

## DESIGN CRITERIA

### DIVISION 4800 STREET LIGHTING

**4801 GENERAL:** These criteria shall be adhered to for the design of all publicly-financed or privately-financed traffic signal systems to be installed in the public street right-of-way or on other public property under the jurisdiction of the City of Shawnee, Kansas.

- .1 Applicability:** These criteria shall be applied as follows:
  - A. New Developments: A street lighting system is required along all streets of any new development having street improvement plans approved after June 24, 1984. For new developments requiring five (5) or less street lights per these design criteria, the developer has the option of paying a street light development fee instead of installing a system. The fee shall be as established by the Governing Body in Policy Statement PS-27, as amended, based on the number of required street lights as determined by the Engineer. However, payment of the fee shall not obligate or require the City to install either a city-owned or leased street lighting system to serve the development.
  - B. Capital Improvement Projects: A street lighting system may be initiated as part of a street improvement project or as a separate street lighting improvement project via the City's Capital Improvements Program (CIP).
- .2 System Scope:** The City Project Engineer shall be responsible for determining the scope of a street lighting system and phasing of construction.
- .3 System Composition:** The street lighting system shall consist of one (1) or more control centers, distribution systems, poles, luminaires and other appurtenances required to provide a complete, operable system. Components of the system shall conform to the specifications of Section 2802 MATERIAL AND EQUIPMENT.
- .4 Modification of Design Criteria:** These criteria are established to provide uniform procedures to aid the design engineer in preparing improvement plans for projects in the City of Shawnee. These criteria are not intended to be an ironclad set of rules that would restrict the design engineer from utilizing imaginative design; however, they may be modified only with prior authorization of the City Project Engineer.

**4802 DESIGN CRITERIA:** These criteria shall be followed when specifying the type and placement of equipment for a street lighting system. Copies of the City Standard Plan and Detail Sheets are available through the Traffic Engineering Division or can be found on the City of Shawnee’s website at [www.cityofshawnee.org](http://www.cityofshawnee.org)

**.1 Illumination Standards:** The illumination standards listed below are for reference only. The design engineer should refer to the Illuminance Criteria in the most current edition of the American National Standard Practice for Roadway Lighting (ANSI/IES RP-8). Specific references that follow are to the 1983 Edition of the Standard Practice.

A. Horizontal Illumination: The average maintained horizontal illuminance values recommended by the Standard Practice are as follows:

<b>Average Maintained Horizontal Illumination (foot-candles)</b>			
<b>Street Classification</b>	<b>Area Classification</b>		
	<b>Residential</b>	<b>Intermediate</b>	<b>Commercial</b>
Local	Not Applicable	Not Applicable	1.2
Collector	0.6	0.9	1.2
Arterial	1.0	1.4	2.0

B. Uniformity Ratios: The average-to-minimum illuminance ratios recommended by the Standard Practice are as follows:

<b>Average-to-Minimum Uniformity Ratios (Average Horizontal Illumination Divided by Minimum Value)</b>	
<b>Street Classification</b>	<b>Ratio</b>
Residential Local	Not Applicable
Residential Collector	Not Applicable
Non-Residential Local	6:1
Non-Residential Collector	6:1
Arterial	3:1

- .2 Lighting Layout:** The street lighting system layout required is dictated by the street classification and is typically continuous. The design engineer should consult the Engineer to assist in determining the appropriate street classification. The spacing of street lights shall conform to the criteria below, which are generally based on the above illumination standards.
- A. Residential Local Streets: Lights shall be required at street intersections, at or near the end of cul-de-sacs longer than one hundred forty feet (140') measured from a typical Stop sign location, at changes of horizontal street alignment of forty-five degrees or more that are two hundred feet (200') or more from a street intersection, and at a minimum number of selected mid-block locations such that the spacing of lights is about two hundred seventy-five feet (**275'**), but never less than two hundred feet (200') or more than three hundred fifty feet (350').
  - B. Residential Collector Streets: Lights shall be required at street intersections, at changes of horizontal street alignment of forty-five degrees or more that are more one hundred fifty feet (150') or more from a street intersection, and at a minimum number of selected mid-block locations such that the spacing of lights is about two hundred feet (**200'**), but never less than one hundred fifty feet (150') or more than two hundred fifty feet (250').
  - C. Non-Residential Local Streets: Lights shall be required at street intersections, at or near the end of cul-de-sacs longer than one hundred fifty feet (150'), and at mid-block locations such that the spacing of lights is about two hundred feet (**200'**), but never less than one hundred seventy-five feet (175') or more than two hundred twenty-five feet (225').
  - D. Non-Residential Collector Streets: Lights shall be required at street intersections and at mid-block locations. Mid-block lights shall be placed at intervals of approximately about two hundred feet (**200'**), but never less than one hundred seventy-five feet (175') or more than two hundred twenty-five feet (225').
  - E. Arterial Streets: Lights shall be required at street intersections and at mid-block locations. Mid-block lights shall be placed at intervals of approximately one hundred feet (**100'**) on alternate sides of the street such that the spacing of lights is about two hundred feet (**200'**) on either side of the street.

- .3 Pole Type and Lamp Wattage:** Pole types, differentiated by mounting height and mast arm length, are illustrated in the Standard Details. All luminaires shall utilize High Pressure Sodium (HPS) lamps. Typical pole heights and lamp wattage applicable to the various street classifications are listed below:

Street Classification	Pole Type	Lamp Wattage
Residential Local <sup>(1)</sup>	P140, P301, P302 <sup>(2)</sup>	150
Residential Collector <sup>(1)</sup>	P140, P301, P302 <sup>(2)</sup>	150
Non-Residential Local	P301, P302 <sup>(2)</sup> , P303 <sup>(2)</sup>	150, 250
Non-Residential Collector	P301, P302 <sup>(2)</sup> , P303 <sup>(2)</sup>	150, 250
Arterial	P302, P303 -4 <sup>(2)</sup> P305 - 7 <sup>(3)</sup>	250, 400
<p>(1) The same type of pole shall be used in areas where post-top or cobra-head luminaires are in place or proposed along residential streets.</p> <p>(2) These pole types shall typically be used where necessary to avoid a storm sewer or other obstruction.</p> <p>(3) These pole types shall be specified when street lights will be placed in the median of an arterial street.</p>		

- .4 Equipment Placement:** Lighting equipment, except the service feed, shall be installed only within a public street right-of-way or on other public property. Usually such equipment, except conduits under a street pavement, shall be placed in a median, shoulder area or “parking” strip of a street. Along residential streets, street lights, junction boxes and control centers shall be placed at or near the beginning of a curb return of a street intersection, or adjacent to a property line at other mid-block locations. Along non-residential streets, street lights, junction boxes and control centers shall be placed at or near the beginning of a curb return of a street intersection, and should be placed adjacent to a property line at other mid-block locations whenever possible. However, such equipment shall not be placed in front of a residential property unless the Engineer determines that no practical alternative exists at a particular location. Where there are more than two (2) ins and outs for one or more circuits a Type II Junction Box shall be used.

- .5 Equipment Setbacks:** Street lighting equipment setbacks are as follows:

- A. Street Light: Typically, the street light setback from a curbed street shall be thirty inches (30") measured from back-of-curb to the center of the pole base, although the Engineer may authorize or require a greater setback on heavily traveled streets. The setback from a non-curbed street shall not be less than six feet (6') measured from edge-of-pavement to the center of the pole base. When a street light will be placed in the median of an arterial street, it shall be installed at the centerline of the median. Where a different setback must be used to avoid a storm sewer or other obstruction, the design engineer shall specify a mast arm of appropriate length to put the luminaire at or near the curb or pavement edge.

- B. Distribution System: Typically, the distribution system setback from a curbed street shall be the same as that specified for the street lights except where a different setback must be used to avoid a storm sewer box, sanitary sewer manhole, or other obstruction, but it shall not be less than thirty inches (30") measured from back-of-curb to the center of the conduit. The setback from a non-curbed street shall be the same as that specified for the street lights, but it shall not be less than six feet (6') measured from edge-of-pavement to the center of the conduit.
  - C. Junction Box: Typically, the junction box setback from a curbed street shall be the same as that specified for the distribution system, but it shall not be less than thirty inches (30") measured from back-of-curb to the center of the box. The setback from a non-curbed street shall be the same as that specified for the distribution system, but it shall not be less than six feet (6') measured from edge-of-pavement to the center of the box.
  - D. Control Center: The control center setback along all streets shall be six feet (6') measured from the right-of-way line to the center of its pedestal, such that a sidewalk four feet (4') wide may be placed with one edge adjacent to its foundation and the other edge one foot (1') inside the right-of-way line. When a control center will be placed in the median of an arterial street, it shall be installed at the centerline of the median.
- .6 Electrical System:** The electrical system shall comply with the National Electrical Code (ANSI/NFPA 70), the National Electrical Safety Code (ANSI C2), and the service standards issued by the appropriate electrical utility company that will be supplying power to the street lighting system.
- A. Service Feed (Lead In Cable): The service feed location shall be coordinated with the appropriate electric utility company to insure the available of service to the control center. The load should be adjusted to take advantage of the rate schedule and secure the most economical rate.
  - B. Distribution System (Secondary Cable): The following criteria shall govern the design of the electrical distribution system. The distribution system shall be installed underground in conduit.
    - (1) Except where it crosses under a street, distribution cable shall be behind the back-of-curb or outside the edge-of-pavement.
    - (2) Junction boxes shall be used where splices in the distribution cable are required outside the pole base.
    - (3) Distribution cable shall be sized so that the voltage drop does not exceed five percent (5%) at any point in the system.
    - (4) Conductors shall be no larger than #2 AWG and no smaller than #8 AWG.
    - (5) All circuits shall be two hundred forty volts (240V).
    - (6) All poles shall be bonded together to form a continuous system.

**4803 PLAN REQUIREMENTS:** This section governs the preparation of improvement plans for a street lighting project.

- .1 General:** The improvement plans shall include all information necessary to build and check the design of a street lighting system. For new developments, the plans shall be submitted as a separate set, which clearly shows other public street and stormwater drainage improvements (and utilities, if applicable) in a de-emphasized manner. The plans shall be arranged as required by the Engineer. The title sheet for the plans shall be signed and sealed by a Kansas Registered Professional Engineer responsible for preparing the plans. The signed and sealed plans shall be submitted to the Engineer for review and approval prior to construction.
- .2 Private Improvements:** If any private improvements are shown on the public improvement plans, they shall be clearly defined and marked as such. An appropriate note shall be included on the drawings stating that these private improvements will not be maintained by the City of Shawnee.
- .3 Sheet Size:** The suggested sheet size for improvement plans is twenty-four inches by thirty-six inches (24" x 36") although sheets twenty-two inches by thirty-four inches (22" x 34") may be used. All sheets in a given set shall be the same size.
- .4 Types of Sheets in Plans:** The improvement plans shall consist of the following:
  - ~ Title Sheet
  - ~ Street Lighting Plan Sheets
  - ~ Standard Detail Sheets

Each sheet shall contain proper project identification, the type of sheet, a sheet number, including the individual sheet number and the total number of sheets, and dates of when the plans were originally prepared and all revisions.

**.5 Required Information for Title Sheet:** The title sheet shall include the following information:

A. The project title in ½-inch lettering, centered at the top of the sheet as follows:

STREET LIGHTING IMPROVEMENTS (Name of Development, Street, Etc.) (City Project Number, When Applicable) CITY OF SHAWNEE, KANSAS
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- B. An index of the sheets included in the plans.
- C. A list containing the name and telephone number of each utility company and the State One-Call System.
- D. An approval block for the signature of the representative of the appropriate electrical utility company approving the control center location and the date of such approval.
- E. An address block for the control center.
- F. The name, address, and telephone and fax numbers of the design engineer.
- G. The name, address, and telephone and fax numbers of the owner/developer, where applicable.
- H. The project control bench marks shall be identified as to location and elevation based on NGVD Datum. A minimum of two (2) benchmarks are required for any project.

- I. A list of materials and quantities as follows (Only items applicable to the project need be shown)

:SUMMARY OF STREET LIGHTING MATERIALS AND QUANTITIES <sup>(1)</sup>		
BID PROPOSAL ITEM	UNIT	QUANTITY
Conductor System	LUMP SUM	
2" P.V.C. Conduit Schedule 40	L.F.	
2" P.V.C. Conduit Schedule 80	L.F.	
3" P.V.C. Conduit Schedule 40	L.F.	
3" P.V.C. Conduit Schedule 80	L.F.	
TYPE I – Junction Box	EACH	
TYPE II - Junction Box	EACH	
Service Box	EACH	
TYPE 1 – Screw Anchor Foundation for 14' Pole	EACH	
TYPE 2 - Screw Anchor Foundation for 30' Pole	EACH	
Concrete Foundation for 14' Pole	EACH	
Concrete Foundation for 30' Pole	EACH	
TYPE P140 - 14' Aluminum Pole	EACH	
TYPE P301 - 30' Aluminum Pole with 6' Type A Mast Arm	EACH	
TYPE P302 - 30' Aluminum Pole with 8' Type A Mast Arm	EACH	
TYPE P303 - 30' Aluminum Pole with 10' Type B Mast Arm	EACH	
TYPE P304 - 30' Aluminum Pole with 12' Type B Mast Arm	EACH	
TYPE P305 - 30' Aluminum Pole with Two 8' Type A Mast Arms	EACH	
TYPE P306 - 30' Aluminum Pole with Two 10' Type B Mast Arms	EACH	
TYPE P307 - 30' Aluminum Pole with Two 12' Type B Mast Arms	EACH	
Post-Top Luminaire 150-WATT H.P.S.	EACH	
Cobra Head Luminaire 150-WATT H.P.S.	EACH	
Cobra Head Luminaire 250-WATT H.P.S.	EACH	
Cobra Head Luminaire 400-WATT H.P.S.	EACH	
Control Center Pedetal (100-AMP, 240-VOLT) & Foundation	EACH	
Remove / Relocate Existing Equipment	LUMP SUM	
INCIDENTAL ITEM	UNIT	QUANTITY
3 - 1c #4 TYPE USE Distribution Cable <sup>(2)</sup>	L.F.	
1 - 1c #10 TYPE THHN Pole Wiring Cable	L.F.	
Grounding Conductor and Rod	EACH	
Connector Kit, Fused	EACH	
Connector Kit, Unfused	EACH	
Fargo Connector	EACH	
Transformer Bases	EACH	
Right-Of-Way Restoration	LUMP SUM	
NOTES:		
(1) These approximate quantities were prepared solely for the Contractor's convenience and are not guaranteed to be a complete list of materials required for this project.		
(2) For the total lineal footage of this item, multiply the quantity shown by three.		



J. A list of general notes to the contractor including at least the following:

GENERAL NOTES

1. THE SHAWNEE MANUAL OF TECHNICAL SPECIFICATIONS AND DESIGN CRITERIA SHALL GOVERN THE CONSTRUCTION OF ALL PUBLIC IMPROVEMENTS FOR THIS PROJECT.
2. THE CITY OF SHAWNEE'S PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE SHAWNEE MUNICIPAL CODE AND THE MANUAL OF TECHNICAL SPECIFICATIONS AND DESIGN CRITERIA. THE APPROVAL OF THESE IMPROVEMENT PLANS SHALL NOT BE CONSTRUED TO BE AN APPROVAL OF ANY VIOLATION OF THE CITY OF SHAWNEE'S MUNICIPAL CODE, INCLUDING BUILDING AND ZONING CODES, AND ANY OTHER CITY ORDINANCE. THE CITY OF SHAWNEE IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OR DIMENSIONS AND ELEVATIONS, WHICH SHALL BE CONFIRMED AND CORRELATED AT THE PROJECT SITE. THE CITY OF SHAWNEE THROUGH ITS APPROVAL OF THESE IMPROVEMENT PLANS ASSUMES NO RESPONSIBILITY OTHER THAN AS STATED ABOVE FOR ACCURACY AND COMPLETENESS.
3. THESE IMPROVEMENT PLANS ARE APPROVED INITIALLY FOR ONE (1) YEAR AFTER WHICH THEY ARE AUTOMATICALLY VOID AND MUST BE UPDATED AND RE-APPROVED BY THE CITY ENGINEER BEFORE ANY CONSTRUCTION WILL BE PERMITTED.
4. THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF THE IMPROVEMENT PLANS, APPROVED BY THE CITY OF SHAWNEE, AT THE PROJECT SITE AT ALL TIMES.
5. THE CONSTRUCTION OF THE IMPROVEMENTS SHOWN OR IMPLIED BY THESE PLANS SHALL NOT BE INITIATED, OR ANY PART THEREOF UNDERTAKEN, UNTIL THE CITY ENGINEER IS NOTIFIED OF SUCH INTENT, AND ALL REQUIRED PERMITS AND FEES, PROPERLY EXECUTED BONDS, AND CONTRACT AGREEMENTS ARE RECEIVED AND APPROVED BY THE CITY ENGINEER.
6. THE CONTRACTOR SHALL CONTACT THE ENGINEERING INSPECTOR AT LEAST FORTY-EIGHT (48) HOURS IN ADVANCE TO SCHEDULE A REQUIRED INSPECTION.
7. THE CONTRACTOR SHALL NOT WORK ON SUNDAYS OR HOLIDAYS. WORK ON SATURDAYS IS ALLOWED WHEN REQUESTED AT LEAST FORTY-EIGHT (48) HOURS IN ADVANCE AND WHEN APPROVED BY THE CITY ENGINEER.
8. THE CONTRACTOR SHALL STAKE THE LOCATIONS FOR ALL POLES, CONDUITS, CONTROL CENTERS, SERVICE BOXES, AND JUNCTION BOXES TO BE INSTALLED. THE STATIONS AND OFFSETS PROVIDED ARE TO THE CENTER OF THE STREET LIGHTING EQUIPMENT. THE CONTRACTOR SHALL PROVIDE ELEVATIONS. IF OBSTRUCTIONS ARE ENCOUNTERED DURING INSTALLATION, THE CONTRACTOR WILL RE-STAKE THOSE LOCATIONS AFFECTED BY THE OBSTRUCTION. THE CONTRACTOR SHALL CONTACT THE ENGINEERING INSPECTOR TO INSPECT THE STAKING PRIOR TO COMMENCING ANY EXCAVATION OR CONSTRUCTION WORK.
9. THE PLACEMENT OF CONDUIT SHALL BE COORDINATED WITH ALL PAVING OPERATIONS WITHIN THE PROJECT LIMITS. CONDUIT INSTALLATION AND CONDUIT CONNECTIONS SHALL BE INSPECTED AND APPROVED BY THE ENGINEERING INSPECTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXTRA COSTS OF INSTALLING CONDUITS BY ALTERNATE CONSTRUCTIONS METHODS AFTER THE STREET PAVEMENT HAS BEEN PLACED AND FOR ANY DAMAGE TO THE PAVEMENT THAT MAY OCCUR DURING CONDUIT INSTALLATION.
10. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING EXISTING EQUIPMENT AS NOTED AND DELIVERING ALL SALVAGEABLE EQUIPMENT TO THE SHAWNEE PUBLIC WORKS SERVICE CENTER. THE CONTRACTOR SHALL CONTACT THE CITY ENGINEER AT LEAST TWENTY-FOUR (24) HOURS IN ADVANCE TO COORDINATE THE DELIVERY. ALL EQUIPMENT SHALL BE DISASSEMBLED PER THE INSTRUCTIONS OF THE CITY ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE OR LOSS OF SALVAGEABLE EQUIPMENT.
11. ALL EXISTING UTILITIES SHOWN ON THESE IMPROVEMENT PLANS ARE ACCORDING TO THE BEST INFORMATION AVAILABLE TO THE DESIGN ENGINEER, HOWEVER, ALL UTILITIES ACTUALLY EXISTING MAY NOT BE SHOWN. UTILITIES DAMAGED THROUGH THE NEGLIGENCE OF THE CONTRACTOR TO OBTAIN THE LOCATION OF SAME SHALL BE REPAIRED OR REPLACED AT THE EXPENSE OF THE CONTRACTOR.
12. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO MINIMIZE THE DOWNTIME OF AN EXISTING STREET LIGHTING SYSTEM TO BE MODIFIED. ALL EXISTING EQUIPMENT DAMAGED THROUGH THE NEGLIGENCE OF THE CONTRACTOR DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED, AS DIRECTED BY THE CITY ENGINEER, AT THE EXPENSE OF THE CONTRACTOR.
13. ALL EXISTING UNDERGROUND SPRINKLER SYSTEMS DAMAGED THROUGH THE NEGLIGENCE OF THE CONTRACTOR DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL OPERATING CONDITION AT THE EXPENSE OF THE CONTRACTOR. ALL AFFECTED PIPES AND FITTINGS SHALL BE REPLACED WITH NEW MATERIALS AT THE ORIGINAL LOCATION. ALL RESTORATION WORK SHALL BE ACCEPTABLE TO THE CITY ENGINEER AND THE PROPERTY OWNER.

These notes are not meant to be all-inclusive, and in certain situations the use of additional notes may be required by the Engineer.

- K. A vicinity map adequately showing the project location in relation to major streets and the section in which it is situated, with a north arrow and at a scale of one inch (1") equals two thousand feet (2,000').

- L. For new development where more than one (1) plan sheet is needed to show the entire street lighting system adequately, a general layout plan showing the entire system in relation to streets and the new development, with a north arrow, a bar scale and at a scale of one inch (1") equals one hundred feet (100').
- M. A signature block to be signed and sealed by the Kansas Registered Professional Engineer responsible for preparing the plans.
- N. An approval block for the signature of the Engineer and the date of such approval. The approval block shall be as follows:

APPROVED BY THE CITY OF SHAWNEE

BY: \_\_\_\_\_  
City Traffic Engineer

DATE: \_\_\_\_\_  
Approved For One  
Year From This Date

**.6 Required Information for Street Lighting Plan Sheets:** The street lighting plan sheets shall include the following information:

- A. A legend of symbols shall be shown that apply to all sheets. The legend may be shown on the title sheet if room permits.
- B. A schematic wiring diagram of the distribution system for each control center showing size, length and amperes of the secondary cable between each street light.
- C. One (1) or more plan sheets adequately showing the street lighting system in relation to the streets and adjacent properties, with a north arrow, a bar scale and at a minimum scale of one inch (1") equals fifty feet (50'), unless a larger scale is specified by the Engineer.
- D. All existing and proposed utilities such as power, gas, water, telephone, cable, sanitary sewer, storm sewer, and other items shall be accurately shown according to the best information available in the records of the owner of such facility, or field location, and shall be identified as to type, size, material, etc., as may be applicable. For new developments, some irrelevant items may be omitted.
- E. All existing and known proposed improvements within fifty feet (50') each side of the right-of-way and one hundred feet (100') beyond the project limits shall be shown at their proper locations unless otherwise approved or required by the Engineer. These improvements shall include items such as street pavement, curbs and gutters, sidewalks and driveways, storm and sanitary sewers, water mains and fire hydrants, utility poles and pedestals, trees and shrubs, fences and walls, buildings, and similar items, and shall be identified as to type, size, material, etc., as may be applicable. Irrelevant items may be omitted for new

developments.

- F. Street centerline stations shall be marked at one hundred-foot (100') intervals and at other pertinent points.
- G. The plans shall clearly show the proposed placement of all street lights, junction and service boxes, and control centers. The items to be constructed or installed for the project shall be legibly noted and located by station and offset. Street lights shall be further identified by control center, circuit and fixture numbers.

**.7 Required Information for Standard Detail Sheets:** The most current sheets of standard details shall be included in the improvement plans, which shall not be modified or revised in any manner except to show that a particular standard drawing is deleted and superceded by a detail shown on a special drawing sheet. Copies of the standard drawing sheets may be obtained from the Traffic Engineering Division or of the City of Shawnee website at [www.cityofshawnee.org](http://www.cityofshawnee.org)

**.8 Required Information for Special Drawing Sheets:** The improvement plans may include one (1) or more special drawing sheets to show all details of appurtenances, materials, and construction not covered by the standard drawings. The details shown on a special drawing sheet shall be drawn clearly and neatly at an appropriate scale with proper identifications, dimensions, materials and other information necessary to insure the desired construction.