivity when tested in accordance to ASTM E1710-97. The applied material must have an initial minimum intensity reading of 375 millicandelas for white and 175 millicandelas for yellow as measured with an LTL-2000 Retroreflectometer with a 1.05 degree observation angle, 88.76 degree entrance angle and 30 meter geometry (viewing distance).

(5) Abrasion Resistance

Using a Taber Abraser with an H-18 wheel and a 125 g (4.4 ounce) load, the sample shall be inspected at 200 cycles, under a microscope, to observe the extent and type of bead failure. No more than 15% of the beads shall be lost due to popout and the predominant mode of failure shall be "wear down" of the beads.

(6) Color and Luminosity Characteristics

The thermoplastic material without glass spheres shall meet the following:

White:	Daylight reflectance at 45-degree/ 0 degree of 80% minimum
Yellow:	Daylight reflectance at 45-degree/ 0 degree of 45% minimum.

The daylight reflectance shall not change significantly when the preformed thermoplastic is properly applied to the roadway surface

For highway use, the white markings shall contain a minimum of 8% by weight of Titanium Dioxide pigment to ensure a color similar to Federal Highway White, Color No. 17886 Standard 595. Yellow color shall reasonably match color chip Number 13538 of Federal Standard number 595 and be lead free.

(7) Skid Resistance

The surface of the preformed thermoplastic markings shall provide a minimum skid resistance value of 45 BPN when tested according to ASTM: E303.

(8) Thickness

The supplied material shall have a minimum average thickness of 90 mils.

(9) Flexibility

The preformed thermoplastic marking material shall have flexibility at 10 degrees C (50 degrees F) such that no cracking occurs in the test sample when a 25 mm by 150 mm (1" by 6") sample is bent through an arc of 90 degrees at a uniform rate in 10 seconds (9 seconds per degree) over a 25 mm (1") mandrel. The sample must be conditioned prior to testing at  $10 \pm 0.9$  degrees C ( $50 \pm 2$  degrees F) for a minimum of four hours. At least two specimens tested must meet the flexibility requirements at 10 degrees C (50 degrees F) for a passing result.

(10) Environmental Resistance

The applied markings shall be resistant to deterioration due to exposure to sunlight, water, oil, diesel fuels, gasoline, pavement oil content, salt and adverse weather conditions.

(11) Effective Performance Life

When properly applied, in accordance with the manufacturer's instructions, the pavement markings shall be neat and durable. The markings shall remain retroreflective and show no fading, lifting, shrinkage, tearing, roll back or other signs of poor adhesion.

**f. Durable Pre-Formed, Patterned Cold Plastic Pavement Markings**

This specification shall consist of furnishing and installing retroreflective preformed patterned pavement markings in accordance with this provision and in conformance to the dimensions and lines shown on the plans or established by the engineer.

(1) Characteristics

The preformed patterned markings shall consist of white or yellow films with clear and/or yellow-tinted microcrystalline ceramic beads incorporated to provide immediate and continuing retroreflection. These films shall be manufactured without the use of lead chromate pigments or other similar, lead-containing chemicals. Preformed words and symbols shall conform to the applicable shapes and sizes as outlined in the "Manual on Uniform Traffic Control Devices for Streets and Highways."

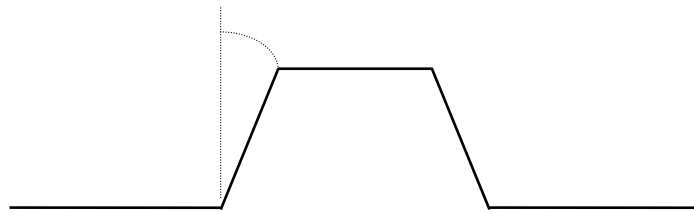
The preformed markings shall be capable of being adhered to Portland cement concrete by a pre-coated pressure sensitive adhesive. A surface preparation adhesive may be used to precondition the pavement surface. The preformed markings shall conform to pavement contours by the action of traffic. The pavement markings shall be capable of application on new, dense and open-graded asphalt concrete wearing courses during the paving operation in accordance with the manufacturer's instructions. After application, the markings shall be immediately ready for traffic. The contractor shall identify proper surface preparation adhesives (where necessary) to be applied at the time of application, and all equipment necessary for proper application, and recommendations for application that will assure effective product performance. The preformed markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's recommendations.

(2) Requirements

The markings shall be highly durable, retroreflective, pliant polymer materials designed for longitudinal, transverse, and symbol/legend markings subjected to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment on typical longitudinal configurations such as edge lines and lane lines and typical transverse configurations such as stop bars and crosswalks.

(a) Composition

The retroreflective pliant polymer pavement markings shall consist of a mixture of high-quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area, and an embedded reinforcing net, and a reflective layer of microcrystalline ceramic beads bonded to a durable polyurethane topcoat surface. The patterned surface shall have approximately 50% + or - 15% of the surface area raised and presenting a near vertical face ( $\beta$  angle of  $0^\circ$  to  $60^\circ$ ) to traffic from any direction. (See diagram below.) The channels between the raised areas shall be substantially free of exposed beads or particles.



### (3) Retroreflectance

The white and yellow markings shall have the following initial expected retroreflectance values as measured in accordance with the testing procedures of ASTM D4061. The photometric quantity to be measured shall be the coefficient of retroreflected luminance ( $R_L$ ) and shall be expressed as millicandelas per square foot per foot-candle [ $(\text{mcd} \cdot \text{ft}^{-2}) \cdot \text{fc}^{-1}$ ]. The metric equivalent shall be expressed as millicandelas per square meter per lux [ $(\text{mcd} \cdot \text{m}^{-2}) \cdot \text{lx}^{-1}$ ]. The test distance shall be 100 feet (30 m).

	Initial Reflectance	
	White	Yellow
Entrance Angle	88.76°	88.76°
Observation Angle	1.05°	1.05°
Retroreflected Luminance, $R_L (\text{mcd} \cdot \text{ft}^{-2}) \cdot \text{fc}^{-1}$ *	500	300

\*These retroreflectance values are based on dark room photometric readings per ASTM D4061.

### (4) Bead Index of Refraction

All microcrystalline ceramic beads bonded to the polyurethane-coated, patterned surface of the material shall have a minimum index of refraction of 1.70 when tested using the liquid oil immersion method. The glass beads mixed into the pliant polymer shall have a minimum index of refraction of 1.5 when tested by the liquid oil immersion method.

#### (a) Testing Procedure for Refractive Index of the Beads by Liquid Immersion

##### EQUIPMENT REQUIRED:

- A. Microscope (minimum 100X magnification)
- B. Light source - preferably sodium light or other monochromatic source
- C. Refractive index liquids\*
- D. Microscope slide and slide cover
- E. Mortar and pestle

\*Available from R.P. Cargille Laboratories, Inc., Cedar Grove, NJ.

##### PROCEDURE:

- A. Using the mortar and pestle, crush a few representative beads and place a few of these crushed particles on a microscope slide.
- B. Place a drop of a refractive index liquid, with an index as close to that of the glass as can be estimated, on the particles.
- C. Cover the slide with a microscope slide cover and view the crushed particles by transmitted light normal to the slide surface (illuminated from the bottom).
- D. Adjust the microscope mirror to allow a minimum light intensity for viewing. This is particularly important if sodium light is not used.
- E. Bring a relatively flat and transparent particle into focus.
- F. By slightly raising and lowering the objective (microscope tube), look for one or both of the following:
  1. Becke Line - This light line will appear to move either into the particle or away from it. In general, if the objective is raised, the line will move toward the material of higher refractive index; if the objective is lowered, the line will move toward the material of lower index.

2. Variation in Particle Brightness - When raising the object from a sharp focus, the particle will appear to get brighter or darker than the surrounding field. If it becomes brighter, the glass has a higher refractive index than the liquid. If it becomes darker, the glass has a lower refractive index than the liquid. In both cases, the opposite will be true if the object is lowered.
3. This test can be used to confirm that the beads are above or below a specified index. It can also be used to give an accurate determination of the index (+ or - 0.001). This is done by using several refractive index liquids until a match or near match of indices occurs. The index of the glass will equal that of the liquid when no Becke line and no variation in bead brightness can be observed.

The size and quality of the beads shall be such that the performance requirements for the retroreflective pliant polymer shall be met.

(5) Acid Resistance

The beads shall show resistance to corrosion of their surface after exposure to a 1% solution (by weight) of sulfuric acid. The 1% acid solution shall be made by adding 5.7cc of concentrated acid into 1000cc of distilled water. CAUTION: Always add the concentrated acid into the water, not the reverse. The test shall be performed as follows:

Take a 1" x 2" sample, adhere it to the bottom of a glass tray and place just enough acid solution to completely immerse the sample. Cover the tray with a piece of glass to prevent evaporation and allow the sample to be exposed for 24 hours under these conditions. Then decant the acid solution (do not rinse, touch or otherwise disturb the bead surfaces) and dry the sample while adhered to the glass tray in a 150° F. (66° C.) oven for approximately 15 minutes. Microscopic examination (20X) shall show no more than 15% of the beads having a formation of a very distinct opaque white (corroded) layer on their entire surface.

(6) Color

The preformed markings shall consist of white and yellow films with pigments selected and blended to conform to standard highway colors. The white markings shall contain a minimum of 8% by weight of Titanium Dioxide pigment to ensure a color similar to Federal Highway White, Color No. 17886 Standard 595. Yellow color shall reasonably match color chip Number 13538 of Federal Standard number 595 and be lead free.

(7) Skid Resistance

The patterned surface of the retroreflective pliant polymer shall provide an initial average skid resistance value of 45 BPN when tested according to ASTM E303 except values shall be taken in one direction and then at a 45° angle from that direction. These two values shall then be averaged to find the skid resistance of the patterned surface.

(8) Patchability

The pavement marking material shall be capable of use for patching worn areas of the same type in accordance with manufacturer's instructions.

(9) Thickness

The patterned material without adhesive shall have a minimum caliper of 65 mil (0.065") at the thickest portion of the patterned cross-section and a minimum caliper of 20 mil (0.02") at the thinnest portion of the cross-section.



**g. Temporary Cold Plastic Pavement Markings**

This specification covers a white and yellow pre-formed cold plastic reflectorized pavement marking material of a type that is applied to a road surface as temporary pavement markings by a pre-coated pressure

sensitive adhesive that produces an adherent reflectorized stripe of specified thickness and width and is capable of resisting deformation. By definition, temporary cold plastic pavement markings, are markings that meet the full requirement of the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) that will generally be in service for at least 6 months or longer. The application of the markings is intended to be such that they are removable without undue pavement scarring. The markings will be used when it is anticipated that they will be revised for future lane additions or lane use modifications between construction projects or construction seasons.

(1) Characteristics

The material shall be manufactured without the use of lead-chromate pigments or other, similar, lead-containing chemicals.

Glass spheres shall be incorporated to provide immediate and continuing retroreflection. Ceramic skid particles shall be bonded to the top layer to provide a skid-resistant surface.

Preformed word and symbol markings shall conform to the applicable shapes and sizes as outlined in the MUTCD.

The preformed markings shall be capable of being adhered to Portland cement concrete pavements by an inlaid, pre-coated pressure sensitive adhesive. A surface preparation adhesive may be used to precondition the inlay pavement surface.

The preformed marking film shall mold itself to pavement contours by the action of traffic. Following proper inlay application and tamping, the markings shall be immediately ready for traffic.

(2) Composition

The retroreflective pavement marking film shall consist of a mixture of high-quality polymeric materials, pigments and glass spheres distributed throughout its base cross-sectional area. A reflective layer of glass spheres and a layer of skid-resistant ceramic particles shall be bonded to the top urethane wearing surface. The urethane wear surface shall have a nominal thickness of 5 mil (0.005 inches). The film shall have a pre-coated, shear-resistant, pressure sensitive adhesive.

(3) Color

The daytime color of the white film shall provide a minimum initial luminance factor, Y, of 80 and shall conform to the following chromaticity requirements:

WHITE		YELLOW	
X Values	Y Values	X Values	Y Values
0.290	0.315	0.474	0.455
.0310	0.295	0.491	0.435
0.330	0.360	0.512	0.486
0.350	0.340	0.536	0.463

The daytime color of the yellow film shall provide an initial luminance factor, Y, in a range of 36 to 59 and shall conform to the above chromaticity requirements:

Measurements shall be made in accordance with ASTM E 1349, using illuminant “C” and 0/45 (45/0) geometry. Calculations shall be in accordance with ASTM E308 for the 2-degree observer.

(4) Reflectance

The white and yellow films shall have the following initial minimum reflectance values as measured in accordance with the testing procedures of ASTM D 4061. The photometric quantity to be measured shall be coefficient of retroreflected luminance ( $R_L$ ) and shall be expressed as millicandelas per square meter per lux ( $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lux}^{-1}$ ) (millicandelas per square foot per foot-candle ( $\text{mcd}\cdot\text{ft}^{-2}\cdot\text{fc}^{-1}$ )).



	WHITE			YELLOW		
Entrance Angle	86.0°	86.0°	86.5°	86.0°	86.0°	86.5°
Observation Angle	0.2°	0.5°	1.0°	0.2°	0.5°	1.0°
Retroreflected Luminance $R_L$ (mcd-ft <sup>-2</sup> -fc <sup>-1</sup> )	700	500	400	410	250	175

(5) Skid Resistance

The surface of the retroreflective films shall provide an initial minimum skid resistance value of 55 BPN as measured by the British Portable Skid Tester in accordance with ASTM E303.

The surface of the retroreflective film shall retain an average skid resistance value of 45 BPN, when tested in accordance with ASTM E303, for a period of one year when installed in non-snow removal areas. The 45 BPN minimum value shall be an average of several readings taken in both the wheel track and non-wheel track areas.

(6) Tensile Strength and Elongation

The film shall have a minimum tensile strength of 7.18 kilopascals (150 lbs. per square inch) of cross-section when measured in the direction of the length of the roll and tested in accordance to ASTM D638-76, except that a sample 150 mm x 25 mm (6" x 1") shall be tested at a temperature between 21.1 degrees and 26.7 degrees C (70 degrees F and 80 degrees F) using a jaw speed of 10 to 12 inches per minute. The sample shall have a maximum elongation of 50% at break when tested by this method.

(7) Reflectivity Retention

The glass spheres must be strongly bonded and not be easily removed by traffic wear. Using a Taber Abraser with an H-18 wheel and a 125 g (4.4-ounce) load, the sample shall be inspected at 200 cycles, under a microscope, to observe the extent and type of sphere failure. No more than 15% of the spheres shall be lost due to popout and the predominant mode of failure shall be "wear down" of the spheres.

(8) Glass Spheres

The size, quality and refractive index of the glass spheres shall be such that the performance requirements for the markings shall be met. The sphere adhesion shall be such that spheres are not easily removed when the material surface is scratched.

The film shall have glass sphere retention qualities such that when a 50 mm x 150 mm (2" x 6") sample is bent over a 12.7 mm (1/2") diameter mandrel, with the 50 mm (2") dimension perpendicular to the mandrel axis, microscopic examination of the area on the mandrel shall show no more than 10% of the spheres with entrapment by the binder of less than 40%.

(9) Thickness

The film, without adhesive, shall have a minimum thickness of 60 mil.

**h. Urethane Acrylate**

The material shall be a reflectorized multi functional urethane acrylate, plural component, durable liquid pavement marking material suitable for application of long line pavement markings on chip seal treated roadways only.

(1) Characteristics

It shall consist of a homogeneous blend of multi functional polyacrylate modified resins, pigments and a top application of retro-reflective beads. Two parts of Part A (resin and pigmentation) shall be mixed with one Part B (curing agent) by volume.

(2) Composition

The composition of the material shall be as follows:

Part A Component	White	Yellow
Pigments % by Weight (ASTM D-476, Type II)		
TiO <sub>2</sub>	24-27%	10-15%
Non-Lead Organic Yellow		7-9%
Resin % by Weight		
Modified Resins	73-76%	76-83%

(3) Color

The materials shall visually match the color chips that correspond to the Federal Standard Number 595B for the following colors:

White	Color 17925
Yellow	Color 13538

The material shall be applied to 3" x 6" steel plates at 20 ± 1 mil thickness without glass beads and exposed per ASTM G-53. The test shall be conducted for 72 hours at 122 degrees F, 4 hours humidity, and 4 hours UV using QUV A-340 bulbs in alternating cycles. The color of the coatings shall be within 5 units of the Federal Standards shown above.

(4) Yellowness index

Test in accordance with ASTM D-1925 by curing the prepared sample for 72 hours. The maximum yellow index reading, XYZ C/2° shall not exceed 6.0 preceding the QUV (ASTM G-53) or 15.0 after 72 hours of QUV exposure.

(5) Toxicity

Upon heating to the appropriate application temperature, the material shall not exude fumes, which are toxic or injurious to persons or property when handled in accordance with manufacturer specifications. The compositions shall not contain free isocyanate functionality.

(6) No Tracking Time

When mixed in the proper ratio and applied at 15 ± 1 mils wet film thickness with 8 pounds per gallon Type 4 gradation beads and 10 pounds per gallon AASHTO M247 Type I beads, the product shall have a no track time of less than 5 minutes when tested according to ASTM D-711 at 75°F ± 2°F. When saturated with a double drop of 12 pounds per gallon Type 4 gradation beads and 12 pounds per gallon AASHTO M247 Type I beads and tested under the same conditions as above, it shall have a no track time of 3 minutes or less.

(7) Hardness

The material, when tested according to ASTM D-2240, shall have a Shore D Hardness greater than 75. Samples shall be allowed to cure at 75°F ± 2°F for a minimum of 72 hours prior to performing the tests indicated.

(8) Flexibility

The material, when tested in accordance with ASTM D-522, shall pass the test at 3/4". Panels are prepared by casting 5 mil films on 4" x 12" aluminum panels. The test is run after panels are cured for a minimum of 24 hours at 75°F ± 2°F.

(9) Adhesion to Concrete

The material, when tested according to ASTM D 4541, shall have greater than 600 psi adhesion to the specified concrete surface such that there shall be a 100% concrete failure in the performance of this test. The prepared specimens shall be conditioned at 75 ± 2°F for a minimum of 72 hours prior to the performance of the test indicated.

(10) Abrasion Resistance

The material, when tested according to ASTM test method D- 4060, using a Taber Abrader with a 1,000 gram load and CS-17 wheels, for 1,000 cycles, shall not have more than 80 mg weight loss. The tests

shall be run on cured samples of material (without beads) which have been applied at a film thickness of 15±0.5 mil to code S-16 steel plates. The samples shall be cured at 75°F±2°F for a minimum of 72 hours.

(11) Tensile Strength

When tested according to ASTM D-638, the material shall have an average tensile strength of not less than 6,000 pounds per square inch. The Type IV Specimens shall be pulled at a rate of 1/4” per minute by a suitable dynamic testing machine. The samples shall be cured at 75 °F ± 2°F for a minimum of 72 hours prior to performing the indicated tests.

(12) Compressive Strength

When tested according to ASTM D-695, the material shall have a compressive strength of not less than 12,000 pounds per square inch. The cast sample shall be cured at 75°F ± 2°F for a minimum of 72 hours. The rate of compression of these samples shall be no more than 1/4” per minute.

**i. Lead-Free, Water-Borne Emulsion Based White and Yellow Traffic Paint**

The pavement marking paint shall be a rapid dry. The traffic paint shall provide optimum adhesion for glass spheres when both binder and glass spheres are applied in the recommended quantities. The paint shall be well ground and mixed, shall not settle badly or cake in the container or thicken in storage. It shall not change in consistency and shall be readily broken up with a stirrer to a smooth and uniform condition.

(1) Characteristics

The paint shall consist of Dow DT 250NA acrylic resin lead-free pigments, dryers, and water as solvent and sufficient pigment suspending agents to insure soft settlement during storage.

(2) Composition

The formulation for the waterborne paint shall be as follows:

Test Component	White	Yellow
TiO <sub>2</sub> % by Weight	8.5% @ 0.14 gm/cm <sup>3</sup> (1.17 lbs/gal)	1.35% @ 0.04 gm/cm <sup>3</sup> (0.36 lbs/gal)
Pigment – TiO <sub>2</sub>	Enamel Grade ASTM D-476 Type III	Clariant 11-2400 Yellow Pigment
Unit Weight	1.65 gm/cm <sup>3</sup> ± 0.02 (13.8 lbs/gal ± 0.2)	1.63 gm/cm <sup>3</sup> ± 0.02 (13.6 lbs/gal ± 0.2)
Vehicle Solids % by Weight	17%	17.5%
Extender Pigment % by Weight	52%	55%
Calcium Carbonate	ASTM D-1199 Ground and Classified – Dry Brightness 95	ASTM D-1199 Ground and Classified – Dry Brightness 95

(3) Drying Time

When applied at a wet film thickness of 15 mils with a top dressing of 0.70 – 1.20 kg (6-10 pounds) of glass spheres per liter (per gallon) of paint and when the pavement temperature is between 4.4 degrees C and 48.9 degrees C (50 degrees F and 120 degrees F) and the relative humidity doesn't exceed 50%, the binder shall dry to a no-tracking condition in a minimum of 20 seconds and a maximum of 60 seconds. Air flow across the surface of field applied material must be at least 23 meters/minute (75 feet/minute) to qualify material for this requirement.

These dry times shall not be exceeded when the paint is applied with specialized equipment so as to have the pigmented binder at a temperature of 65.5 degrees C to 76.7 degrees C (150 degrees F to 170 degrees F) at the spray gun.

The no-tracking condition shall be determined by passing over the applied line in a simulated passing maneuver with a passenger car traveling 56 KPH (35 MPH). There shall be no visual deposition of the paint to the pavement surface when viewed from a distance of 15.2 meters (50 feet). Furthermore, the pigmented

binder, without glass spheres, shall dry to no-tracking condition in 180 seconds or less when tested in accordance with ASTM D-711.

(4) Dry Opacity

The minimum contrast ratio shall be 0.96 when drawing down with a 0.005 bird film applicator on a 2A Leneta Chart or equal and air-dried for 24 hours. Contrast Ratio = Black/White. Dry Opacity will be determined according to Method 4121, Federal Test Method Standard No. 141a. Apply the paint with the above applicator to the chart specified in Section 1.1 of Method 4121.

(5) Flexibility

Apply the paint to aluminum alloy 2024-0,  $0.81 \pm 0.08$  mm ( $0.032 \pm 0.003$  inch) thick panels with a 0.005 inch Bird Film Applicator. Air dry 18 hours and bake for 5 hours at a temperature of 105 to 110 degrees C (220 to 230 degrees F). Cool for 15 minutes at 25 degrees C (77 degrees F) and bend over the conical mandrel as specified in ASTM D522. There shall be no cracking of the film at a mandrel diameter of 2.54 cm (1 inch) or larger when examined without magnification.

(6) Abrasion Resistance

When subjected to the Falling Sand Abrasion Resistance Test, the amount of sand required to completely abrade the paint film from an area 4mm ( $5/32''$ ) in diameter on the panel shall not be less than 70 liters (18.5 gal). The test shall be conducted according to Method 6191 of Federal Test Method Standard No. 141a with the following additions and exceptions:

Fresh, new unused sand shall be used for each test of three panels. Sand shall be measured by weight with 7.9 kg (17.5 lbs) of sand being counted as equivalent to 5 liters (1.3gal).

A test shall be the average liters (gallons) of sand required to abrade the 4mm ( $5/32''$ ) spot on three separate panels. Panels for the test will be prepared as follows:

Apply the paint without reduction to a smooth glass panel with a 0.15mm (0.006 inch) Bird Film Applicator. Air dry for 24 hours and bake for 3 hours at a temperature of 105 to 110 degrees C (220 to 230 degrees F). Condition the panel for 24 hours at a temperature of 21 to 27 degrees C (70 to 80 degrees F) and a relative humidity of 50% to 70% before making the test. The glass panels shall not be less than 200mm (8 inches) long and the abrasion test shall be made on the middle third of the film on the panel.

(7) Water Resistance

Apply a film of the paint with a 0.13mm (0.005 inch) Bird Film Applicator to a smooth glass panel approximately 250 mm (10 inches) long. Allow to dry for 48 to 72 hours and then immerse one end of the panel in a beaker of distilled water to a depth of approximately 125 mm (5 inches). After 24 hours of immersion, remove the panel and examine. After 24 hours of air drying the immersed portion of the film shall be equal in hardness, toughness, gloss, and color adhesion to the portion of the film that was not immersed in water. Adhesion shall be checked using knife blade or spatula on both ends of the film, comparing the ease with which the film can be removed from the glass.

(8) Stability Test

Fill a 0.5 liter (one-pint) friction top paint can with a thoroughly mixed sample to within 25 mm (one inch of the top). Determine consistency in grams (pounds) according to Method 4281, Federal Test Method Standard No. 141a. Close the can with the lid and shake for 5 minutes. Place the can in an air oven at 60 degrees (140 degrees F) for 18 hours. Remove and cool to room temperature. Open the can and remove any skins and examine the contents. There shall be no livering or other deterioration. Thoroughly mix the paint and again determine the consistency in grams (pounds). The increase in consistency shall not be more than 17 grams (0.6 oz).

(9) Fineness of Grind

When tested according to ASTM D1210, the fineness of grind shall not be less than 3 Hegman units.

(10) Sphere Embedment

Paint shall be applied to a glass panel at a wet film thickness of 0.3mm (0.012 inch) followed immediately by an application of glass spheres dropped on the surface of the paint. After drying for at least 24 hours, observe the amount of sphere embedment with a 30-power microscope. At least 90% of the spheres

shall be embedded between 50% and 65%. The glass spheres used for this test must be a moisture resistant silicone treated sphere suitable for use with a water base coating.

(11) Directional Reflectance

The daylight directional reflectance of white pigmented binder (without glass spheres) shall be not less than 85% relative to magnesium oxide when tested in accordance with Federal Test Method Standard No. 141a, Method 6121. If yellow, after drying shall suitably match color 33538 of Federal Standard 595.

The paint for the pavement markings shall contain no lead and/or chromium and shall have volatile organic content conforming to the latest Environmental Protection Agency regulations.

In addition, the paint and/or components shall conform to the American Society for Testing Materials (ASTM) as follows:

ASTM D93	Flash Point by Pensky Martens Closed Tester
ASTM D476	- Titanium Dioxide Pigments, Type II Rutile
ASTM D562	- Consistency of Paints Using Stormer Viscosimeter
ASTM D711	- No Pick-Up Time of Traffic Paint
ASTM D768	- Yellow Iron Oxide
ASTM D868	- Evaluating Degree of Bleeding of Traffic Paint
ASTM D969	- Laboratory Test for Degree of Bleeding of Traffic Paint
ASTM D1152	Methyl Alcohol
ASTM D1199	Calcium Carbonate
ASTM D1210	Fineness of Dispersion of Pigment-Vehicle Systems
ASTM D1475	Density of Paint, Varnish, Lacquer, and Related Products
ASTM D2243	Freeze-Thaw Resistance of Waterborne Coatings
ASTM D2369	Volatile Content of Coatings
ASTM D2805	Hiding Power of Paints by Reflectometry
ASTM D3723	Pigment Content of Water Emulsion by Low Temperature Ashing
ASTM D3960	Volatile Organic Content (VOC) of Paints and Related Coatings
ASTM D4060	Abrasion Resistance by Taber Abraser
ASTM D4366	Hardness of Organic Coatings by Pendulum Damping Tests
ASTM E70	pH of Paints and Related Material
ASTM E1347	Standard Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry

The paint shall show no cracking, flaking, blistering, appreciable loss of adhesion, softening, coagulation, discoloration, and have a minimum bleeding ratio of 0.97 when tested in accordance with Federal Specification TT-P-1952B. The paint shall be capable of dilution with water at all levels without curdling or precipitation such that the wet paint can be readily cleaned up with water only.

**j. Epoxy Pavement Marking**

This specification is for the application of epoxy resin and glass beads as reflective pavement markings on Portland cement concrete. The epoxy resin material shall be toxic heavy metal free, two-component, 100% solids, and shall be formulated and tested to perform as a pavement marking material with glass spheres applied to the surface. The two components are an epoxy resin and an amine curing agent. The contractor shall provide complete manufacturer's specifications and material safety data sheets to the Engineer for all material furnished.

(1) Characteristics

The material shall not exude toxic fumes when heated to application temperature. The material which, when mixed in the proper ratio and applied at 0.14 mil (500 µm) wet film thickness at 74.8 degrees F (23.8 degrees C) with the proper saturation of glass beads, has a no-tracking time of less than 40 minutes for slow

curing material and less than 10 minutes for rapid curing material. The material shall be capable of fully curing under a constant surface temperature of 32 degrees F (0 degrees C) or above.

(2) Color

Provide white which complies with Federal Standard 595 17875. Provide yellow which matches the standard shade within the red and green tolerance limits when compared with the Highway Yellow Color Tolerance chart available from the U.S. Department of Transportation, Washington, D.C. (Federal Standard 595 13538).

(3) Abrasion Resistance

Maximum loss should be 0.0028 ounces (80 mg) when tested at  $30 \pm 1.5$  mils ( $750 \pm 38$   $\mu$ m) and a 72 hour cure and with a CS-17 wheel under a load of 2.2 lbs. (1000 grams) for 1000 cycles

(4) Hardness:

Shore D hardness of 75 minimum.

(5) Adhesion to Concrete

When catalyzed, has such a high degree of adhesion to the specified concrete surface that there is a 100% concrete failure. Apply the material at a film thickness of  $15 \pm 1.5$  mils ( $375\mu\text{m} + 38\mu\text{m}$ ) to concrete with a minimum compressive strength of 4061 psi (28 MPa). Allow the material to cure for 72 hours at 77 degrees F (25 degrees C) before the test is performed.

(6) Yellowness Index

White only. Value after 72 hours in QUV – 30 maximum when tested at  $15 \pm 1.0$  mils ( $375\mu\text{m} + 25\mu\text{m}$ ) and a 72 hour cure.

(7) Field Evaluation

Field test materials at AASHTO NTPEP regional test facilities, which include both hot and cold weather conditions and are a minimum of six months in duration.

(8) Glass Beads For Drop-On Application (double drop system):

For the first drop, furnish large beads, which are compatible with the epoxy system, and comply with AASHTO M 247 except with the following gradation (FP-96, Type 4):

<b>Sieve Size</b>	<b>Percent Passing</b>
No. 10 (2.00 mm)	100
No. 12 (1.70 mm)	95 – 100
No. 14 (1.40 mm)	80 – 95
No. 16 (1.18 mm)	10 – 40
No. 18 (1.00 mm)	0 – 5
No. 20 (850 $\mu$ m)	0 – 2

For the second drop, furnish regular beads which are specifically manufactured to be compatible with the epoxy system, and which comply with the requirements of AASHTO M247, Type 1. Both types of beads are to be coated with a moisture resistant coating and an adhesion promoting coating which is compatible with the epoxy system.

(9) Test Methods

ACI 503, Appendix A.1 Adhesion to Concrete

ASTM D2240 Hardness

ASTM C501 Abrasion Resistance

(10) Prequalification

Manufacturers interested in prequalifying material under this specification must provide a one liter sample of each color plus one liter of hardener to the Engineer for laboratory testing. Also include a copy of the quality control test report for each lot of material, an infrared spectroscopy analysis for each component if available, material safety data sheets and a complete set of installation recommendations and instructions.

Forward an official copy of the AASHTO NTPEP test report along with evidence that the product in reference is identical to that submitted for prequalification.

The material will be evaluated for compliance with all requirements of this specification, and the manufacturer will be notified of the results. Both component A and component B will be analyzed and "fingerprinted" using infrared spectroscopy for use in screening future verification samples to ensure that materials submitted for use are of an identical formulation as originally approved.

(11) Verification testing

The Engineer will take a one liter verification sample of Part A and Part B of the epoxy from one lot of each color per project. Send the samples to the engineer for testing and evaluation. Lots previously tested will be exempted from testing and may be exempted from sampling if coordinated with the engineer. Samples may be tested using infrared spectroscopy and testing as necessary. Deviations as determined by comparison with the prequalification sample will be cause for removal from the pre-qualified list. The Engineer may also take a 0.5 gallon (2 liter) sample of each type of glass bead used on the project. Forward all samples to the engineer for verification testing

### **26.3 CONSTRUCTION REQUIREMENTS**

The proposed permanent markings shall be laid out by the contractor in advance of the marking installation. Markings shall not be applied until the layout and conditions of the surface have been approved by the City Inspector. If a paint line is used for layout purposes (in lieu of a chalk line or string line) the paint line shall not be wider than ½ inch) in width. If wider, the paint shall be removed following the application of the final permanent marking. New markings shall match existing markings as applicable in areas abutting existing road surfaces. The surface shall be dry and all dust, debris, oil, grease, dirt, temporary markings and other foreign matter shall be removed from the road surface prior to the application of the permanent marking material.

The Contractor shall be responsible for keeping traffic off freshly applied markings until they have set sufficiently to bear traffic. Traffic control is the responsibility of the Contractor and shall conform to the City of Overland Park Traffic Control Handbook. Failure to comply with traffic control guidelines will result in the Pavement Marking Contractor being directed to stop operations and leave the site until proper and approved traffic control has arrived and put in place on site.

**a. Glass Spheres**

The drop on glass spheres shall be applied at a rate of eight to ten pounds per 100 square feet.

**b. Thermoplastic Pavement Markings**

Thermoplastic material shall readily apply to the pavement at temperatures of 400 – 425 degrees F from approved equipment to produce an extruded line that shall be continuous and uniform in shape having clear and sharp dimensions. Application temperatures shall not exceed 450 degrees F.

The thermoplastic markings shall be applied to the pavement surface in a molten state by mechanical means with surface application of glass spheres, and upon cooling to normal pavement temperature, produce an adherent retro-reflectORIZED stripe of specified thickness and width and capable of resisting deformation.

(1) Equipment

The equipment used to install the thermoplastic shall be as follows:

A self-propelled machine is required in order to fulfill the timing needs of the marking installation for longitudinal lines.

The equipment shall be constructed to provide mixing and agitation of the materials. Conveying parts between the main material reservoir and the shaping die shall be constructed as to prevent accumulation and clogging. The mixing and conveying parts up to and including the shaping die will maintain the materials at a temperature not less than 400 – 450 degrees F. To assure that the material does not fall below the minimum temperature, the shaping die shall be heated by means of a gas-fired infrared heater or a heated, oil-jacketed system. It shall be constructed as to insure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off square stripe ends and shall provide a method of

applying “skip” lines. The equipment shall be constructed to be able to provide for varying die widths and to produce varying widths of traffic markings. The use of pans, aprons, or similar appliances with die overruns will not be permitted.

If the plans indicate thermoplastic material for transverse lines, i.e., crosswalks, crosshatching, etc., a push cart shall be used according to the following requirements: Only one pass with the thermoplastic pavement marking equipment shall be allowed in order to provide the required line width according to the plans. Multiple passes of narrower lines with overlaps to provide the required width shall not be allowed. Liquid thermoplastic shall not be used for word or symbol markings.

All conditions apply as stated above for material temperatures, line definition and workmanship when a hand pushcart is used for cross walks. The Inspector will verify measurement. The pushcart shall be equipped with a special kettle for melting and heating the material shall be provided. The kettle shall be equipped with a thermostat so that heating can be done by controlled heat transfer liquid rather than by direct flame so as to provide positive temperature control and prevent overheating of the material. It shall be constructed for a nominal application of 90 – 125 mil thickness. The heater and applicator shall be so equipped and arranged as to meet the requirements of the National Board of Fire Underwriters of the National Fire Protection Association, of the state, and of the local authorities. The pushcart shall be equipped with an automatic glass sphere dispenser attached to the striping machine in such a manner that the spheres are dispensed almost instantaneously upon the installed line. The glass sphere dispenser shall be equipped with an automatic cut-off control synchronized with the cut-off of the thermoplastic material.

The equipment shall be arranged as to permit preheating of the pavement immediately prior to application of the thermoplastic material, if preheating is recommended by the thermoplastic manufacturer. The applicator shall be capable of containing a minimum of 1000 pounds of molten material (not applicable for hand-liner use). The applicator shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc.

The Contractor’s striper shall be equipped with electrical foot counters. The counters shall individually tabulate the length of line applied by each gun whether solid or dashed. The Contractor shall determine the accuracy of the foot counters and establish an adjustment factor as required to determine the pay item quantities. The foot counters shall be periodically checked to assure accurate measurements. No thermoplastic shall be applied without the accurate operation of the foot counters. The Contractor shall provide the Engineer with a certified document on these calibrations.

#### (2) Application Over Existing Markings

Existing thermoplastic markings on asphalt road surfaces may be over laid with thermoplastic material providing that the existing markings (thermoplastic) are less than 30 mils thick, and are securely bonded to the substrate. If the thermoplastic is greater than 30 mils, or not securely bonded to the substrate, then it shall be ground to 30 mils, or removed completely if not securely bonded to the road.

Existing solvent based paint on asphalt road surfaces may be over laid with thermoplastic provided that more than 75% of the road surface is exposed, and there is no more than a single coat of paint on the remaining unexposed area. If more than one layer of paint exists, the paint is not securely anchored to the substrate, or there is less than 75% of the road surface exposed, then the paint must be thoroughly removed.

All existing polyester, epoxy, or other type pavement marking paints on asphalt or concrete road surfaces must be completely removed from all road surfaces prior to the installation of thermoplastic material.

#### (3) Application Temperatures

To insure optimum adhesion, the pavement and ambient air temperature shall be 50 degrees F and rising. The thermoplastic material shall be applied in a melted state at a temperature of 400 – 425 degrees F. The temperature of the material within the shaping dies shall be maintained at the manufacturer’s recommendations for application temperatures, but in no case shall the temperature fall below 400 degrees F or exceed 450 degrees F.

Where manufacturer’s application temperatures differ from those as specified, the manufacturer’s temperatures shall apply upon approval of the Engineer.



(4) Line Quality

The finished lines shall have well defined edges and be free of waviness. Pavement marking lines shall be straight or of uniform curvature and shall conform with the tangents, curves, and transitions as specified in the pavement marking standards and/or as directed by the Inspector.

(5) Line Thickness

The minimum thickness of the lines as viewed from a lateral cross section shall be not less than 90 mil. Drop-on glass spheres shall not be included in the measurement, or if so, then appropriate allowances shall be made for the added mil thickness. A device for gauging the installed material thickness shall be furnished to the City Inspector as requested for use on the project. The gauge shall be easy to read and shall readily indicate excessive variations.

(6) Clean Up

The Contractor shall be responsible for removing all pavement markings material spilled upon the roadway surface or adjoining area. The Contractor shall use methods acceptable to the Engineer/Inspector for removing the spilled material.

(7) Line Repair

Any pavement marking which is crossed by a vehicle and tracked shall be replaced and any subsequent marking made by the vehicle shall be removed by methods acceptable to the Inspector at NO additional cost to the City.

**c. Preformed Thermoplastic Pavement Markings**

The markings shall be applied in accordance with the manufacturer's recommendations on clean and dry surfaces.

(1) Asphalt

The materials shall be applied using the propane torch method recommended by the manufacturer. The material must be able to be applied at ambient and road temperatures down to 32 degrees F without any preheating of the pavement to a specific temperature. The pavement shall be clean, dry and free of debris and oil or grease residue. At temperatures below 50 degrees F, the preformed thermoplastic pavement markings shall be kept as warm as possible to maintain flexibility.

Remove pavement surface moisture by holding a propane torch approximately 6" above the section of asphalt using a continuous circular motion. Heat the pavement with the torch upon placing the material to a temperature of 200 degrees F for 90 mil, and up to 300 degrees F for 125 mil materials. Immediately after the road surface has been properly preheated, position the material with exposed sphere side up and heat.

Position the torch approximately 12" over the marking so the flame is extended and heat is evenly applied moving the torch in a circular motion across the marking. When the correct temperature of the marking has been reached, it will turn slightly darker or pale yellow if the material is white. Over heated or burned material shall be removed. After the entire material section has been heated and bonded to the pavement, re-heat the perimeter of the marking and the road surface to bond the edges. If installing reversible arrows, which do not contain a top coating of glass spheres, the glass spheres shall be hand applied on the molten material.

Feather the leading edge of the pavement marking with a putty knife or bevel with the torch. Leading edges are any edge that would be susceptible to snow plow blades approaching from the direction of normal travel. After cooling, use a putty knife to attempt to remove a portion of the material. The material shall not pry off without asphalt embedded to the underside.

**d. Durable Pre-formed, Patterned Cold Plastic Pavement Markings**

The Contractor shall furnish and install white and yellow permanent retro-reflectorized durable preformed, patterned cold plastic pavement marking material at the location shown on the plans, in conformance with the details and material specifications included herein.

(1) Procedure

The markings shall be applied in accordance with the manufacturer's installation instructions.

## (2) Road Surface Conditions

If the roadway surface is new concrete open to traffic less than 90 days, remove curing compound by sandblasting, shotblasting, or hydroblasting. If markings already exist on the roadway, remove markings from the surface by sandblasting or grinding. At a minimum, 90 percent of the road surface under the existing markings must be exposed prior to tape application. If existing markings have been removed, the road surface must be blown clean using an air compressor with at least 185 cubic feet per minute air flow and 90 psi air pressure. All road surfaces where tape will be applied should be swept with a broom and cleaned with a high pressure blower. The road surface must also be dry.

## (3) Application Temperatures

Air temperature and pavement surface temperature shall be a minimum 40 degrees F. The pavement surface must be dry with no precipitation for 24 hours prior to application. If the markings are placed within the seasonal start and end dates (May 1<sup>st</sup> to October 1<sup>st</sup>), the Surface Preparation Adhesive P-50 is not required. If the markings are placed outside of the seasonal start and end dates, the Surface Preparation Adhesive P-50 is required.

## (4) Adhesive Application (if applicable)

Read and become familiar with all health and safety information and directions for use regarding the P-50 preparation adhesive. Refer to 3M Market Test Information Folder 5.17, August 2001.

Adhesive should be applied according to the following methods for transverse and longitudinal markings. Allow the P-50 adhesive to dry until it feels tacky but is no longer in liquid form and has a matte finish rather than a glossy wet appearance. P-50 adhesive dries quickly under most circumstances. Typical time for P-50 adhesive to dry is 2 to 3 minutes under optimal conditions of 70 degrees F and medium to low humidity levels. Coverage of the adhesive is approximately 450 lineal ft/gal spraying a 6 inch wide pattern.

### (a) Transverse Markings

Evenly apply one coat of P-50 adhesive to the road surface using a solvent-resistant roller with a 3/8-inch nap roller. The coating on the pavement must extend at least 1-inch beyond the premarked area. Allow the adhesive to set to prevent the tape from sliding after application. If the adhesive is not allowed to set, it will not bond properly to the adhesive on the tape and adhesion failure will likely occur. The P-50 adhesive is set when it feels tacky but will not lift or string when touched with fingertips protected with gloves.

### (b) Longitudinal Markings

Using a manufacturer approved spray applicator, apply a thin, uniform coat of P-50 adhesive to the pavement. The adhesive should extend at least 1-inch beyond the premarked area where the edges of the tape will be applied. The applicator shall be designed to spray a 6-wide pattern for application of 4-inch wide tape using a size 8004 spray tip nozzle. Adjust the arm of the applicator up or down so that the spray pattern is 6 inches wide. For tape wider than 4 inches, spray multiple passes, overlapping the previous pattern by 1/2-inch. Allow additional time for the overlapped areas to dry.

## (5) Application of Markings

Tape should be applied according to the following methods for transverse and longitudinal markings.

### (a) Transverse Markings

Apply the tape by hand. When splicing is required, use butt splices. Do not overlap the material. If there is a crack in the road, lay the tape over the crack and then cut the tape 1-inch from each side of the crack. Use this same technique on concrete when the transverse marking is applied over a joint. Tamp the tape thoroughly with a tamper cart with a minimum 200 pound load. Start tamping in the center of the marking and work toward the ends. Do not twist or turn the tamper cart on the tape. Make six passes (three full passes back and forth) over the surface of the tape making sure all edges are firmly adhered.

### (b) Longitudinal Markings

Apply the tape using a manual highway tape applicator as approved by the manufacturer. If there is a crack in the pavement or if the tape is to be applied over a bridge expansion joint, lay the tape over the crack or joint, then cut the tape 1-inch away from the crack or joint on each side. Tamp the tape thoroughly with a manufacturer approved tamper cart with a minimum 200 pound load, or slowly drive over the tape three times

with a vehicle. The vehicle must be equipped with a pointing device to aid in keeping the vehicle on the tape, making three passes forward over the tape. Use a vehicle tire on long line markings only. When using the tamper cart, do not twist or turn the tamper cart on the tape. Make six passes (three full passes back and forth) over each part of the tape making sure all edges are firmly adhered.

**e. Temporary Cold Plastic Pavement Markings**

The Contractor shall furnish and install white and yellow permanent retro-reflectorized cold preformed plastic pavement marking material at the location shown on the plans, in conformance with the details and material specifications included herein.

The cold plastic markings shall consist of a homogeneous, extruded, prefabricated material of specified thickness and width which shall contain reflective glass spheres uniformly distributed throughout the cross-section, and shall be applied only to pavement surfaces as temporary markings between construction projects or an interim basis when lane assignments are anticipated in the near future.

(1) Procedure

Apply the tape according to manufacturer's instruction with pre-coated adhesive and pressure.

(2) Road conditions

It is recommended that the tape be installed as soon as practical following tape manufacturer instructions.

Clean the surface of the road using a broom and/or high-pressure air blower. If either of these methods fail to clean the road surface, then high-pressure water wash shall be used. Road surface must be dry and all dust, dirt, debris, oil, grease and foreign material removed before applying tape. If using water-cooling to groove, the groove must be completely dry prior to tape application.

(3) Tape Application

If there is a crack in the pavement, or if the tape is to be applied over a bridge expansion joint, manhole or utility box, lay the tape over the crack joint or fitting, then cut the tape one inch away from the crack or joint on each side. Apply the required surface preparation adhesive and allow to dry completely (5-10 minutes at 70 degrees F), but not over 30 minutes. Butt splices must be used; do not overlap tape ends.

(4) Tamping

Tamp the tape thoroughly with a tamping cart with a minimum 200 pound load, three times back and forth (six passes) over each part of the tape. Start in the center of the marking and work out to the edges removing any trapped air. Do not twist or turn the tamper cart on the tape. Make six passes (three passes back and forth) over each part of the tape (tamping is very important). Make sure all edges are firmly adhered.

(5) Application Conditions

The air temperature shall be 60 degrees F and rising with a surface temperature of 70 degrees F and rising. The overnight air temperature shall not have been below 40 degrees F the night before tape application. The pavement surface must be clean and dry. No rainfall should occur within 24 hours prior to application. Traffic must be kept off of pavement surfaces coated with a surface preparation adhesive prior to tape application (follow manufacturer's instruction regarding the use of surface preparation adhesive)

(6) Surface moisture

Cold preformed plastic tapes will not adhere if moisture is present. Therefore, road surfaces must be dry and above the minimum required temperature for application of all tapes. If rainfall occurs within 24 hours prior to application, a surface moisture test (plastic wrap or roofing paper method as approved by the inspector) must be performed and approval obtained from the inspector. The groove must be visibly dry for a minimum of two hours prior to application. A moisture test shall be completed after the two-hour drying time to ensure no presence of moisture.

**f. Urethane Acrylate**

The Contractor shall furnish and install white and yellow retro-reflectorized pavement marking paint material at the location shown on the plans, in conformance with the details and material specifications included herein.

(1) Application Temperature

Ambient and surface temperature shall be 35°F and rising. The pavement surface temperature and ambient temperature shall be determined and documented before the start of each day of marking operation and at any other time deemed necessary by the inspector.

(2) Surface Preparation

The surface shall be clean and dry. The surface preparation shall include, but not be limited to, cleaning and removal of sealing and curing compound. All permanent and temporary pavement markings shall be at least 90% removed and pavements cleaned free of grease, oil, mud, dust, dirt, grass, loose gravel, loose or flaking paint and other deleterious material.

The pavement surface shall first be power broomed and vacuumed. An additional compressed air operation, separate from the compressed air guns on the striping applicator, shall be used to remove residue and debris resulting from the cleaning work. Compressed air shall also be used during striping application. The prepared pavement surface area shall be wider than the material to be applied, such that a prepared area is on all sides of the material after application. On streets treated with chip seal material, the new markings shall not be installed until after the second sweeping operation. Any existing marking which may interfere with the performance of the material shall be physically removed by approved method except for the use of chemicals.

(3) Equipment

The material shall be applied with equipment utilizing the impingement mix, solvent free, airless spray application system or standard mix tube application equipment. The equipment shall be designed to control the viscosity of the material accurately at the spray gun. This equipment shall have pressure gauges for each proportioning pump. Each vehicle shall be operated by a technician who is an expert in that particular equipment's operation and plural component application techniques.

(4) Application Rate

The material and retro-reflective glass spheres shall be placed according to requirements. The material shall be applied at a rate of 240 feet per gallon based on a minimum of 20 mils applied at a four inch width.

**g. Pavement Marking Paint**

The Contractor shall furnish and install white and yellow retro-reflectorized pavement marking paint material at the location shown on the plans, in conformance with the details and material specifications included herein.

(1) Application

The wet thickness and dry thickness of the pavement marking paint shall not be less than 15 mils 12 mils, respectively without glass spheres. Glass spheres shall be applied uniformly over the entire length of line at the rate of 6 to 10 lbs per gallon of paint. The gun tip shall be oriented perpendicular to the centerline to ensure that the beginning and ends of all lines are perpendicular to the centerline and not skewed. The equipment shall be maintained such that the needle can be fully closed when shut as to ensure square cut lines at the beginning and ends.

(2) Surface Preparation

The surface shall be clean and dry. The surface preparation shall include, but not be limited to, cleaning and removal of sealing and curing compound. All permanent and temporary pavement markings shall be at least 90% removed and pavements cleaned free of grease, oil, mud, dust, dirt, grass, loose gravel, loose or flaking paint and other deleterious material.

The pavement surface shall first be power broomed and vacuumed. An additional compressed air operation, separate from the compressed air guns on the striping applicator, shall be used to remove residue and debris resulting from the cleaning work. Compressed air shall also be used during striping application.

The prepared pavement surface area shall be wider than the material to be applied, such that a prepared area is on all sides of the material after application. On streets treated with chip seal material, the new markings shall not be installed until after the second sweeping operation. Any existing marking which may interfere with the performance of the material shall be physically removed by approved method except for the use of chemicals.

#### **h. Epoxy Pavement Marking**

The Contractor shall furnish and install white and yellow epoxy markings at the location shown on the plans, in conformance with the details and material specifications included herein.

##### **(1) Equipment**

Use equipment that is capable of spraying both yellow and white epoxy in the manufacturer's recommended proportions. Provide equipment that will place stripes on the left and right sides, and place two lines simultaneously with either line in a solid or intermittent pattern in yellow or white. All guns must be in full view of operators at all times. If words, symbols, crosswalks, cross-hatching and stop bars are to be of epoxy resin material, equip the truck with a hand spray wand for such application. Mount the equipment on a truck of sufficient size and stability, and with an adequate power source, to produce lines of uniform dimension and prevent application failure. Provide equipment with metering devices to register the accumulated volume dispensed for each material, each day. Additionally, provide individual pressure gauges, clearly visible to the operator, for each pump used.

Provide equipment with two glass bead dispensers (double drop system) that uniformly distributes the glass beads to the surface of the epoxy pavement marking at a rate of at least 25 pounds per gallon. Glass beads may be applied by a pressure gun or controlled free fall.

##### **(2) Contractor's Personnel**

Assure that at least one employee on the project when pavement markings are being applied holds an American Traffic Safety Services Association (ATSSA) pavement marking certification.

##### **(3) Surface Preparation**

On existing pavements, remove the existing pavement markings in accordance with these Specifications. Remove the existing markings and prepare the surface according to the manufacturer's recommendations (for the type of markings being installed).

On new Portland cement concrete pavement (PCCP), use shot blasting to remove curing compounds and laitance from the surfaces to which the pavement marking will be applied. Prepare the surfaces of new concrete bridge decks the same as new PCCP.

On aged asphalt pavements, THOROUGHLY remove all dirt, grit, grease, grime, vegetable matter, residue of prior pavement marking application (including such adhesives or primers that may have been used in their application), and any other foreign matter from the roadway surface prior to the application of epoxy pavement markings.

##### **(4) Alignment**

All layout required in the construction of the pavement marking is the responsibility of the Contractor. Lay out the pavement marking as detailed on the Plans. When the Plans do not provide details, submit a layout plan (conforming to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD)) for the pavement markings to the Engineer for approval. Normally locate longitudinal pavement marking stripes 2 inches from existing longitudinal joints. Provide adequate guide marks approximately 2 inches by 6 inches at approximately 30 to 50 ft intervals for the application of the pavement markings.

##### **(5) Pavement Marking Application**

When no traffic is present, and for edgelines under any condition of traffic, a slower curing epoxy material (40 minutes) may be used. When the application is taking place under traffic, use a fast setting (10 minutes) epoxy material for center lines and skip lines. Apply the epoxy material closely behind the cleaning procedure.

Provide the Project Engineer with a copy of the manufacturer's application instructions. Apply the epoxy pavement markings in accordance with the manufacturer's recommendations. In the absence of manufacturer's recommendations, apply the markings when the ambient and pavement surface temperatures

are 40 degrees F and rising. Cease pavement marking operations when the ambient or the pavement surface temperature drops to 40 degrees F.

Before mixing the components of the pavement marking material, heat the individual components to the temperature ranges recommended by the manufacturer of the material. Avoid exceeding the maximum recommended temperature at any time.

Apply the epoxy pavement marking material at a thickness of 20 mils  $\pm$  0.2 mils) on asphalt and PCCP. Immediately apply the glass beads to the epoxy pavement marking at the rate of 25 pounds per gallon of epoxy, equally divided between the large and regular bead gradations. Apply the large beads on the first drop, and the regular beads on the second.

## **26.4 INSTALLATION PERFORMANCE MEASURES**

To ensure total understanding of what is expected in the application of any permanent pavement marking material on new pavement surfaces in the City of Overland Park, the following guidelines shall be followed. On streets receiving a thin surface treatment only, such as micro-surfacing or slurry seal, some of the performance measures may be waived by the inspector.

### **a. Thermoplastic Installation Performance Measures**

All thermoplastic lines shall be of uniform thickness, with well-defined edges and squared off beginnings and endings of all lines.

All thermoplastic lines will have minimal dribbles, runs and overlaps. In the event thermoplastic long lines must stop and then continue, the restart shall line up to within ½ inch of the existing long line and maintain a totally straight line. Hand pushcarts shall be used when doing crosswalks. When the crosswalk cannot be laid continuous, the startup of the line shall be within ¼ inch of the initial line.

The application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc.

Thermoplastic pavement marking materials shall not be applied when pavement temperatures are below 50 degrees F, or when the surface of the pavement shall show evidence of moisture. Temperatures should be at least 50 degrees F and rising.

Thermoplastic material will not properly adhere to pavement if moisture is present. Should rainfall occur within 24 hours prior to application, the surface moisture test (plastic wrap or roofing paper method as approved by the inspector) must be performed, and approval obtained from the Inspector.

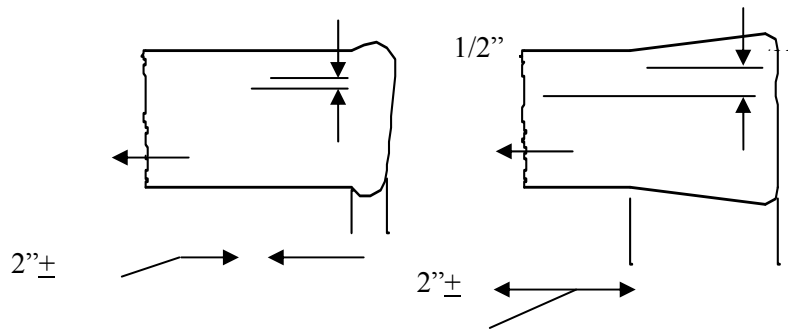
**Lack of specified thickness:** The full unit price bid per meter (foot) shall be withheld if lack of thickness is found more than three (3) times per mile, or project if less than 1 mile in length. Each line shall be checked a minimum of six (6) times per mile, or project if less than 1 mile in length, using the random number tables and method of sampling as set forth in section 5.17.06 of Part V of the KDOT Construction Manual.

**Lack of specified width:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot for each ¼" of width lacking not to exceed 100% of the unit price bid per foot for the length of the line less than specified width. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

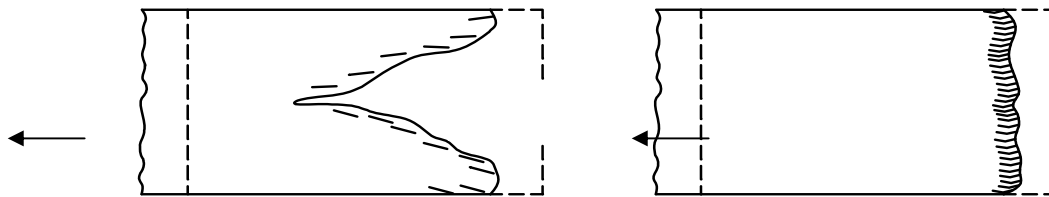
**Lack of specified length/cycle:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot for each 1" of length lacking or exceeding the specified length for broken lane line and/or broken center line not to exceed 100% of the unit price bid per foot for the length of the line less than specified length. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

**Lack/Excess of Surface Spheres or Improper Application:** The full unit price bid per foot shall be withheld for each lineal foot of material with inappropriate application rate of the surface glass spheres. The same penalty shall apply if the spheres are not evenly disbursed across and along a line or if the spheres imbed improperly. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

**Bell ends:** The full unit price bid per foot shall be withheld for wide “bell” ends greater in length than 2 inches. This penalty shall be for the full 6 feet of a lane line or broken centerline or for no more than 6 feet of a long line.

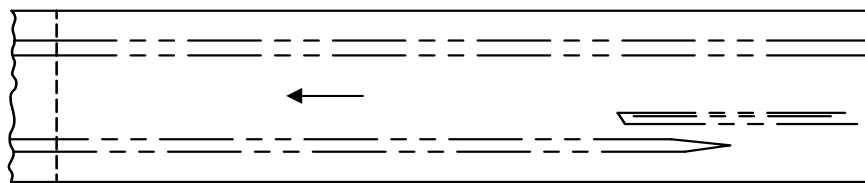


**Lack of adhesion:** The full unit price bid per foot shall be withheld for one foot for each occurrence if found more than three (3) times per 1 mile, or project if less than 1 mile in length.

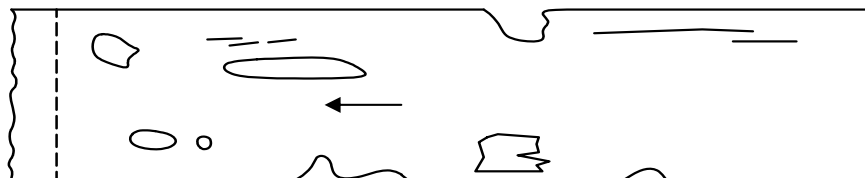


**Line Deviation:** A line that in the judgment of the Engineer deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.

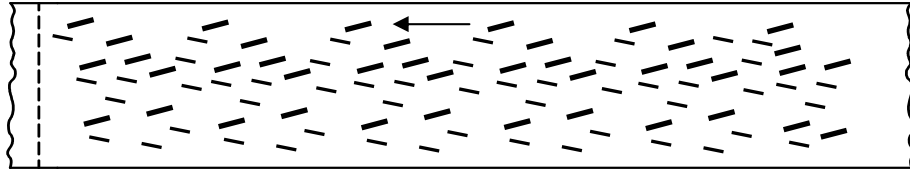
**Pitted Line:** The full unit price bid per foot shall be withheld for each pit greater than 10 feet in length.



**Gaps in Line or Crumbly Edges:** The full unit price bid per foot shall be withheld for the entire length of the portion of any line receiving less than the required amount of thermoplastic material. This penalty shall be imposed when the Contractor fails to correct line quality after the second warning within 1 mile, or project if less than 1 mile in length.



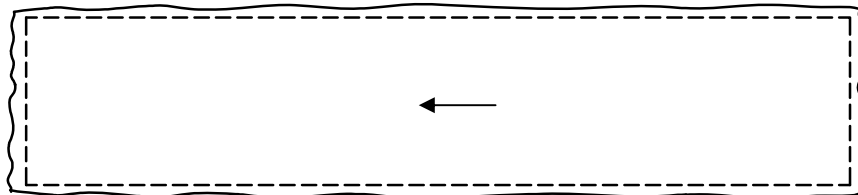
**Rough Line Surface:** The full unit price bid per foot shall be withheld for the entire length of the portion of any line with a rough or “burlap” surface. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.



**Excessive Dripping between Lines:** The full unit price bid per foot shall be penalized for the length of any dribbled open space between broken lines that is not removed to the satisfaction of the Engineer before leaving the project site that work day. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.



**Swollen Line of Excessive Width:** The full unit price bid per foot shall be penalized for swollen lines in excess of the specified width.

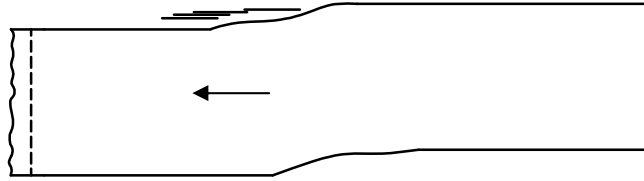


**Smeared Line Edges:** Fifty (50) percent of the unit price bid per foot shall be penalized for each occurrence of a length greater than 15 feet.



**Wavy Line:** The full unit price bid per foot shall be withheld for the entire length of waviness in a line caused by poor operation by the driver/operator of the application equipment. Penalty shall be imposed from the first occurrence.





**Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor (a) removes all pavement marking material placed outside the scope/limits of the project, and (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer and the local entity, if different from the Engineer.

**Timeliness:** All thermoplastic material shall be completely installed within two (2) calendar weeks of the road surface material being laid. Failure to install markings on schedule shall result in liquidated damages of \$1500 per day, separate from the project liquidated damages as stated elsewhere in the Contract Documents, until pavement markings are installed on schedule, or completion of the markings completes the project. These liquidated damages shall be imposed each time the Contractor fails to install pavement markings within the two-week window as described above.

**b. Preformed Thermoplastic Installation Performance Measures**

Applied material must be from an approved manufacturer, of proper dimensions and composition. Material must be applied per manufacturer's instructions. No substitutions of materials will be allowed without prior approval of the Engineer.

Contractor is responsible for accurate layout and measurement. Preformed thermoplastic to be used only where specified or with approval of the Engineer.

Applied material must adhere fully and completely to road surface, with straight edges and squared ends; lay smooth on surface with no warps, folds, creases, waves, bubbles or rips. Color and beading must be uniform and consistent.

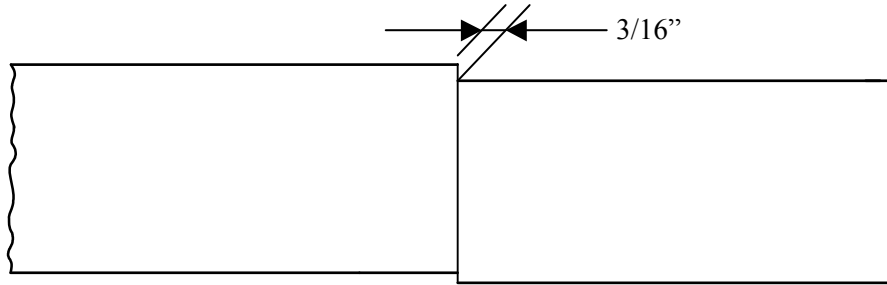
No overlap of materials. Ends or sides matched to existing markings must not exceed 1/8" in separation. Applied material to be in alignment with existing markings and of consistent size.

Preformed thermoplastic pavement marking materials shall not be applied when pavement temperatures are below 32 degrees F, or when the surface of the pavement shall show evidence of moisture.

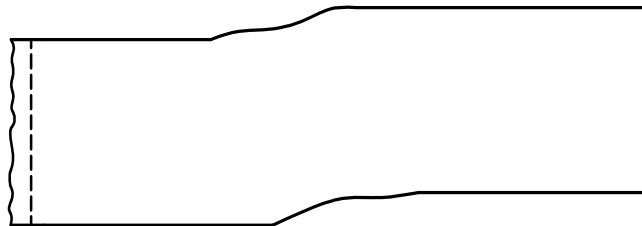
**Lack/Excess of Surface Spheres or Improper Application:** The full unit price bid per foot shall be withheld for each lineal foot of material or per each for symbol markings with inappropriate application rate of the surface glass spheres. The same penalty shall apply if the spheres are not evenly disbursed across and along a line or if the spheres imbed improperly. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

**Lack of adhesion:** The full unit price bid per foot or per each for symbol markings shall be withheld for one foot for each occurrence if found more than three (3) times per 1 mile, or project if less than 1 mile in length.

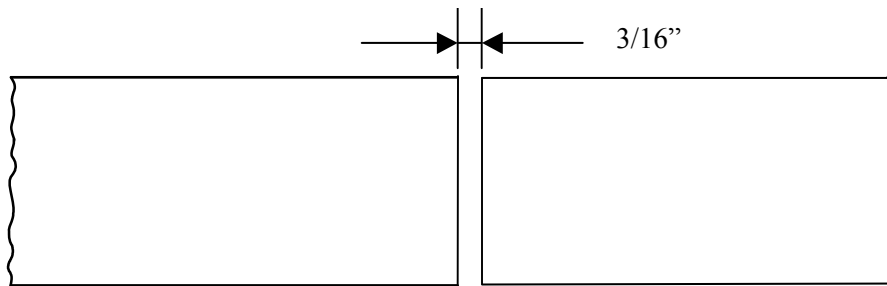
**Line Deviation:** A line that deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.



**Wavy Line:** The full unit price bid per foot shall be withheld for the entire length of waviness in a line caused by poor workmanship and/or application procedures. Penalty shall be imposed from the first occurrence.



**Gaps Between Successive Lines:** Successively placed lines that contain gaps as specified by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.



**Burned or Discolored Markings:** Fifty (50) percent of the full unit price bid per foot shall be withheld for each lineal foot of material or per each for symbol markings which shows signs of burning or discoloration due to prolonged application of the torch. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

**Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor (a) removes all pavement marking material placed outside the scope/limits of the project, and (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer and the local entity, if different from the Engineer.

**Timeliness:** All preformed thermoplastic material shall be completely installed within two (2) calendar weeks of the road surface material being laid. Failure to install markings on schedule shall result in liquidated damages of \$1500 per day, separate from the project liquidated damages as stated elsewhere in the

Contract Documents, until pavement markings are installed on schedule, or completion of the markings completes the project. These liquidated damages shall be imposed each time the Contractor fails to install pavement markings within the two-week window as described above.

**c. Cold Plastic or Durable Pre-Formed, Patterned Cold Plastic Installation Performance Measures**

Applied material must be from an approved manufacturer, of proper dimensions and composition. Material must be applied per manufacturer's instructions. No substitutions of materials will be allowed without prior approval of the Engineer. Manufacturer-approved adhesive must be used and applied per instructions. No substitutions of materials will be allowed without prior approval of the Engineer.

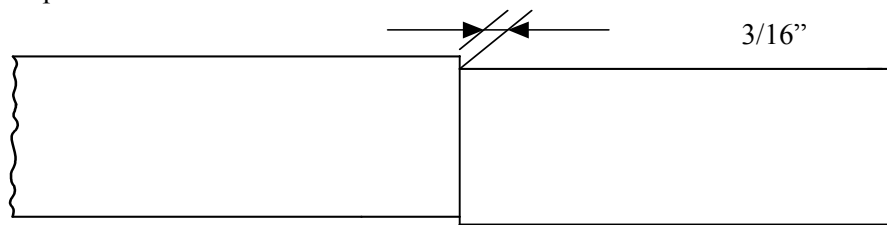
Contractor is responsible for accurate layout and measurement. Cold plastic to be used only where specified or with approval of the Engineer.

Applied material must adhere fully and completely to road surface, with straight edges and squared ends; lay smooth on surface with no warps, folds, creases, waves, bubbles or rips. Color and beading must be uniform and consistent.

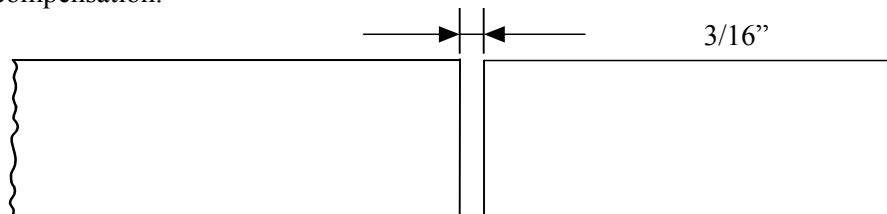
No overlap of materials. Ends or sides matched to existing markings must not exceed 1/8" in separation. Applied material to be in alignment with existing markings and of consistent size.

**Lack of adhesion:** The full unit price bid per foot shall be withheld for one foot for each occurrence if found more than three (3) times per 1 mile, or project if less than 1 mile in length.

**Line Deviation:** A line that in the judgment of the Engineer deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.



**Gaps Between Successive Lines:** Successively placed lines that contain gaps as specified by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.



**Inlaid Groove Quality:** The full unit price bid per foot shall be withheld for the entire length of line that does not meet the requirements for depth of the inlaid material or for a groove that displays a coarse tooth pattern bottom that is not conducive to complete adhesion of the marking material. Penalty shall be imposed from the first occurrence.

**Wavy or Misaligned Line:** The full unit price bid per foot shall be withheld for the entire length of waviness caused by poor operation by the driver/operator of the grooving/installation equipment or for any misalignment in the material installed within the inlaid groove. Penalty shall be imposed from the first occurrence.



**Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor (a) removes all pavement marking material placed outside the scope/limits of the project, and (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer and the local entity, if different from the Engineer.

**Timeliness:** All cold plastic or durable pre-formed patterned cold plastic material shall be completely installed within two (2) calendar weeks of the road surface material being laid. Failure to install markings on schedule shall result in liquidated damages of \$1500 per day, separate from the project liquidated damages as stated elsewhere in the Contract Documents, until pavement markings are installed on schedule, or completion of the markings completes the project. These liquidated damages shall be imposed each time the Contractor fails to install pavement markings within the two-week window as described above.

**d. Pavement Marking Paint and Urethane Acrylate Installation Performance Measures**

The line shall be uniform thickness across the entire cross section of the line with well-defined edges. Heavy inner thickness and thin edges or vice-versa will not be accepted. Glass spheres shall be spread uniformly over the entire length of line. Beginning and ends of lines shall be clean cut and perpendicular to the centerline of the street.

Pavement marking paint materials shall not be applied when pavement temperatures are below 50 degrees F, or when the surface of the pavement shall show evidence of moisture. Temperatures should be at least 50 degrees F and rising.

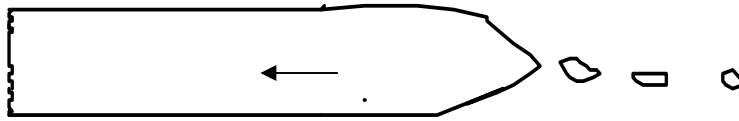
**Lack of specified thickness:** The full unit price bid per foot shall be withheld if lack of thickness is found more than three (3) times per 1 mile, or project if less than 1 mile in length. Each line shall be checked a minimum of six (6) times per 1 mile, or project if less than 1 mile in length, using the random number tables and method of sampling as set forth in section 5.17.06 of Part V of the KDOT Construction Manual.

**Lack of specified width:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot for each 1/4" of width lacking not to exceed 100% of the unit price bid per foot for the length of the line less than specified width. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

**Lack of specified length/cycle:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot for each 1" of length lacking or exceeding the specified length for broken lane line and/or broken center line not to exceed 100% of the unit price bid per meter (foot) for the length of the line less than specified length. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

**Lack/Excess of Surface Spheres or Improper Application:** The full unit price bid per foot shall be withheld for each lineal foot of material with inappropriate application rate of the surface glass spheres. The same penalty shall apply if the spheres are not evenly disbursed across and along a line or if the spheres imbed improperly. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

**Pointed Ends:** The full unit price bid per foot shall be withheld for pointed ends. This penalty shall be for the full 6 feet of a lane line or broken centerline or for no more than 6 feet of a long line.

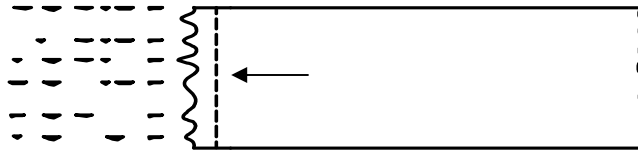


**Skewed Ends:** The full unit price bid per foot shall be withheld for skewed ends. This penalty shall be for the full 6 feet of a lane line or broken centerline or for no more than 6 feet of a long line.

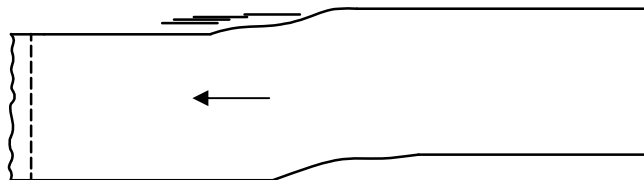


**Line Deviation:** A line that in the judgment of the Engineer deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.

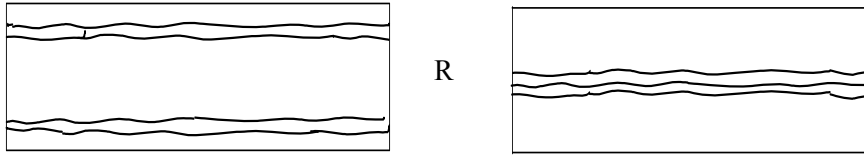
**Excessive Dripping between Lines:** The full unit price bid per foot shall be penalized for the length of any dribbled open space between broken lines that is not removed to the satisfaction of the Engineer before leaving the project site that work day. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.



**Wavy Line:** The full unit price bid per foot shall be withheld for the entire length of waviness in a line caused by poor operation by the driver/operator of the application equipment. Penalty shall be imposed from the first occurrence.



**Non-Uniform Thickness:** The line shall be uniform thickness across the entire cross section of the line with well-defined edges. Heavy inner thickness and thin edges or vice-versa will not be accepted. The full unit price bid per foot shall be withheld for lines that are not of uniform thickness. Penalty shall be imposed from the first occurrence.



**Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor (a) removes all pavement marking material placed outside the scope/limits of the project, and (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer and the local entity, if different from the Engineer.

**Timeliness:** All paint or urethane acrylate material shall be completely installed within two (2) calendar weeks of the road surface material being laid. Failure to install markings on schedule shall result in liquidated damages of \$1500 per day, separate from the project liquidated damages as stated elsewhere in the Contract Documents, until pavement markings are installed on schedule, or completion of the markings completes the project. These liquidated damages shall be imposed each time the Contractor fails to install pavement markings within the two-week window as described above.

**e. Epoxy Installation Performance Measures**

The line shall be uniform thickness across the entire cross section of the line with well-defined edges. Heavy inner thickness and thin edges or vice-versa will not be accepted. Glass spheres shall be spread uniformly over the entire length of line. Beginning and ends of lines shall be clean cut and perpendicular to the centerline of the street.

Pavement marking paint materials shall not be applied when pavement temperatures are below 50 degrees F, or when the surface of the pavement shall show evidence of moisture. Temperatures should be at least 50 degrees F and rising.

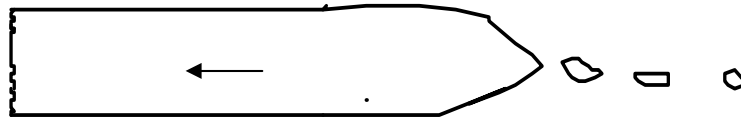
**Lack of specified thickness:** The full unit price bid per foot shall be withheld if lack of thickness is found more than three (3) times per 1 mile, or project if less than 1 mile in length. Each line shall be checked a minimum of six (6) times per 1 mile, or project if less than 1 mile in length, using the random number tables and method of sampling as set forth in section 5.17.06 of Part V of the KDOT Construction Manual.

**Lack of specified width:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot for each 1/4" of width lacking not to exceed 100% of the unit price bid per foot for the length of the line less than specified width. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

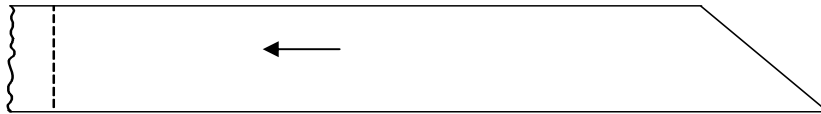
**Lack of specified length/cycle:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot for each 1" of length lacking or exceeding the specified length for broken lane line and/or broken center line not to exceed 100% of the unit price bid per foot for the length of the line less than specified length. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

**Lack/Excess of Surface Spheres or Improper Application:** The full unit price bid per foot shall be withheld for each lineal foot of material with inappropriate application rate of the surface glass spheres. The same penalty shall apply if the spheres are not evenly disbursed across and along a line or if the spheres imbed improperly. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

**Pointed Ends:** The full unit price bid per foot shall be withheld for pointed ends. This penalty shall be for the full 6 feet of a lane line or broken centerline or for no more than 6 feet of a long line.

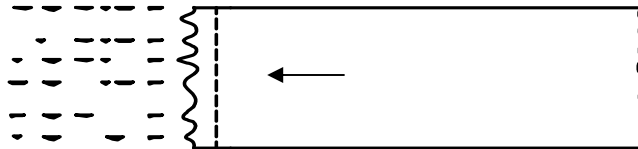


**Skewed Ends:** The full unit price bid per foot shall be withheld for skewed ends. This penalty shall be for the full 6 feet of a lane line or broken centerline or for no more than 6 feet of a long line.

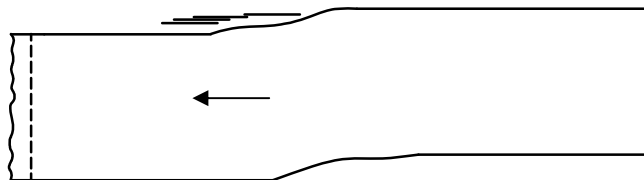


**Line Deviation:** A line that in the judgment of the Engineer deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.

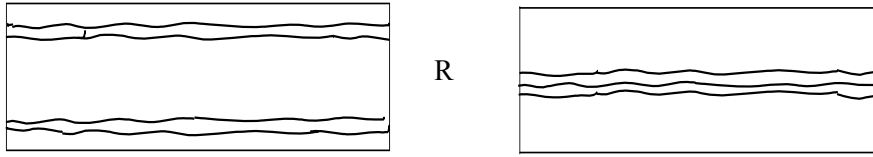
**Excessive Dripping between Lines:** The full unit price bid per foot shall be penalized for the length of any dribbled open space between broken lines that is not removed to the satisfaction of the Engineer before leaving the project site that work day. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.



**Wavy Line:** The full unit price bid per foot shall be withheld for the entire length of waviness in a line caused by poor operation by the driver/operator of the application equipment. Penalty shall be imposed from the first occurrence.



**Non-Uniform Thickness:** The line shall be uniform thickness across the entire cross section of the line with well-defined edges. Heavy inner thickness and thin edges or vice-versa will not be accepted. The full unit price bid per foot shall be withheld for lines that are not of uniform thickness. Penalty shall be imposed from the first occurrence.



**Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor (a) removes all pavement marking material placed outside the scope/limits of the project, and (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer and the local entity, if different from the Engineer.

**Timeliness:** All epoxy material shall be completely installed within two (2) calendar weeks of the road surface material being laid. Failure to install markings on schedule shall result in liquidated damages of \$1500 per day, separate from the project liquidated damages as stated elsewhere in the Contract Documents, until pavement markings are installed on schedule, or completion of the markings completes the project. These liquidated damages shall be imposed each time the Contractor fails to install pavement markings within the two-week window as described above.

## 26.5 MEASUREMENT AND PAYMENT

Measurement for Permanent Pavement Markings shall be as listed in the bid proposal, which includes all labor, materials, tools and equipment necessary to fully complete the installation according to the plans and specifications. No measurement will be made for the removal of existing pavement markings prior to installing new markings in the same location.

The Engineer will measure the various widths, type and color of pavement marking material along the marking centerline by the linear foot complete in place. Each line of double median approach lines, double centerlines, solid and broken centerline or other parallel lines will be measured separately. Crosshatch lines, chevron lines, crosswalk lines, solid lane lines, stop lines and edge lines, etc. will be measured by the linear foot, measured along the centerline of all markings for each length of the various widths, type and color of material complete in place.

The Engineer will measure broken lines, composed of short line segments separated by a specified gap, by the linear foot of the various widths, type of material and color for the actual marked line only complete in place.

The Engineer will measure each symbol marking, consisting of left and right turn arrows, “ONLY” markings, etc. Each isosceles triangle within a yield line will be measured separately. The “X” and “RR” symbols of a railroad crossing markings will be measured as one combined railroad crossing symbol.

Payment for this work will be made at the contract lump sum price bid for “Permanent Pavement Markings”, which price shall be full compensation for all materials, labor, equipment and incidentals necessary to complete the work. The removal of existing pavement markings prior to installing new markings in the same location shall be considered subsidiary to the bid item “Permanent Pavement Markings”.

## 27 - TEMPORARY EROSION AND POLLUTION CONTROL

### 27.1 DESCRIPTION

At the locations shown on the plans or directed by the Engineer, temporary erosion, sediment and pollution controls shall be installed in accordance with Section 901 of the Standard Specifications except as otherwise modified herein.



The Contractor shall take measures on the project site to prevent and minimize the transport of sediment and pollutants from the project limits, in accordance with the requirements of the KDHE NPDES Construction General Permit, City Ordinances, and the Stormwater Pollution Prevention Plan (SWPPP) developed for the project. Specifications for temporary erosion, sediment and pollution controls shall conform to [Section 2150, “Erosion and Sediment Control,”](#) of the Construction and Material Specifications as approved by the Kansas City Metropolitan Chapter, American Public Works Association, May 21, 2008 edition. Any future revisions of Section 2150 shall not be in force until adopted by the City in writing. The following exceptions shall apply.

The following exceptions or clarifications to the APWA 2150 specifications shall apply:

- (1) The term “Owner” shall mean “City” and the term “Engineer” shall mean “Consulting Engineer” as defined in the General Conditions of these contract documents. The term “Superintendent” shall mean the Contractor’s designee as described in the General Conditions of these contract documents.
- (2) In **Section 2151.3**, revise the last sentence to state “The Contractor shall complete the required certification forms for coverage under the KDHE Construction General Permit and shall notify all Subcontractors in writing of the requirements of the SWPPP, obligate them under contract to comply, and enforce compliance during the work.”
- (3) In **Section 2151.8**, delete the 2nd, 3rd and 4th sentences and replace with the following: “The Contractor shall submit any documentation required by the Engineer to evaluate the alternative. If agreed to by the Engineer (and subject to KDHE or other agency approval if applicable), payment for such alternate method shall be handled in accordance the General Conditions of these contract documents.”
- (4) Delete **Section 2151.9**.
- (5) In **Section 2151.10**, delete the 2nd sentence.
- (6) In **Section 2151.11**, replace the last sentence with the following “Controls shall be installed prior to disturbance in an area, unless otherwise indicated in the plans.”
- (7) In **Section 2151.14**, add the following to the end of the 1st sentence: “during both active and inactive phases.”
- (8) In **Section 2131.14** revise the 3<sup>rd</sup> sentence to change “once per month” to “once every 14 days”.
- (9) In **Section 2151.14** revise the 1<sup>st</sup> sentence of the 2<sup>nd</sup> paragraph to read “A report of each inspection is to be made within 24 hours of the inspection and shall contain the following minimum information: ...
- (10) In **Section 2151.14**, regarding the contents of the inspection reports, add the following to the end of the 1st sentence in the 2nd paragraph “and any other item required of an inspection by the KDHE Construction General Permit, including observations at stormwater discharge locations.”
- (11) In **Section 2151.14** 2<sup>nd</sup> paragraph, revise the 2<sup>nd</sup> sentence to state “The inspection report shall be signed by the person performing the inspection.”
- (12) In **Section 2151.20**, replace the last sentence with the following “Stream crossings shall be limited to those detailed in the plans or as approved by the Engineer.”
- (13) In **Section 2152.9**, Revise the first sentence to state “All spills in excess of reportable quantities shall be reported to the appropriate federal, state, and local agencies within 24 hours of their occurrence: KDHE 24-hour spill response center (785) 296-1679; KDHE Northeast District, Lawrence, (785) 842-4600; and the National Spill Response Center 1-800-424-8802.”. Revise the last sentence of this section to state “Spills that pose immediate threat to public safety or contamination of a water body shall be reported immediately to the Overland Park Fire Department at 911. Such spills shall also be reported to the Kansas Division of Emergency Management, (800) 275-0297 or (785) 296-8013.”.
- (14) In **Section 2153.1 and 2154.1**, add the following note after the designation of the APWA Standard Drawings: “Where there is a conflict between drawings or details included in the plans and the APWA Standard Drawings, the drawings or details in the plans shall govern.”

- (15) Delete **Sections 2153.4 and 2153.5** and all related references in the table **Section 2156.5**. Seeding (permanent and temporary) and sodding shall be governed by the specification Seeding and Sodding contained herein. Where references to sections 2153.4 or 2153.5 remain in other sections of APWA Section 2150, those references shall be interpreted to refer to the respective specification Seeding and Sodding contained herein.
- (16) Delete **Section 2153.7** and all related references. Hydrocover shall be governed by the specification Hydraulic Mulching contained herein. Where references to section 2153.7 remain in other sections of APWA Section 2150, those references shall be interpreted to refer to the respective specification Hydraulic Mulching contained herein.
- (17) In **Section 2153.11**, add the following phrase to the end of the first sentence “if so directed by the Engineer.” In the last sentence of the section, delete the phrase “shall be subsidiary to the earthwork” and replace with “shall be subsidiary to the other items of the contract.”
- (18) Replace paragraph (D) of **Section 2154.4**, with the following: “**Measurement and Payment:** “Sediment Removal” shall be subsidiary.” Revise the “Sediment Removal” item in **Section 2156.5**, Measurement and Summary Table, to conform.
- (19) **Section 2154.5(A)** Materials shall meet requirements as stated on Standard Drawing for Silt Fence.
- (20) **Section 2154.5(B)(2)** Delete “When used for swales, drainageways or concentrated flows, extend the ends up the side slope of the ditch sufficiently to prevent bypassing of flow around the end posts.” Silt fence is not allowed in these areas.
- (21) In **Section 2154.5(D)**, revise the second sentence to state “Initial excavation of depressions on the upstream side of silt fence to create added storage shall be subsidiary.”
- (22) In **Section 2154.7(D)**, revise the second sentence to state “Initial excavation of depressions on the upstream side of rock barriers to create added storage shall be subsidiary.”
- (23) **Section 2154.9** After 1<sup>st</sup> sentence add “Straw wattles are not allowed for curb inlet protection.”
- (24) **Section 2154.12(B)** Delete 3<sup>rd</sup> sentence. Compost Berms shall be installed as indicated on Standard Drawing.
- (25) **Section 2154.16(A)** Add “Straw wattles are not allowed for curb inlet protection.”
- (26) In **Section 2154.16(B)**, change the first sentence to state “Use the inlet protection systems shown on the plan, as appropriate. Alternate inlet protection methods may be approved by the Engineer.”
- (27) **Section 2154.17** Revise 1<sup>st</sup> sentence to read “A stabilized layer of large aggregate located in areas of high traffic and at the construction entrance, intended to remove mud and silt embedded in tires, to prevent trackout and to protect the site from rutting.
- (28) **Section 2154.17(B)** Delete the 3<sup>rd</sup> sentence.
- (29) In **Section 2154.18(C)**, revise the second sentence to state “Remove sediment and restore the trap to its original dimensions when sediment accumulates to 20% of the design depth”.
- (30) In **Section 2154.19(C)**, revise the second sentence to state “Remove sediment and restore the basin to its original dimensions when sediment accumulates to 20% of the design depth”.
- (31) In **Section 2154.19(D)**, revise the last sentence of the second paragraph to state “Routine removal of sediment shall be subsidiary.”
- (32) In **Section 2154.20 (D)**, revise the first sentence to state “Temporary Stream Crossing” shall be lump sum and such payment will be full compensation for installation, maintenance, removal and any other work noted on the plans.”
- (33) Delete Section 2156.
- (34) Specifications for items not covered by these specifications or covered completely by the Standard Drawings shall be developed by the Engineer for each project specifically. Information relevant for such specifications may be taken from manufacturer’s information and may be supplemented by guidance given in other publications and standards, subject to approval by the City.

**27.2 EROSION CONTROL DELAY LIQUIDATED DAMAGES**

If the Contractor fails to install erosion and sediment control measures in accordance with time limits required by contract (including any requirements given in the plans, specifications, or applicable permits), the Contractor is liable for an Erosion Control Delay Liquidated Damages assessment, which shall commence on the first calendar day after the violation of the time limit began and end on the day in which the measures are fully installed.

If the Contractor fails to complete corrective actions to existing measures within 7 calendar days of the deficiency being discovered, as required by this specification, then the Contractor is likewise liable for the Erosion Control Delay Liquidated Damages assessment, which shall commence on first calendar day after the 7th day from discovery of the deficiency and end on the day in which all corrective actions are completed.

The Erosion Control Delay Liquidated Damage assessment is \$250.00 for each 24-hour calendar day liable. This assessment shall be in addition to, and may run concurrently with, any other liquidated damage assessment. Administration of this assessment shall be handled in the same manner as for other liquidated damages as specified in the Contract Documents.

The Erosion Control Delay Liquidated Damage assessment is any addition to any other remedies the City may pursue in enforcing the Contractor’s obligations. The provisions of this specification shall in no way reduce the Contractor’s responsibility for complying with the time requirements of the specification and permits and for identifying and initiating corrective actions.

**27.3 MEASUREMENT AND PAYMENT**

The Engineer will measure temporary erosion and pollution control items as shown on the plans or described in referenced APWA Section 2150, except as modified herein.

Item Description	Method of Measurement	Basis of Payment
Erosion Control Blanket (Type)	Square Yard	Unit Bid Price
Compost Cover	Cubic Yard	Unit Bid Price
Sediment Removal	Cubic Yard	Unit Bid Price
Silt Fence	Linear Foot	Unit Bid Price
Silt Fence (Wire-Supported)	Linear Foot	Unit Bid Price
Rock Barrier	Each	Unit Bid Price
Open-Flow Ditch Check	Each	Unit Bid Price
Straw Wattles	Linear Foot	Unit Bid Price
Foam Dike	Linear Foot	Unit Bid Price
Gravel Bags	Pound	Unit Bid Price
Compost Filter Berm	Linear Foot	Unit Bid Price
Compost Filter Sock (Diameter)	Linear Foot	Unit Bid Price
Temporary Berm	Linear Foot	Unit Bid Price
Temporary Slope Drain	Linear Foot	Unit Bid Price
Inlet Protection	Each	Unit Bid Price
Stabilized Stone Pad	0.1 Ton	Unit Bid Price
Sediment Trap	Each	Unit Bid Price
Sediment Basin	Lump Sum	Lump Sum Price
Temporary Stream Crossing	Lump Sum	Lump Sum Price
Turbidity Curtain	Linear Foot	Unit Bid Price

Payment for the temporary erosion and pollution control devices at the contract unit and lump sum prices bid is full compensation for the specified work. Repairs to ground cover, including sod and seeding, that are necessary to restore locations disturbed during the removal of erosion and sediment control measures

shall be subsidiary to the initial installation. No payment will be made for sediment controls made necessary by the Contractor's failure to provide stabilized ground cover in a timely manner.

## 28 - SEEDING

### 28.1 DESCRIPTION

This work shall consist of the furnishing and planting of seed at those locations indicated on the plans or as designated by the Engineer.

All materials, bed preparation, and planting shall conform to the applicable requirements of Sections 901, 902, 903 and 904 of the Standard Specifications, except as otherwise modified herein. In general, all disturbed areas should have a minimum of 6 inches of select topsoil uniformly placed. All disturbed areas shall be seeded as soon as practicable after construction.

### 28.2 CONSTRUCTION REQUIREMENTS FOR PERMANENT SEEDING

#### a. Seeding Season

Determine seeding rate and season using the following table. Any seeding done outside of the seeding season as specified in the Standard Specifications will be maintained by the Contractor until satisfactory growth is established or reseeded shall be done at the Contractor's expense if the growth is unsatisfactory.

Seed Type	Minimum Pure Live Seed (%)	Rate of Pure Live Seed (lbs/acre)	Seeding Dates
Cool Season Grasses			
Fescue	83	348	Feb 15 – April 20 and Aug 15 – Sept 30
Kentucky Bluegrass	64	120	
Warm Season Grasses			
Buffalo	72	45	Nov 15 – June 1

#### b. Preparation of Seedbed

All areas to be seeded shall be disked, harrowed, or hand raked to a minimum of 2 to 6 inches before application of seed. The final seedbed shall be well mixed with no large clumps of any kind and shall have no foreign material in it. The seedbed should be uniform and well packed. **Approval of the seed bed shall be obtained from the Engineer before seeding is started.**

#### c. Seeding

Seed shall be applied with an acceptable seed drill or other equipment approved by the Engineer at a depth of 1/4 inch in a uniform manner at the prescribed rate. Broadcasting and hand raking to a depth of 1/4 inch will only be used on areas where it is impossible to operate a seed drill. Unless a cultipacker type seeder is used, the seed shall be covered to a depth of 1/4 to 1/2 inch with a shallow-set spike tooth harrow or other approved methods. After covering, the areas shall be firmed by rolling.

#### d. Mulching

Mulch shall be applied within 24 hours following the seeding operation. Vegetative type mulch shall be spread uniformly in a continuous blanket at the rate of 1 1/2 tons per acre by means of a mechanical spreader or other approved means. The mulch shall be anchored in the soil to a depth of three inches by a mulch puncher or straight serrated coulter disk mulch anchor machine designed to force the mulch into the soil surface. The machine shall be weighted and operated in such manner to secure the mulch firmly in the ground to form a soil-binding mulch and prevent loss or bunching by wind. The coulters shall be at least ten inches in

diameter. Two passes may be required to anchor the mulch to the satisfaction of the Engineer. No mulch shall be placed unless it can be anchored on the same day.

**e. Fertilizer**

Starter fertilizer shall be an approved commercial brand composed of a mixture of soluble and insoluble Nitrogen and shall conform to the State Fertilizer Laws. It shall be uniform in composition, dry and free flowing, and shall be delivered to the site guaranteed analysis. Certification shall be submitted to the city on the fertilizer. Any fertilizer which becomes caked or otherwise damaged, making it unsatisfactory for use, will not be accepted. Fertilizer shall be placed prior to seeding at a rate of application of 1 lb. of actual nitrogen per 1000 square feet of planting area unless otherwise determined by a soil test. No fertilizer shall be used when seeding the banks of sediment basins or sediment traps.

**f. Seed Maintenance and Acceptance**

All seeded areas shall be maintained by the Contractor prior to acceptance by the Engineer. Prior to acceptance, seeded areas shall be kept free of weeds in accordance with Weed Control paragraph in “General Requirements”. The Engineer will issue a written notification of acceptance once a stand of vegetation free of weeds is present that has a 70% density that covers all of the disturbed area, as measured by the Engineer.

**28.3 CONSTRUCTION REQUIREMENTS FOR TEMPORARY SEEDING**

Provide interim stabilization with annual vegetation as a temporary cover to minimize erosion. This item only covers seeding installed by conventional drilling. Temporary seeding shall only be used for periods not to exceed 12 months unless approved by the city. During final stabilization, temporary seeding shall only be used to establish vegetation outside of the permanent seeding or sodding dates as specified in the Standard Specifications.

The following seed mixtures and planting rates shall be used:

Seed Type	Minimum Pure Live Seed (%)	Rate of Pure Live Seed (lbs/acre)	Seeding Dates
Annual Ryegrass	83	90	Anytime
Millet	77	65	May 1 – Aug 15 Heat Tolerance
Winter Wheat	83	120	Sept 15 – Nov 30 Cold Tolerance

**a. Preparation and Planting**

Preparation, planting and all other construction requirements for temporary seeding shall be as specified for permanent seeding, except as modified herein. Temporary seeding shall be drilled. Prior to application, the soil shall be tilled to a depth of at least 2 inches and gullies, depressions, and large clods eliminated. Roller compaction of the seedbed is not required. Within 24 hours of seeding, mulch or erosion control blankets shall be applied. When mulch is used, it shall be applied in accordance with the same requirements given for permanent seeding. Fertilizer is not required. Contractor shall schedule work so as to provide temporary seeding as early as practical in the construction process. Contractor shall maintain a readiness to perform temporary seeding frequently during the progress of the project. No more than 7 calendar days shall elapse between the Engineer’s request for temporary seeding and its application. Multiple mobilizations to seed areas as construction progresses shall be expected.

**b. Maintenance**

Mulch shall be replaced or repaired as needed during germination and early growth. Bare spots shall be patched, by hand seeding if necessary. Vehicle and personnel traffic shall be minimized in areas seeded.

## **28.4 MEASUREMENT AND PAYMENT**

Payment for this work will be made at the contract lump sum price bid for "Seeding," which price shall be full compensation for all materials, labor, equipment and incidentals necessary to complete the work. No separate payment will be made for fertilizer or mulching.

## **29 - CONTRACTOR CONSTRUCTION STAKING**

### **29.1 DESCRIPTION**

This work shall be performed in accordance with Section 802 of the Standard Specifications as amended herein. The Contractor shall set construction stakes establishing all lines, slopes, continuous profile-grades, centerlines, and benchmarks necessary to control and perform the work.

### **29.2 CONSTRUCTION REQUIREMENTS**

#### **a. Vertical Control**

Prior to construction Johnson County Bench Marks that will be damaged or removed by construction shall be replaced by a benchmark outside of construction area. New benchmarks shall be an aluminum cap (caps will be furnished by the County) set in a rigid concrete structure. A hole shall be drilled into concrete and the cap grouted into place. The preferred locations are traffic signal bases, culvert headwalls and bridge handrails. A standard monument record sheet shall be completed for each permanent benchmark. Elevations shall be determined with a double rod level run using digital level and bar code rods and shall tie into Johnson County vertical control network at each end of the level run. Level runs shall close within 0.1 ft. per 4 miles. Level run data shall be furnished in digital and paper format. Mapping grade state plane coordinates shall also be provided. This effort shall be coordinated with the Johnson County Public Works Department County Surveyor.

#### **b. Horizontal Control**

Prior to construction Section Corner and quarter section corners shall be referenced to points outside construction and a Land Corner Endangerment Report submitted to the Kansas State Historical Society and the County Engineer within 30 days of the survey as required by state law. During construction the surveyor will coordinate with contractor on the placement of the monument box. After construction the surveyor shall use his previous reference ties and preliminarily mark the aluminum cap. This location shall be checked with coordinates from the design survey to insure that the ties match the previous coordinates. If within tolerance the aluminum cap shall be punched at the proper location. New Land Corner Reference Reports with updated references shall be submitted to the Kansas State Historical Society and the County Engineer within 30 days of the survey as required by state law.

#### **c. Property Corners**

The Contractor shall locate all existing property corners within the project limits prior to commencing construction. All existing property corners shall be marked and protected. Property corners anticipated to be disturbed during construction shall be located by ties and shall be reset by the Contractor at the termination of construction activities. All property surveying shall be performed by a qualified land surveyor registered in the State of Kansas.

#### **d. KCP&L Conduits**

A stamped sealed survey shall be provided by the Contractor for all conduit installed as part of the contract.

#### **e. Swale Staking**

The Contractor shall set cut stakes for all rough swale grading and shall maintain or reset such stakes for checking of the grade as required by the Engineer. Final grade for the swales and berms shall be established by "blue top" surveying or other approved method, and grade devices shall be maintained for inspection by the Engineer prior to sodding.

**f. Bridge Staking**

Contractor Construction Staking for bridges requires two independent surveys.

Bridge control points (alignment and elevation references and offsets for abutments and pier bents) will be set by, or under the supervision of, a Professional Land Surveyor licensed in the State of Kansas. The Contractor shall stake the control points for critical bridge elements (piling, drilled shafts, and spread footings). The Contractor shall employ a Professional Land Surveyor, licensed in the State of Kansas, from another surveying company to perform an independent check of the location of the control points for critical bridge elements. That independent Surveyor shall utilize the original design control points or other monumentation, as approved by the Engineer. The Contractor shall report any discrepancies to the Engineer, and shall resolve all discrepancies before constructing the bridge elements. After the critical bridge elements have been constructed, the independent Surveyor will verify the locations and elevations of the critical bridge elements. The original survey and the check survey must agree within the tolerances for that bridge element allowed in the Contract Documents. The Contractor shall report any discrepancies in excess of the tolerances to the Engineer.

**29.3 MEASUREMENT AND PAYMENT**

The Engineer will measure contractor construction staking by the lump sum.

Payment for “Contractor Construction Staking” at the contract lump sum price bid is full compensation for the specified work, which shall include all staking, establishing vertical and horizontal control points and property corner resetting.

## Section 05065 Survey Control Points

### **Part 1 General**

#### **1.01 Description**

Provide surveying services and set survey monuments for the Johnson County Public Works (JCPW) according to the Contract Documents consistent with standard surveying practices.

<b><u>Bid Items</u></b>	<b><u>Units</u></b>
Control Point (Horizontal) (New)	Each
Control Point (Horizontal) (Reset)	Each
Control Point (Vertical) (New)	Each
Control Point (Vertical) (Reset)	Each
Control Point (Horizontal & Vertical) (New)	Each
Control Point (Horizontal & Vertical) (Reset)	Each

### **Part 2 Materials**

#### **2.01 General**

Provide the necessary materials to complete the specified surveying services. Provide materials and equipment that comply with the current requirements of the Contract Documents.

#### **2.02 Bench Mark Discs**

Johnson County will provide standard 2 inch diameter aluminum survey monuments to be set in concrete.

#### **2.03 Horizontal Control Monuments**

Johnson County will provide standard 3 ¼ inch diameter aluminum survey monuments to be set in concrete.

#### **2.04 Concrete**

Use commercial grade concrete or sakrete/quikrete readily available at home improvement centers. Volumetric proportioning and hand mixing of concrete is permitted where small quantities are required.

#### **2.05 Miscellaneous Materials**

Provide the following miscellaneous materials:

- a) Commercially available 10" PVC Pipe
- b) Commercially available reinforcing steel bars (non-coated); and
- c) Other miscellaneous materials for survey monuments detailed in the Contract Documents
- d) Johnson County will furnish the warning sign – Surveyor will need to furnish a commercially available steel sign post.

#### **2.06 Acceptance of Materials**

The Engineer will accept materials for the specified survey monuments and miscellaneous materials based on compliance with dimensional and other specified requirements and visual inspection for condition.

### **Part 3 Survey Requirements**

#### **3.01 Surveying Personnel**

Before performing any surveying operations on the project, inform the Engineer of the Contractor's personnel responsible for surveying services. Provide a Land Surveyor, trained and experienced in surveying and licensed by the Kansas State Board of Technical Professions according to Kansas Statutes to perform the required surveys to set survey monuments and reference point monuments.



## **Section 05065**

### **Survey Control Points**

#### **3.02 Surveying Equipment**

Provide surveying equipment that complies with the following tolerances:

- a) GPS equipment: Horizontal:  $5\text{mm} + 1 \text{ ppm} \times \text{Baseline Distance}$   
Vertical:  $5 \text{ mm} + 1.4 \text{ ppm} \times \text{Baseline Distance}$
  
- b) Levels: Height Measurement: (Based on 1km double-run leveling)  
Electronic measurement with invar rod      0.4mm

#### **3.03 Horizontal Control Points**

- a) General Location: Locate of the monument after consideration the physical conditions of the site and obtain approval by the Engineer.
  - The most important consideration is selecting a location that will minimize the probability that the monument will be disturbed by future construction. Parks, cemeteries, public works shop sites, etc. should be good locations.
  - For convenience of use, parking should be nearby, and it should be in a location where people will not mind the monument being occupied on a regular basis.
  - The location should be where the warning sign can be set without being obtrusive. You might consider locations close to a fence where the warning sign can be set in the fence line.
  - To avoid rock excavation, avoid locations where rock is close to the surface.
  - Locations should be where the line of sight is clear above a 15 degree angle (preferably 10 degree angle to the south, east, and west. Due to satellite locations, any obstructions should be to the north, at 25 degrees east & west of north a 45 degree vertical obstruction is a maximum.
  - Avoid areas where trees will grow up and restrict the view.
  - A light pole or power pole is not a major problem if more than 15 ft. from the monument.
  - 230 KV power lines will cause interference, and should be avoided.
  - Avoid locations near cellular phone towers.
  - Avoid railroad tracks due to vibrations.
  
- b) Setting the Monument. The surveyor will be responsible for digging the hole and setting the monument and warning sign.
  - Dig a 10" diameter hole and bell out the bottom as shown on the attached sheet. Some monuments are 36" long and some monuments are 30" long. The hole will need to be deep enough to accommodate the monument.
  - Pour the hole full of concrete and set the aluminum monument in the wet concrete.
  - Adjust the top of the monument so that it is just above ground surface, but well below the level that a lawn mower would hit.
  - Place the warning sign at least 3 feet away from the monument. Drive the post at least 2 ft. into the ground.
  - Complete the Monument Record Sheet and return to JCPW.
  
- c) Establishing Coordinates - New coordinates will be established using Static GPS Surveying.
  - Before starting the Static GPS survey use an occupational planning program to determine the optimum time to perform the Static Survey. Perform this survey with 1 hour minimum

## **Section 05065**

### **Survey Control Points**

observations using two GPS receivers.

- The antenna heights are to be measured before and after the observations in both feet and meters.
- Tribrachs used in the survey are to be checked and adjusted each day.
- Place the first receiver on the original JCPW monument and the second on the new JCPW monument and record with both receivers running at the same time for a 1 hour minimum observation. Next move the receiver from the original JCPW to a neighboring JCPW monument. Record both the new JCPW monument and the neighboring JCPW monument for a minimum of 1 hour. Next move the receiver from the neighboring JCPW monument to a different neighboring JCPW monument. Record both the new JCPW monument and the 2<sup>nd</sup> neighboring JCPW monument for a minimum of 1 hour.
- Post-process the static survey to determine the coordinates of the new JCPW monument.
- Report the North American Datum 1983 adjustment of 1997 (NAD 83(1997)) latitude, longitude, ellipsoid height and the Kansas North Zone 1501 State Plane coordinates (US feet) to JCPW. Caution, if OPUS is used to determine coordinates on the monument. OPUS reports North American Datum 1983 adjustment of 2007 (NAD 83(2007)) coordinate values not the requested NAD 83 (1997) values. Submit copies of all field notes and digital and paper copies of any calculations determining the monument coordinates. A horizontal monument record sheet shall be completed for each JCPW monument with clear digital photographs of the monument.
- If the JCPW monument being replaced is only a horizontal control monument the North American Vertical Datum 1988 (NAVD 88) height (US feet) based on the most current Geoid model provided by the National Geodetic Survey (NGS) may be reported.
- If the JCPW Monument being replaced was both a vertical and horizontal control monument then the elevation needs to be established using the procedure for Johnson County Vertical control monuments Section 3.04.

#### **3.04 Vertical Control Points**

- a) Elevations for Vertical Control Points shall be established with a double rod level run using digital level and bar code rods only.
- Prior to running digital levels perform an instrument collimation check (two-peg test) to determine instrument collimation error. The determined value should meet manufacture's specifications and set to be applied to all future field observations, as outlined in the digital level user's manual.
  - Limit sight lengths to no more than 70 meters (230 feet), from the instrument to either bench mark, or from the instrument to one bench mark and a turning pin, or when between two turning pins, in the case of multiple setup requirements, e.g., distance between bench marks is greater than 140 meters (459 feet). Backsight distance to foresight distance imbalance must be less than 5 meters (16.4 feet). Accumulated backsight to foresight distance imbalance must be less than 10 meters (32.8 feet) in the case of multiple setups.
  - All observations between the old and new points must be confirmed by performing double-run leveling, i.e., leveling from the old point to the new point as forward leveling and from the new point to the old point as backward leveling. For return observations, reset and re-level the instrument, even when only one turn is required.
  - In the case of using two rods, for leveling in a multiple setup leveling scenario, always start and end with the same rod on the bench mark, i.e., an even number of setups. This ensures

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### Survey Control Points

any systematic error, with regards to the level rods, is canceled during the leveling observations.

- Level runs shall close within 0.025 ft. per mile.
  - To compute the elevation difference from the old mark to the new, average the two elevation differences between the old mark and the new mark maintaining the sign, positive or negative, of the forward leveling from the old to the new mark. The field elevation for the new bench mark will be the average computed difference (the mean of both the forward and backward leveling) plus the published elevation of the old bench mark.
  - Record equipment information, such as model and serial numbers, determined instrument collimation, observer and rodmen names, and starting time with appropriate date and time zone on the recording form. When the last setup has been observed, record the ending time, and weather conditions, e.g., temperature observed at instrument height with units, wind effects, and sun conditions during the level observations, on the recording form.
- b) If a Johnson County Network bench mark has to be removed before a new bench mark can be established, a series of three reference points should be set in the vicinity before beginning any construction work that would endanger the Network bench mark. Set stable points, which are unlikely to move or be damaged from the time they are set, to the time they are used to establish the elevation of the new mark. Examples of “stable” reference points are a chiseled cross in concrete or an outcrop, an anchor bolt set into concrete, a nail driven in a tree root, a stable re-bar driven in a location that will survive construction, as well as others. Leveling should be performed so there is a separate setup between each reference point and the bench mark(s), following similar procedures. A suggested sequence is as follows: observe forward and backward leveling between the old bench mark to be reset and reference point 1; observe forward and backward leveling between the old bench mark to be reset and reference point 2; and observe forward and backward leveling between the old bench mark to be reset and reference point 3. The loop should be closed by observing forward and backward leveling between reference points 1 and 2, and between reference points 2 and 3, to provide an additional check on the reference points. A copy of the notes indicating descriptions of references set and elevation differences shall be provided to JCPW before beginning any work that would endanger the Network bench mark.
- c) Establish permanent replacement bench marks for all project bench marks that were destroyed during the construction using one of these methods:
- A bench mark disc “set in place” on new concrete structure.
  - A bench mark disc “drilled and grouted” on existing concrete structure.
  - A bench mark disc set in the top of a reinforced concrete cylinder (6 inch diameter x 4 foot depth into the ground, minimum) cast in place.
  - A drill hole in bedrock
  - A deep rod mark driven to refusal
  - As directed by the Engineer.
- Note: It is not necessary to establish the new mark at the same elevation or exact same location as the old mark.
- d) Elevations from References: Establish elevations for permanent replacement bench marks from references. A similar set of observations is obtained between each of the reference points and the

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### **Survey Control Points**

new bench mark, after it has been established, as done in part b. Elevation differences between reference points that differ from the original elevation differences, beyond allowable section closure tolerances, must be investigated and noted. If the old bench mark is still in existence, a direct level tie between the old and new marks can be achieved by digital leveling. If the old mark has been disturbed or destroyed, loop closure analysis should indicate which of the reference points is in question. Re-run the leveling to ensure correct high points were held and procedures were followed. Note and describe any stability issues relevant to the reference point of concern. Submit all data with a discussion of conditions which may have caused the difference in elevation for review and final determination on the acceptability of the data to JCPW. It may be necessary to perform a level tie to an adjacent existing bench mark, following the digital level procedures, to establish an elevation for this new bench mark in these conditions.

- e) Elevations from loop between two Network benches: Elevations shall be determined following the procedure outline in part “a” and shall tie into Johnson County vertical control network at each end of the level run.
- f) Determine and record state plane coordinates (+/- 20 US feet) of for the bench mark.
- g) A witness post should be set within 2 meters (6.6 ft) of the relocated mark, if possible. (Occasionally the setting of a witness post can be skipped, especially if it will pose a hazard or draw unwanted attention, such as in urban areas.) Remove any witness posts for the destroyed bench mark.
- h) Deliverables:
  - Level notes that were recorded.
  - Level run data shall be furnished in digital and paper format.
  - A standard monument record sheet shall be completed for each permanent bench mark.
  - Provide the Engineer with a written report of all post project bench marks, listing the bench mark number, elevation, project stationing and offset, and a complete description of the monument type and its physical location.
  - Clear digital photographs of the monument taken during daylight hours.

