Three classes of earth fill are provided to meet the varying requirements of substation construction. The required class of fill will be specified on the substation grading drawings. All fills shall meet the requirements for a particular class as listed below as well as the general specifications which are set out in A601.1.

CLASS "A" FILL (As specified, including long, non-typical driveways):
A professional testing laboratory shall be engaged to determine optimum moisture requirements, Suitability of fill material and compliance with the required degree of compaction.

Fill shall be placed in 6-inch layers and thoroughly rolled at optimum moisture content with a sheepsfoot of pneumatic-tired roller to a compaction of 95 percent standard density in accordance with ASTM D698.

CLASS "B" FILL (Typical) :
Moisture content of fill material shall be controlled. Fill shall be placed in 6-inch layers and thoroughly rolled with a sheepsfoot or pneumatic-tired roller.

The degree of compaction shall be considered satisfactory when the depth of penetration of the sheepsfoot, or tire, into the soil surface does not appear to decrease with repeated passes of the equipment over the fill. Soil shall be laboratory tested proving greater than 90% compaction.

CLASS "C" FILL:
Degree of compaction not specified. Compaction need only be that obtained by the movement of the grading equipment in the delivery and spreading of the fill material.

Fill material, as removed from excavation, shall be bladed into position in layers not exceeding 9-inches in depth.

APPROVED:Signatures on file
SUPERSEDES: MAR 1976

SUBSTATION EARTH FILLS
CLASSIFICATION OF FILLS

CLEARING AND GRUBBING

ALL TREES, BRUSH, STUMPS, BOULDERS OF OTHER UNDESIRABLE MATERIAL SHALL BE REMOVED FROM WITHIN THE LIMITS OF THE EXCAVATION OR FILL.

STRIPPING

BEFORE PLACING FILL, THE AREA TO BE GRADED SHALL BE STRIPPED TO REMOVE VEGETATION AND UNSUITABLE TOPSOIL.

BORROW

FILL MATERIAL SHALL BE OBTAINED FROM CUT AREAS UNLESS OTHERWISE SPECIFIED OR SHOWN ON SUBSTATION GRADING DRAWINGS.

ALL FILL MATERIAL SHALL BE REASONABLY FREE OF ORGANIC MATERIAL, FROZEN MATERIAL AND ROCK OF ANY DIMENSION GREATER THAN THREE INCHES.

DEPOSITING AND BLADING

FILL MATERIAL SHALL BE DEPOSITED AND BLADED INTO PLACE IN ACCORDANCE WITH REQUIREMENTS FOR THE SPECIFIED CLASS OF FILL LISTED ON A601.

LAYERS SHALL BE PLACED APPROXIMATELY PARALLEL TO FINISHED GRADE, STARTING AT LOWEST POINTS OF EXISTING SURFACE. FILL SLOPES SHALL BE COMPACTED TO SAME DENSITY AS THE FILL. BROKEN CONCRETE, MASONRY OR OTHER DEBRIS SHALL NOT BE USED AS FILL MATERIAL.

MOISTURE CONTROL

THE MOISTURE CONTENT OF THE FILL MATERIAL SHALL BE CONTROLLED FOR CLASS "A" AND CLASS "B" FILLS. WET MATERIAL SHALL BE ALLOWED TO DRY BY EVAPORATION. DRY MATERIAL SHALL BE MOISTENED BEFORE AND DURING COMPACTION. FOR CLASS "C" FILLS THE MATERIAL SHALL BE PLACED AS TAKEN FROM THE EXCAVATION.

COMPACTION

COMPACTION OF FILL SHALL BE IN ACCORDANCE WITH REQUIREMENTS FOR THE SPECIFIED CLASSES OF FILL LISTED ON A601.

EACH LAYER OF FILL SHALL BE COMPACTED TO SPECIFIED DENSITY BEFORE ADDITIONAL LAYERS ARE PLACED.

GRADING

FINAL GRADE SHALL BE AS SPECIFIED BY SUBSTATION GRADING DRAWINGS.

SUPERSEDES OCT 1956
APPROVED: Signatures on file

SUBSTATION EARTH FILLS
GENERAL SPECIFICATIONS

AFTER SUBSTATION WORK THAT WOULD DISTURB THE STONE SURFACING IS COMPLETE; SUBSTATION FENCED AREAS SHALL BE SURFACED WITH A 4-INCH LAYER OF CRUSHED STONE OVER AN EVENLY GRADED AND WELL-COMPACTED SUBGRADE.

THE CRUSHED STONE SHALL CONSIST OF CLEAN, TOUGH, DURABLE FRAGMENTS OF ROCK. IT SHOULD BE UNIFORM IN QUALITY AND CONFORM TO THE REQUIREMENTS FOR COURSE AGGREGATE CLASS "A (AE)" CONCRETE, AS SPECIFIED BY THE HIGHWAY DEPARTMENT OF THE STATE IN WHICH THE SUBSTATION IS LOCATED. THE CRUSHED STONE SHALL BE MOSTLY OF THE ¾" SIZE AND BE GRAY OR WHITE IN COLOR; LIGHT GRAY IS PREFERRED.

OKLAHOMA:

(1-INCH TO NO. 4) CRUSHED STONE, LIMESTONE PREFERRED, THAT HAS A SIEVE ANALYSIS IN PERCENTAGE BY *WEIGHT PASSING THROUGH* SQUARE SIEVE OPENINGS, AS LISTED BELOW.

- 1½" – 100%
- 1" – 90 TO 100%
- ½" – 25 TO 60%
- #4 – 0 TO 10%
- #8 – 0 TO 5%

ARKANSAS:

(1¼-INCH TO NO. 4) CRUSHED STONE, THAT HAS A SIEVE ANALYSIS IN PERCENTAGE BY *WEIGHT RETAINED ON* SQUARE SIEVE OPENINGS, AS LISTED BELOW.

- 1¼" – 0%
- ¾" – 25 TO 65%
- ⅜" – 70 TO 90%
- #4 – 95 TO 100%

CRUSHED STONE SHALL BE FREE OF MINE SHAT OR SHALE, RIVER GRAVEL OR PEBBLES, CRUSHED CONCRETE, SEASHELLS OR OTHER SUBSTANCES THAT MIGHT HAVE A DELETERIOUS EFFECT ON THE SUBSTATION GROUNDING SYSTEM.

NOTE:

ONE CUBIC YARD OF CRUSHED STONE OF THIS SIZE WEIGHS APPROXIMATELY 1.2 TONS AND WILL COVER APPROXIMATELY 9 SQUARE YARDS (81 SQUARE FEET) TO A DEPTH OF 4-INCHES.

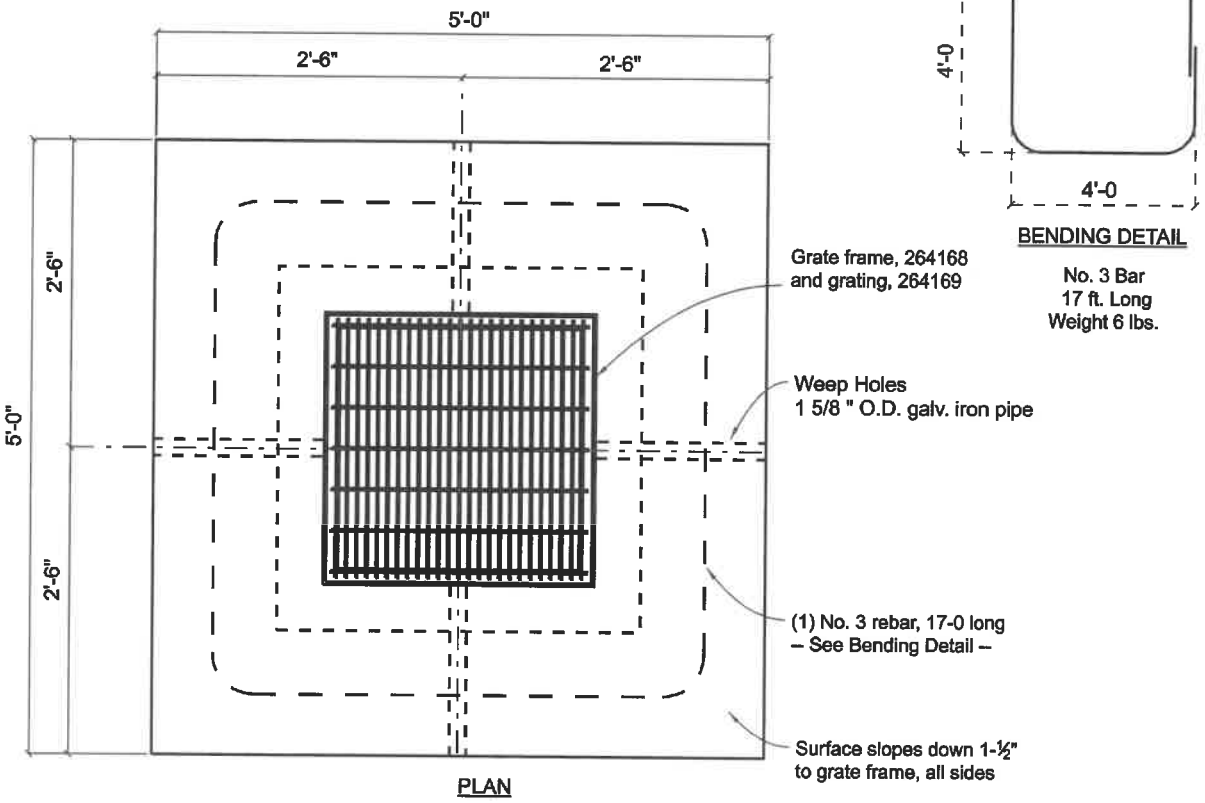
APPROVED: Signatures on file
SUPERSEDES FEB 1959

SUBSTATION YARD SURFACING

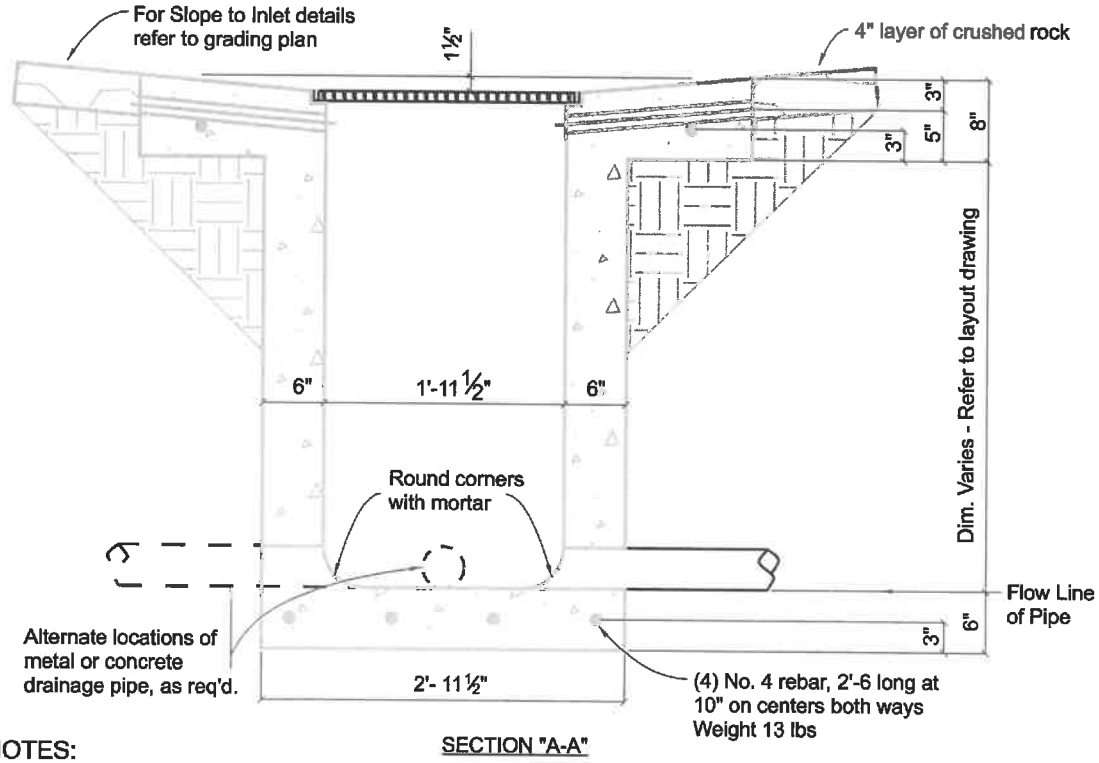
OG&E Electric Services©

SUBSTATION STANDARD
NOV 1975

A605



PLAN



SECTION "A-A"

NOTES:
1. Refer to A701 for concrete specifications
2. All exposed concrete edges shall be rounded-off with an edger

SUBSTATION
DRAIN INLET

APPROVED: Signatures on file
SUPERSEDES MAY 1974

A605.1

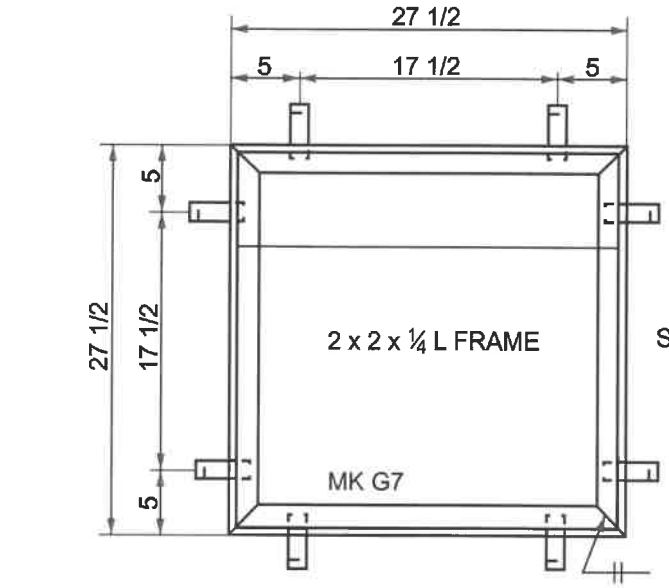
WAS STANDARD SUPPLY S813 and S814

SUBSTATION STANDARD
JULY 2008

OG&E Electric Services©

NOTES:

1. All dimensions are in inches
2. Galvanize after fabrication
3. Gratings shall be fabricated from welded floor grating with 1 ¾ x 3/16 bearing bars on 1 3/16 centers.



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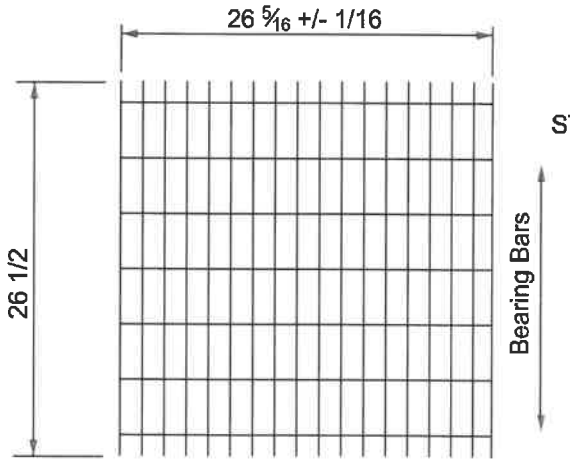


STK: 264169

APPLICATION DATA

Grating for storm sewer inlet used to drain off surface and/or surplus water.

SUPERSEDES: FEB 1988

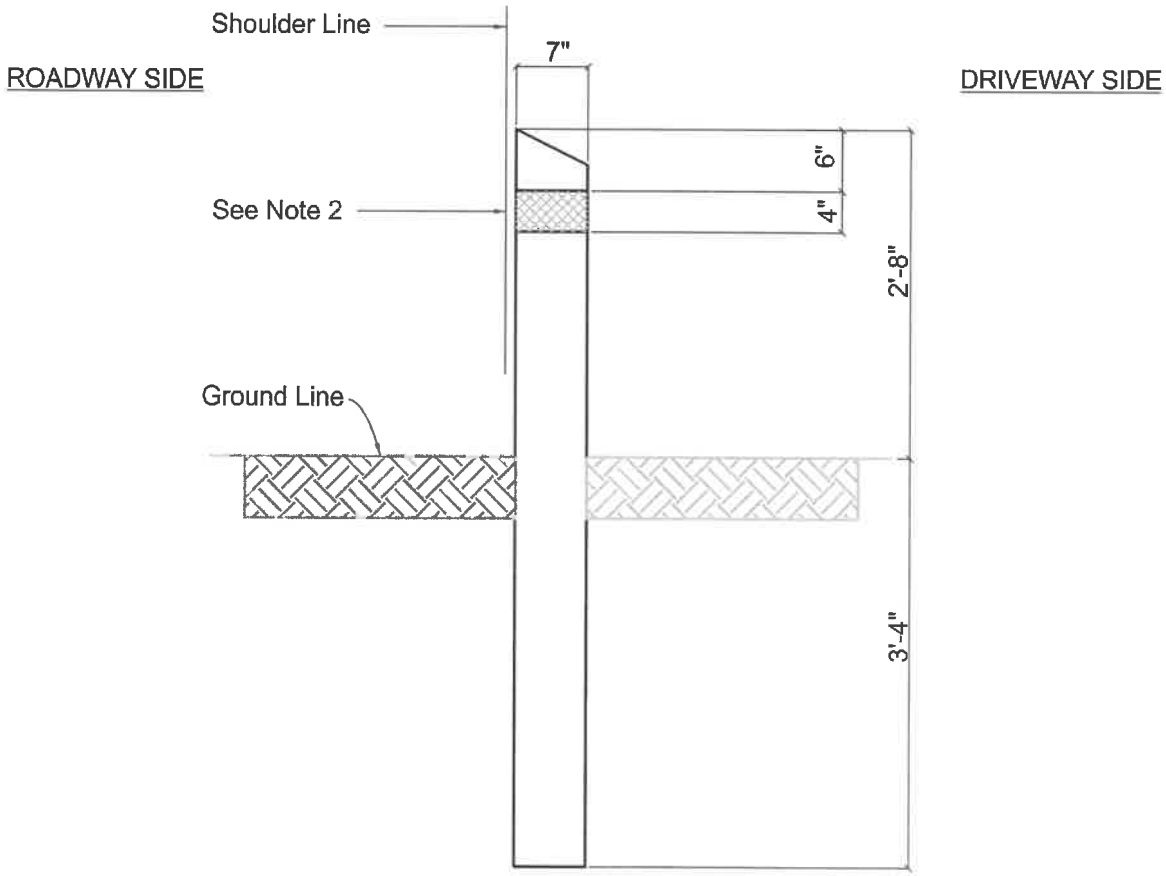
APPROVED: Signatures on file

DRAIN INLET
DETAILS

OG&E Electric Services©

SUBSTATION STANDARD
NOV 1975

A606



NOTES:
1. 7 inch diameter by 6 feet creosoted post
2. Reflective metal strips, WHITE at driveways and RED at culverts
3. Guide posts are required at roadway shoulder line on each side of driveways which abut federal or state rural highways

APPROVED: Signatures on file
SUPERSEDES AUG 1963

GUIDE POST
FOR DRIVEWAY ENTRANCES

MATERIALS:

1.1 STABILIZED AGGREGATE BASE COURSE (SABC) MATERIALS FOR DRIVEWAYS SHALL CONSIST OF EITHER OF THE FOLLOWING.

1.1A. CRUSHER-RUN STONE (100% PASSING THROUGH A 1½ INCH SIEVE) PLUS APPROXIMATELY 20% ADDITIONAL STONE SCREENINGS AND DUST (100% PASSING THROUGH A #4 SIEVE).

1.1B. CONCRETE AGGREGATE IN ACCORDANCE WITH SUBSTATION STANDARD A604 PLUS APPROXIMATELY 40% ADDITIONAL STONE SCREENINGS AND DUST (100% PASSING THROUGH A #4 SIEVE).

1.2 CRUSHED LIMESTONE IS PREFERRED BUT IN AREAS WHERE CRUSHED LIMESTONE IS NOT READILY AVAILABLE LOCAL MATERIAL SUCH AS SHALE, HARD SANDSTONE, ETC... MAY BE USED PROVIDED THEY CONFORM TO THE REQUIREMENTS OF PARAGRAPH (1.3) OF THESE SPECIFICATIONS. SOIL BINDERS SHALL NOT BE USED AND AGGREGATE SHALL BE PRACTICALLY FREE OF VEGETABLE OR OTHER DELETERIOUS SUBSTANCES.

1.3 THE COURSE AGGREGATE RETAINED ON THE ⅜ INCH SIEVE OF THE FINISH MIXTURE SHALL NOT HAVE A PERCENT OF WEAR OF MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH THE LOS ANGELES ABRASION TEST, AASHTO METHOD T-96. NO SOURCE OF MATERIAL USED IN THE BLEND SHALL HAVE A PERCENT OF WEAR OF MORE THAN 50.

MIXING AND PLACING:

2.1 MIXING OR BLENDING OF MATERIALS SHALL BE PERFORMED ON THE ROADBED. MIXING OF MATERIALS SHALL BE CONTINUED UNTIL A UNIFORM MIXTURE IS OBTAINED, WITH WATER EVENLY DISTRIBUTED THROUGH THE MASS.

2.2 IN ORDER TO FACILITATE MAXIMUM COMPACTION AND UNIFORM DENSITY, THE BASE COURSE MATERIAL MUST CONTAIN SUFFICIENT AND UNIFORM MOISTURE CONTENT WHEN DELIVERED TO THE ROADBED.

2.3 BASE COURSE MATERIAL SHALL BE LAID IN MINIMUM 3-INCH COURSES (COMPACTED THICKNESS) FOR A TOTAL THICKNESS OF 6-INCHES AFTER COMPACTION.

2.4 ROLLING AND COMPACTION OF THE BASE COURSE MATERIAL SHALL BE CONTINUED UNTIL A UNIFORM DENSITY IS OBTAINED THROUGHOUT THE SECTION, INCLUDING THE EDGES, AS INDICATED BY NO APPARENT CHANGE AFTER REPEATED PASSES OF THE COMPACTION EQUIPMENT OVER THE SURFACE. REFER TO SUBSTATION DRAWINGS FOR ANY SPECIAL COMPACTION REQUIREMENTS.

CONCRETE CURBS FOR ENTRANCE DRIVEWAYS:

3.1 BASE COURSE MATERIALS SHOULD BE CONTAINED BY CONCRETE CURBS FOR ENTRANCE DRIVEWAYS TO AVOID THE RAVELING OF EDGES AND THE ESCAPE OF ROCK PARTICLES INTO GRASSED AREAS RESULTING IN HAZARDOUS MOWING CONDITIONS.

3.2 CONCRETE MIX FOR CURBS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS ON SUBSTATION STANDARD A701 AND MUST BE CURED A MINIMUM OF (7) DAYS OR FOR A SUFFICIENT LENGTH OF TIME SUCH THAT PLACING, COMPACTING, AND BLADING OPERATIONS INVOLVING THE BASE COURSE MATERIALS WILL NOT ADVERSELY EFFECT THE CURBS.

DRIVEWAY SPECIFICATIONS
STABILIZED AGGREGATE BASE COURSE

CONCRETE CURBS FOR ENTRANCE DRIVEWAYS CONT'D:

3.3 CONCRETE CURBS SHALL BE 6-INCHES THICK AND EXTEND A MINIMUM OF 12-INCHES BELOW THE FINISHED SURFACE. THE EDGES OF DRIVEWAY CURBS SHALL BE FINISHED WITH A CONCRETE EDGING TOOL. THE TOP OF THE CURBS MAY BE EITHER FLUSH WITH FINISHED SURFACE OF DRIVEWAY, WHERE THE DRIVEWAY GRADE IS RELATIVELY LEVEL; OR 6-INCHES ABOVE THE FINISHED SURFACE OF THE DRIVEWAY, WHERE THE DRIVEWAY IS STEEP AND SUBJECT TO CARRYING RAINFALL RUN OFF WATER. REFER TO SUBSTATION DRAWINGS FOR ELEVATIONS AT TOP OF CURBS.

ENTRANCE RETURN:

4.1 DRIVEWAY ENTRANCE RETURNS MUST NOT EXTEND BEYOND A PROPERTY LINE THAT RUNS PARALLEL WITH THE DRIVEWAY. THE MINIMUM DISTANCE FROM A DRIVEWAY EDGE TO A PARALLEL PROPERTY LINE IS 5'-0.

4.2 DRIVEWAY ENTRANCE WIDTHS AND RETURN RADIUS SHALL BE DETERMINED BY SUBSTATION REQUIREMENTS AND STATE OR MUNICIPAL ORDINANCES.

GUIDE POSTS:

5.1 WHEN A DRIVEWAY ENTRANCE ABUTS STATE OR FEDERAL RURAL HIGHWAYS, GUIDEPOSTS MAY BE PROVIDED AND POSITIONED AS SHOWN ON SUBSTATION STANDARD A606.

SUB-GRADE:

6.1 THE DRIVEWAY SUB-GRADE MUST BE STABLE. AVOID EXCAVATING BELOW SUB-GRADE LINE. NO BASE COURSE MATERIAL SHALL BE PLACED ON A MUDDY OR FROZEN SUB-GRADE.

6.2 COMPACT SUB-GRADE BEFORE PLACING BASE COURSE MATERIAL.

DRIVEWAY GRADE:

7.1 ENTRANCE DRIVEWAY GRADE SHOULD NOT EXCEED 10%; AND CONSIDERATION MUST BE GIVEN TO VERTICAL CLEARANCE FOR MOBILE UNITS AND TRACTOR-TRAILERS.

7.2 PARTICULAR ATTENTION SHALL BE GIVEN TO THE REQUIREMENTS OF ENTRANCE DRIVEWAY GRADES; ASSURING THAT WATER FROM THE DRIVEWAY DOES NOT FLOW ONTO THE HIGHWAY TRAFFIC LANES.

BITUMINOUS SURFACE TREATMENT:

8.1 WHEN SPECIFIED ON THE SUBSTATION DRAWINGS, THE STABILIZED AGGREGATE BASE COURSE SHALL BE FINISHED WITH A DOUBLE BITUMINOUS SURFACE TREATMENT.

SUPERSEDES MAY 1966
APPROVED: Signatures on file

DRIVEWAY SPECIFICATIONS
STABILIZED AGGREGTE BASE COURSE

BITUMINOUS SURFACE TREATMENT CONT'D:

8.2 THE DOUBLE COURSE SURFACE TREATMENT OF AGGREGATES AND BITUMINOUS MATERIALS SHALL BE IN ACCORDANCE WITH SECTION 402 OF STANDARD SPECIFICATIONS FOR OKLAHOMA HIGHWAY CONSTRUCTION, 1967 ADDITION AS AMENDED TO DATE.

8.3 IF NECESSARY THE BASE COURSE SHOULD BE REPAIRED AND BROUGHT TO GRADE, BEFORE CONSTRUCTION OF THE BITUMINOUS SURFACE.

8.4 TREATMENT SHOULD BE APPLIED ONLY AFTER ALL SUBSTATION WORK IS COMPLETE AND WHEN THE TEMPERATURE IN THE SHADE IS NOT LESS THAN 50° F.

APPROVED: Signatures on file
SUPERSEDES MAY 1966

DRIVEWAY SPECIFICATIONS
STABILIZED AGGREGATE BASE COURSE

GENERAL

1.1 Refer to substation standard A701 for air-entrained concrete specifications.

1.2 Test cylinders shall be made for each fifty cubic yards of concrete or for each day pour's, whichever is the smaller. One broken at seven days and the remaining two broken at 28 days. Cylinders shall be made and cured in accordance with ASTM C31.

CONCRETE CURING AND FINISHING:

2.1 Driveway slab shall be protected from excessive loss of moisture by use of a liquid memgrane forming compound, or other approved method. Curing compound should be applied to the fresh concrete immediately after the surface has been finished and before the initial set of the cement has taken place. If possible, leave on side forms or edges slab must be coated with the curing compound after forms have been removed.

2.2 Concrete shall not be placed when anticipated air temparature during the early curing period is below 40 degrees F. At no time shall concrete be deposited on frozen sub grade, nor shall chemicals be added to lower the freezing point of the concrete.

2.3 During hot weather, temperature of fresh concrete, as placed, shall not exceed 90 degrees F.

2.4 Driveway slab shall have a wooden float finish and the surface shall be slightly rough but uniform.

2.5 Edges of driveway shall be finished with a concrete edging tool.

2.6 Particular care in curing and protecting the concrete is required to avoid cracking and checking of concrete during hot weather.

2.7 Traffic may be allowed upon the driveway slab at the end of 14 days following placing of normal concrete or 7 days of hign-early-strength concrete is used.

ENTRANCE RETURN:

3.1 Driveway entrance returns must not extend beyond a property line that runs parallel with the driveway. The minimum distance from a driveway edge to a parallel property line is 5'-0.

3.2 Driveway encrance widths and return radius shall be determined by substation requirements and state or municipal ordinances.

SUB-GRADE:

4.1 The driveway sub-grade must be stable. Avoid excavating below sub-grade line. No material shall be placed on a muddy or frozen sub-grade.

4.2 Compact sub-grade before placing driveway slab.

APPROVED:Signatures on file
SUPERSEDES: NOV 1975

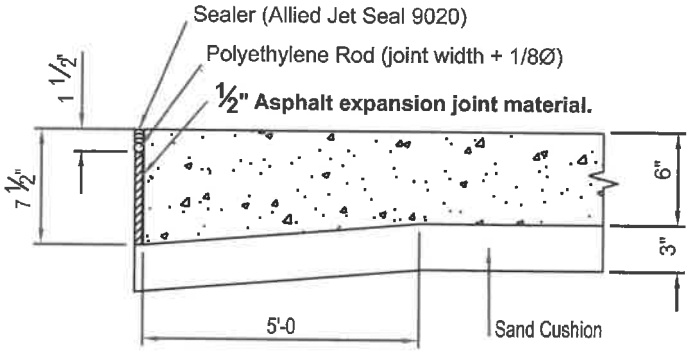
DRIVEWAY SPECIFICATIONS
CONCRETE

DRIVEWAY GRADE:

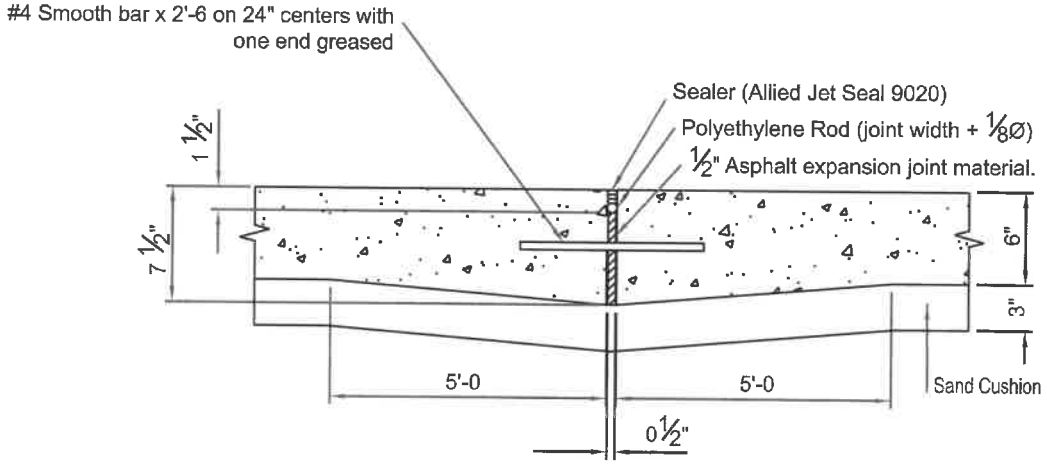
5.1 DRIVEWAY GRADE SHOULD NOT EXCEED 10%; AND CONSIDERATION MUST BE GIVEN TO VERTICAL CLEARANCE FOR MOBILE UNITS AND TRACTOR-TRAILERS.

5.2 PARTICULAR ATTENTION SHALL BE GIVEN TO THE REQUIREMENTS OF DRIVEWAY GRADES; DURING THAT WATER FROM THE DRIVEWAY DOES NOT FLOW ONTO THE HIGHWAY TRAFFIC LANES.

JOINTS:



EXPANSION JOINT
Gate Curb or Roadway



EXPANSION JOINT
Property Line

DRIVEWAY SPECIFICATIONS
CONCRETE

SUPERSEDES MAY 1966
APPROVED: Signatures on file

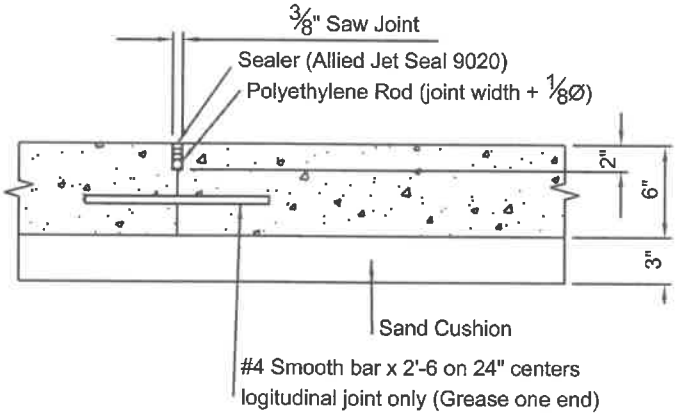
JOINTS Cont'd:

6.1 Refer to Substation Driveway Detail Drawings for location of concrete joints.

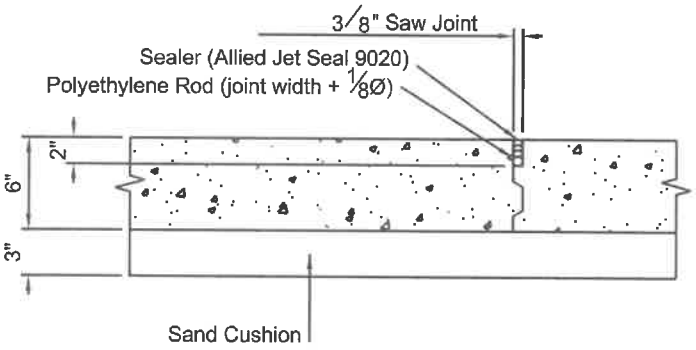
GUIDE POSTS:

7.1 When a driveway entrance abuts state or federal rural highways, guideposts may be provided and positioned as shown on Substation Standard A606.

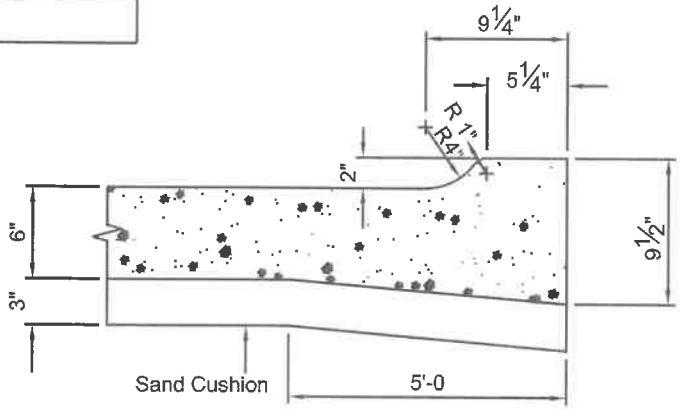
NOTE: Joints to be sawed within 12 hours after pouring concrete.



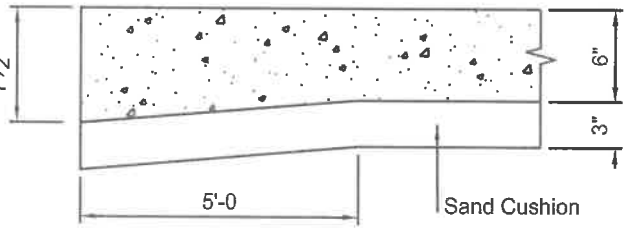
CONTRACTION JOINT



CONSTRUCTION JOINT



INTEGRAL CURB



DRIVEWAY EDGE

APPROVED: Signatures on file
SUPERSEDES NOV 1975

DRIVEWAY SPECIFICATIONS CONCRETE