

STREET, CURB, AND SIDEWALK
DESIGN STANDARDS AND SPECIFICATIONS
FOR THE CITY OF TULLAHOMA, TENNESSEE

Prepared By
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City of Tullahoma, Tennessee

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I. JURISDICTION

These rules and regulations governing the construction of streets, curbing, sidewalks and other necessary public improvements related thereto, shall apply to all areas within the City Limits of Tullahoma and the Urban Growth Boundary of the City of Tullahoma.

II. GENERAL

The purpose of these rules and regulations is to provide adequate design standards and specifications, construction procedures, and quality of materials that would be in the best interest of the safety, convenience and prosperity of the community in the use of these public improvements.

Approval of the construction plans shall be effective for a period of one year. If construction has not begun within this time, plans shall be resubmitted for approval and changes made as may be required by the Public Works Director including changes resulting from amendments to these regulations.

Any maintenance of street, curbing, sidewalk, and drainage system improvements until final approval is granted by the appropriate governing body shall be the responsibility of the developer.

Sidewalk construction shall be required to be installed along both sides of all collector and arterial streets as classified by the approved Major Thoroughfare Plan and may be required along certain residential streets within subdivisions. This construction shall be at the expense of the developer. The streets that may require sidewalk construction shall be determined by the Tullahoma Municipal-Regional Planning Commission and shall be indicated in the minutes of the Planning Commission upon approval of the Preliminary Plat and Construction Plans for a subdivision.

Curbs and gutters shall be required on all streets unless otherwise authorized by the Public Works Director and approved by the Tullahoma Municipal-Regional Planning Commission.

The type of base and surface to be used shall be based upon the classification of the street as determined by the Public Works Director and approved by the Tullahoma Municipal-Regional Planning Commission. Testing of the subgrade soils shall be done in accordance with the methods outlined in the following specifications, expense of which shall be the responsibility of the developer. The number and location of points of testing shall be determined by the Public Works Director.

III. STREET DESIGN STANDARDS

A. GENERAL

1. The arrangement, character, extent, width, grade and location of all streets shall conform to the Major Thoroughfare Plan of the Tullahoma Planning Region and shall be considered in relation to existing and planned streets, to topographic conditions, to public convenience and safety, and in their appropriate relation to the proposed uses of land to be served by such street.
2. The general location and alignment of all streets and roads shall conform substantially to the preliminary plat and other documents approved by the Tullahoma Municipal-Regional Planning Commission.
3. No construction shall proceed on streets until the Public Works Department has granted approval of the design.
4. All streets shall be properly designed as related to special traffic generators, such as industries, business districts, schools, churches, and shopping areas or centers; to population densities; and to the pattern of existing and proposed land use.
5. Proposed streets shall be extended to the boundary lines of the tract to be subdivided, unless prevented by topography or other physical conditions or, unless, in the opinion of the planning commission, such extension is not necessary or desirable for the coordination of the subdivision design with the existing layout or the most advantageous future development of adjacent tracts.
6. Block lengths in residential areas shall not exceed sixteen hundred (1,600) feet nor be less than two hundred (200) feet, except as the planning commission deems necessary to secure efficient use of land or desired features of the public way pattern. Wherever practicable, blocks along arterial or collector routes shall not be less than one thousand (1,000) feet in length.
7. Blocks designed for industrial or commercial uses shall be of such length and width as may be deemed suitable by the planning commission.
8. In any long block, the planning commission may require the reservation of an easement through the block to accommodate utilities, drainage, facilities, and/or pedestrian traffic.

A pedestrian walkway, not less than ten (10) feet wide, may be required by the planning commission through the approximate center of any block more than eight hundred (800) feet long, where

deemed essential to provide circulation or access to a school, playground, shopping center, transportation facility, or other community facility.

9. The finished elevation of proposed streets subject to flood shall be no more than one foot below the regulatory flood protection elevation. All drainage structures shall be sufficient to discharge flood flows without increasing flood height. Where fill is used to bring the finished elevation of any public street to the required elevation, such fill shall not encroach upon a floodway, and the fill shall be protected against erosion by rip-rap, vegetative cover, or other methods deemed acceptable by the Public Works Department.
10. Where a subdivision borders on or contains an existing or proposed arterial or collector route, the planning commission may require that access to such street be limited by:
 - a. the subdivision of lots so as to back on the arterial or collector route and front on a parallel minor route;
 - b. a series of cul-de-sac, "U" shaped public ways, or short loops entered from and designed generally at right angles to such a parallel street, with the rear lines of their terminal lots backing onto the arterial or collector route; or
 - c. a marginal access or service street, separated from the arterial or collector route by a planting or grass strip and having access thereto at suitable points.

The number of residential or local streets entering on arterial or collector routes shall be kept to a minimum.

11. The creation of reserve strips adjacent to a proposed public way in such a manner as to deny access from adjacent property to such public way shall generally not be permitted.
12. The arrangement of streets shall provide for the continuation of major streets between adjacent properties when such continuation is necessary for convenient movement of traffic, effective fire protection, efficient provisions of utilities, and when such continuation is in accordance with the major thoroughfare plan or street plan. If the adjacent property is undeveloped and the street must be a dead-end street temporarily, the right-of-way shall be extended to the property line.

A temporary cul-de-sac shall be provided on all temporary dead-end streets, with a notation on the subdivision plat that land outside the normal public way right-of-way shall revert to abutting property owners whenever the street is continued. Temporary cul-de-sac shall be constructed in accordance with the standards for a permanent street. The extruded curb and asphalt surface course may be deleted from the temporary cul-de-sac if an appropriate

bond amount is posted to cover the cost of these items.

13. Where a street does not extend beyond the boundary of the subdivision and its continuation is not required by the planning commission for access to adjoining property, its terminus shall normally not be nearer to such boundary than fifty (50) feet. However, the planning commission may require the reservation of an appropriate easement to accommodate drainage facilities, pedestrian traffic, or utilities. A permanent cul-de-sac turnabout shall be provided at the end of a dead-end street in accordance with the design standards of these regulations.

For greater convenience to traffic and more effective police and fire protection, permanent dead-end streets shall, in general, be limited in length in accordance with the design standards of these regulations.

14. Where a subdivision adjoins an existing narrow street or where the major thoroughfare or road plan or any zoning setback provisions indicate plans for realignment or widening of a street that would require use of some of the land in the subdivision, the subdivider shall be required to dedicate, at his expense, areas for widening or realigning such street, as set forth below:
 - a. the entire right-of-way shall be provided where any part of the subdivision is on both sides of the existing street; or
 - b. when the subdivision is located on only one side of an existing street, one-half (1/2) of the required right-of-way, measured from the center line of the existing pavement, shall be provided.
15. The Public Works Director may require a traffic study be prepared by the developer to assess rezoning requests, residential developments, and non-residential developments that may impact the current transportation system. Such traffic studies shall be prepared by a registered professional engineer with specific training in transportation engineering. Such studies shall provide appropriate data and recommendations as to the impact to the capacity of the existing traffic system, access control requirements, and any proposed system upgrades including traffic signals, turn lanes, additional lanes, or alignment changes.

B. DESIGN REQUIREMENTS

1. Street right-of-way widths shall be as shown on the Major Thoroughfare Plan or as otherwise specified in Table 1.

TABLE 1
MINIMUM RIGHT-OF-WAY AND PAVEMENT WIDTH
(IN FEET) BY TYPE OF DEVELOPMENT

| Type of Street | Type of Development | | | |
|------------------|---------------------|----------|-----------------|----------|
| | Residential | | Non-Residential | |
| | R.O.W.* | Pavement | R.O.W.* | Pavement |
| Local | 50 | 22 | 60 | 24 |
| Collector | 60 | 24 | 60 | 24** |
| Arterial | 80-150 | 24** | 80-150 | 24** |

Notes:

- * Additional right-of-way may be required to provide adequate slopes given topographic conditions. Such slopes shall not be steeper than four to one (4: 1).
- ** The paved surface shall include two (2) lanes twelve (12) feet in width with an additional paved shoulder of one (1) foot in width on either side of the paved surface. This does not apply to roadways receiving concrete curbing.

- 2. Proposed new intersections along one side of an existing public way shall coincide with any existing intersections on the opposite side of such public way. Street jogs with centerline offsets of less than one hundred fifty feet (150') shall not be permitted. Intersections of arterial or collector streets shall be at least eight hundred (800) feet apart.
- 3. Maximum street grades shall be as follows:
 - a. Arterial--Not greater than 6%
 - b. Collector --Not greater than 8%
 - c. Local --Not greater than 11%

All streets shall have a minimum street grade of not less than one percent (1%) for all portions of the street unless otherwise permitted. The cross slope on all streets, including intersections, shall be three (3) percent or less.

Intersections shall be designed with a flat wherever practical. In hilly or rolling areas, at the approach to an intersection, a leveling

area shall be provided having not greater than a two (2) percent grade for a distance of sixty (60) feet, measured from the nearest right-of-way line of the intersecting public way.

Where a street intersection will involve earth banks or existing vegetation inside any lot corner that would create a traffic hazard by limiting visibility, the subdivider shall cut such ground or vegetation (including trees) in connection with the grading of the public right-of-way to the extent necessary to provide adequate sight distance.

5. Horizontal curves measured to the centerline of the street shall have a minimum radii (in feet) as follows:

Local: 100 feet with normal crown. Superelevation is not permitted unless otherwise authorized by City or County Engineer or Road Superintend. Based on 30 mph design speed.

Collector and Arterial: Minimum radius shall be designed based on Design Speed and Superelevation rate in accordance with "Geometric Design of Highways and Streets", AASHTO, latest edition.

6. Minimum tangent distance between curves (in feet) shall be as follows:

- a. Arterials 300
- b. Collectors 100
- c. Local 100

7. The paved surface shall slope downward from the centerline of the paved surface outward to the edge of the paved surface on each side 2/5ths of an inch per foot to provide sufficient road crown for all paved surfaces. Super-elevation shall permitted upon approval of the City or County Engineer or Road Superintendent for utilization on collector and arterial streets only.

8. The minimum sight distance* (in feet) shall be as follows:

| | Design Speed, mph | | |
|--|--------------------------|-----------|-----------|
| | 30 | 40 | 50 |
| Minimum stopping Sight distance, feet | 200 | 275 | 350 |
| Desirable Stopping | | | |

| | | | |
|---|------|------|------|
| Sight distance, feet | 200 | 300 | 450 |
| Minimum passing Sight distance, feet | 1100 | 1500 | 1800 |

Sight distance values are from "Geometric Design of Highways and Streets", AASHTO, 1994. Sight distances for other design speeds shall be obtained from the latest edition of this manual.

Vertical curve lengths shall be designed based on the minimum sight distance values. "K" values shall be calculated and provided on design documents.

* Sight Distance is measured from a point three and one-half feet (3'-6") above the centerline of the roadway surface to a point six inches (6") above the centerline of the road surface.

The developer shall be required to make any improvements necessary to comply with the minimum sight distance requirements including making modifications to existing roads and streets in order to provide proper sight distance.

9. Minimum right-of-way and pavement diameter (in feet) for cul-de-sacs shall be as follows:

| | Type or Development | | | |
|---------------------|---------------------|----------|-----------------|----------|
| | Residential | | Non-Residential | |
| | R.O.W | Pavement | R.O.W. | Pavement |
| a. Local | 100 | 80 | 120 | 80 |
| b. Collector | 120 | 100 | 120 | 100 |
| c. Arterial | 120 | 100 | 160 | 140 |

Pavement diameter shall be measured from the inside edge of curb and gutter where applicable, or within (1) foot of paved shoulder to roadways without curb and gutter.

A cul-de-sac shall be provided at the dead end of a street unless the street extends not more than one lot width past an intersection within a residential subdivision.

10. Permanent or temporary cul-de-sac streets with only one point of improved access for emergency vehicles shall be limited to a maximum length of 2000 feet. This distance shall be measured from start of the street (center line intersection with existing street) to the end of the cul-de-sac or to the point of intersection of a loop street if that condition is provided. The length of the looping segment is not measured.

11. Minimum radius (in feet) of return at intersection shall be as follows:

| | Local | Collector | Arterial/Industrial |
|--------------------|-------|-----------|---------------------|
| a. At right-of-way | 25 | 40 | 50 |
| b. At pavement | 25 | 40 | 50 |

12. *Intersections* --Streets shall be laid out so as to intersect as nearly as possible at right angles. A proposed intersection of two (2) new streets at an angle of less than seventy-five (75) degrees shall not be permitted. An oblique street should be curved approaching an intersection and should be approximately at right angles for at least seventy-five (75) feet on residential streets and for at least one hundred (100) feet on residential streets and for at least one hundred fifty (150) feet on arterial streets. Not more than two (2) streets shall intersect at anyone point unless specifically approved by the City or County Engineer or Road Superintendent and the Tullahoma Municipal-Regional Planning Commission.

Public ways parallel to a railroad, when intersecting a public way which crosses the railroad at grade, shall be at a distance of at least one hundred fifty (150) feet from the railroad rail-of-way. Such distance shall be determined with due consideration of the minimum distance required for future separation of grades by means of appropriate approach gradients.

13. Street construction designs shall conform to the details shown illustrated in Figures 1 through 7 contained in Appendix A of this Standard.
14. Street construction shall consist of base and pavement thicknesses as indicated in the following table. The sections are minimum thicknesses for the street classifications if no subgrade soils testing is performed prior to construction

TABLE 2
Aggregate Base and Asphaltic Concrete Layer Thicknesses
(Compacted Depth)

| <u>Street Classification</u> | <u>Aggregate Base Course</u> | <u>Asphalt Concrete Binder</u> | <u>Asphalt Surface Course</u> | <u>Total Thickness</u> |
|------------------------------|------------------------------|--------------------------------|-------------------------------|------------------------|
| Local | 8" | 2" | 1 ½" | 11 ½" |
| Collector | 10" | 2 ½" | 1 ½" | 14" |
| Arterial or Industrial | 10" | 4 ½" (2 ½" + 2") | 1 ½" | 16" |

Materials shall conform to Section VII, Standards and Specifications for Bituminous Binder or Surface Course.

Subgrade conditions may be such that a lesser pavement section can be placed and support intended loads. Soils testing shall be performed on the in-situ subgrade material and on proposed fill material. The soil materials shall have a plasticity index of between 10 and 20 (ASTM D-424 and ASTM D-423). The dry density of soil materials shall be not less than 90 pound per cubic foot. Placement and compaction testing shall conform to the requirements of Section V, including density tests performed at a frequency of every 5,000 square feet but not less than 3 tests. Subgrade conditions meeting plasticity index and dry density requirements shall permit pavement sections as indicated in the following table:

TABLE 3

**Aggregate Base and Asphaltic Concrete Layer Thicknesses
For Soils with $10 < P.I. < 20$ and Dry Density > 90 Pounds per Cubic Foot
(Compacted Depth)**

| Street Classification | Aggregate Base Course | Asphalt Concrete Binder | Asphalt Surface Course | Total Thickness |
|------------------------------|------------------------------|--------------------------------|-------------------------------|------------------------|
| Local | 6" | 2" | 1 ½" | 9 ½" |
| Collector | 8" | 2 ½" | 1 ½" | 12" |
| Arterial or Industrial | 8" | 4" | 1 ½" | 13 ½" |
| | | (2" + 2") | | |

Materials shall conform to Section VII, Standards and Specifications for Bituminous Binder on Surface Course.

A geotechnical engineering investigation of the soil conditions may be performed by a registered engineer specializing in the field of soils and asphalt concrete pavement and submitted to the City or County Engineer or Road Superintendent for review. Based on the geotechnical engineering report, a pavement section of lesser dimensions than

required by Table or may be permitted. The report shall provide laboratory soil test results, existing soil conditions, required pavement section, recommended compaction efforts, and inspections and field testing requirements. Inspections and testing shall be performed by an independent testing agency and all costs shall be paid by the developer. The Department of Public Works shall approve the report inspection and testing plan, and the inspection and testing agency. A copy of the daily inspection and testing reports shall be submitted to the Department of Public Works.

C. ACCESS CONTROL AND DRIVEWAYS:

- 1. The number of driveways shall be based upon the amount of lot frontage a parcel of land has directly adjoining a public street. The number of driveways onto a given street shall be as follows:

| Amount of Lot Frontage (see note a) | Maximum Number of Driveways |
|--|------------------------------------|
| Less than 75 feet | 1 |
| 75 feet to 149 feet | 1 (see note b and c) |
| 150 feet to 299 feet | 2 (see note b) |
| Each additional 300 feet | 1 (see note b) |

Notes

- a. In the case of corner or double fronts lots, each individual street and its associated lot frontage shall be considered separately rather than combined to orient all driveways onto one particular street.
 - b. Single family residences and drive-thru business enterprises whereby a service is provided without the patron leaving the vehicle may have two (2) driveways if separated by a distance equal to the width of the widest driveway or a minimum of twenty-five (25) feet, whichever is greater, unless otherwise not permitted by the Department of Public Works due to concerti for public safety.
 - c. Unless otherwise determined by the Department of Public Works.
- 2. All driveways shall be located subject to the following controls:
 - a. No driveway shall be constructed within thirty (30) feet of an adjacent street right-of-way line. On collector or arterial streets this minimum shall be forty (40) feet; or in such a manner that the driveway curb cut is less than five (5) feet from the point of tangency of a street radius except that a compound curve including both the driveway radius and street radius may be utilized where the street radius exceeds fifty (50) feet. A reduction of up to ten (10) feet in any or all

dimensions may be allowed by the Department of Public Works at locations where such reduction would not result in a hazardous condition.

- b. All driveway radii at the point of intersection with the public street shall be set back from the side property line a minimum of one (1) foot as measured by the extension of the side property line into the right-of-way at a right angle to the paved surface with the exception of joint use driveways where written consent from both property owners is provided to the Department of Public Works.
 - c. No curb on city streets or right-of-way shall be cut or altered without a permit from the Department of Public Works, and if a State Highway, a permit also be obtained from the Tennessee Department of Transportation.
 - d. In no case shall a commercial or industrial driveway or parking area be arranged such that vehicles be required to back directly into a public street of any classification. No residential driveway or parking area shall be arranged such that vehicles be required to back directly into a collector or arterial street. A minimum 10' wide by 15' deep turnaround bay shall be provided within the driveway and outside of the right-of-way.
3. The width of all driveways shall be within the minimum and maximum dimensions as follows:

| Land Use | Driveway | | Length of Curb Cut | |
|---|----------|---------|--------------------|---------|
| | Minimum | Maximum | Minimum | Maximum |
| All Residential Districts: | 10 feet | 24 feet | 16 feet | 40 feet |
| Non Residential Districts: | | | | |
| Commercial | 16 feet | 30 feet | 36 feet | 70 feet |
| Industrial | 16 feet | 40 feet | 36 feet | 90 feet |
| Uses served by a substantial number of large trucks (5 or more per day) | 20 feet | 40 feet | 60 feet | 90 feet |

Major traffic generators defined as those uses and facilities utilizing in excess of 150 parking spaces shall be reviewed on an individual basis by the Department of Public Works to determine appropriate entrance driveway requirements in relation to traffic generated by the use or facility.

In no case shall total driveway widths exceed 50% of their respective road frontage. The Department of Public Works may require additional restrictions on driveway widths and lengths of curb cuts where access control is warranted.

4. Any parcel of land in which the driveway configuration including width, radius, and positioning is contrary to these provisions and becomes vacant and remains unoccupied for a continuous period of one (1) year shall be required to remove and modify said driveways into conformance with applicable provisions contained herein for access and driveways unless otherwise authorized by the Department of Public Works.

C. CURBS AND GUTTERS

1. All curb and gutter shall be concrete. No asphalt curbing and gutter is permitted.
2. Curb and gutter type and size shall be approved by the Department of Public Works.
3. Concrete curbs are required for all streets where sidewalks are required.
4. Curb and gutter construction shall conform to the specifications of Section XI and to the details shown illustrated in Figures 10 through 14 contained in Appendix A of this Standard.

D. SIDEWALKS

1. All sidewalks shall be constructed with concrete in accordance with the specifications contained in Section X.
2. Sidewalk widths shall be as specified in this section unless otherwise directed by the Department of Public Works.

| Class of Street | Sidewalk Design Standards | |
|------------------------|----------------------------------|------------------------|
| | Sidewalk Width | |
| | Residential | Non Residential |
| Local | 4' | 5' |
| Collector | 5' | 5' |
| Arterial | 5' | 6' |

3. All sidewalks shall be designed to conform to applicable accessibility requirements for physically challenged individuals to provide for the full and free use of streets, highways, public buildings, public facilities and all other buildings and facilities,

both publicly and privately owned, which serve the public.

4. Sidewalks and bicycle paths, where required by the planning commission, shall be included within the dedicated nonpavement right-of-way of all streets and shall be improved as required by enforcing officer. Concrete curbs are required for all streets where sidewalks are to be constructed unless otherwise approved. A median strip of grassed or landscaped area at least two (2) feet wide shall separate all sidewalks from adjacent curbs.
5. Sidewalk construction shall conform to the details shown illustrated in Figures 15 through 19 contained in Appendix A of this Standard.

IV. MAINTENANCE AND ASSURANCE FOR COMPLETION

1. The Public Works Director or his appointed representative shall be informed twenty-four (24) hours prior to the developer's intended time of paving so that a representative can be available for inspection throughout the placement of asphalt, if determined necessary by the inspecting authority. The subgrade and base must have approval prior to placement of asphaltic binder course.
2. After approval of the 307 binder course of asphalt, a Certification of Inspection shall be issued. The developer shall post a bond with the appropriate County or City of Tullahoma for the estimated cost to place and compact one and one-half inches (1.5") of 411 "E" mix on the streets being developed. Included in this payment shall be the estimated cost of raising all manholes, valve boxes, storm drainage structures, and appurtenances from the binder course elevation to the finished pavement elevation. This amount shall be estimated by the developer's design engineer and verified by the Public Works Director. This bond shall be posted with the appropriate County or City of Tullahoma prior to approval of the Final Plat by the Public Works Director
3. The developer shall be required to maintain the roadway pavement condition during the period prior to final surface course paving but not exceeding two years from application for the binder course or issuance of 75% of Certificates of Occupancy within that subdivision whichever comes first.

A performance bond in the amount of 15 % of estimated surface course paving cost shall be posted to cover repair of binder course during the maintenance period. This bond shall be posted with the appropriate County or City of Tullahoma prior to approval of the Final Plat by the Public Works Director. Repairs to the binder course prior to surface course paving shall be approved by the

Public Works Director.

4. The developer shall place the final surface course consisting of 1 ½" of 411 "E" mix. This shall be performed after two years from application of the binder course or issuance of 75% of Certificates of Occupancy within that subdivision whichever comes first.

B. OTHER

Sidewalks and curbs and gutters shall be completed in their entirety prior to approval of Final Plat. Performance and maintenance bonds for improvements shall conform to the Subdivision Regulations of the Tullahoma Planning Region.

V. STANDARDS AND SPECIFICATIONS FOR EXCAVATIONS, FILLS AND EMBANKMENTS, AND SUBGRADES

A. SCOPE

This section includes the furnishing of all labor, equipment, materials, tools, supplies, transportation, construction drainage, and incidentals of any nature necessary to complete the excavation and construction of fills and embankments.

B. GENERAL

1. *Cut or Excavation* – Cut or excavate earth or other materials in accordance with the elevations, dimensions and slopes shown on the plans. Materials excavated in excess of that so shown shall be backfilled and compacted to plan grade in accordance with Paragraph #2 below. Cut or excavated areas shall be compacted to densities of not less than 95% of maximum density determined by AASHTO Designation T-99 Method A (standard Proctor) or ASTM D- 698 unless specified otherwise in these standards.
2. *Fills and Embankments* --Remove all debris subject to termite infestation, rot or corrosion, and all other deleterious materials from areas to be filled or backfilled. Deposit fill and backfill in loose layers not more than six (6) inches in thickness. Compact all fills to densities of not less than 95% "Standard Proctor". Rocks, blocks or concrete and masonry materials, not more than six (6) inches maximum dimension, but not debris, may be used for fills if well distributed in the earth and provided further, that such materials not be placed against manholes, underground structures, or utilities, or in the top twenty-four (24) inches of fill below grade. No frozen material shall be placed in backfill. Sloping

ground under new fill embankment, existing embankment against which new or embankment is to be built, and existing embankment to be widened, shall be stepped, trenched, plowed or bladed as directed by the City or County Engineer or Road Superintendent to insure a bond between old and new materials.

Where a pavement structure is to be placed upon the subgrade, the top six inches Where a pavement structure is to be placed upon the subgrade, the top six inches of both cut and fill sections shall be compacted to a density equal to 100% of maximum density determined by Standard Proctor. The location and number of density tests shall be determined by the City or County Engineer or Road Superintendent.

For all areas where subgrade has been prepared, a proof-roll test shall be performed for uniformity of support by driving a loaded dump truck at a speed of 2 to 3 mph over the entire surface. Further improvements shall be made on all areas that show a deflection of 1/4 inch or more. When completed, the finished subgrade shall be hard, smooth, stable, and constructed in reasonable close conformance with the lines, grades, and typical cross sections shown on the drawings.

3. *Preparation of Subgrade* --All traces of utility trenches shall be filled and thoroughly tamped with mechanical tamping device. Spongy or unsuitable material shall be removed and replaced with stable compactible material. Every precaution shall be taken to obtain a subgrade of uniform bearing strength through compaction by such means as will provide a firm base and insure against future settlement or superimposed construction. After removal of all loose material from the subgrade, it shall be tested with a template or straight-edge, before depositing surfacing material thereon. All subgrades shall be maintained in satisfactory condition, protected against traffic and properly drained until surfacing is placed upon the subgrade.

Utility trenches within areas to receive asphalt pavement shall be backfilled completely with a TDOT No. 57 stone or compacted by mechanical means to required densities herein specified.

4. *Settlement or Shrinkage of Fill or Embankment* --Fill to required finish grade any areas where settlement occurs. All such areas shall be compacted to the required densities herein specified.
5. *Field Testing* --when required by the City or County or Road Engineer or Road Superintendent, density and moisture testing shall be performed by ASTM D1556 (sand cone method) or ASTM

D2922 (nuclear methods).

1. When ASTM D2922 is used, check and adjust calibration moisture curves if necessary by procedure described in ASTM D2922, paragraph, "ADJUSTING CALIBRATION CURVE." ASTM D2922 results a wet unit weight of soil and when using this method use ASTM D3017 to determine moisture of soil. If mica or other cementitious materials are present, use ASTM D-1556.
2. Check calibration curves furnished with moisture gages along with density calibration checks as described in ASTM D3017. Make calibration checks of both density and moisture gages at beginning of Project on each different type of material encountered and at intervals as required by Architect / Engineer or testing laboratory;

Compaction testing of areas to be paved shall be performed at a frequency of one field density test of subgrade every 5,000 square feet, but not less than three tests.

For all areas where subgrade has been prepared, a proof-roll test shall be performed for uniformity of support by driving a loaded dump truck at a speed of 2 to 3 mph over the entire surface. Further improvements shall be made on all areas that show a deflection of 1" or more. When completed, the finished subgrade shall be hard, smooth, stable, and constructed in reasonable close conformance with the lines, grades, and typical cross sections shown on the drawings.

C. COMPACTED EARTH FILL (NON-PAVED APPLICATIONS)

Compacted Earth Fill-- Consists of the removal of selected earth material from existing stockpiles within the project site to meet the required embankment or fills shown on the grading and topographic planes). Compaction of earth fill against, or around walls, footings, inlets, etc., or any part of a structure that cannot be accessed by rollers shall be compacted with hand operated compaction equipment approved by the City or County Engineer or Road Superintendent. When directed, areas shall be compacted to not less than 95% "Standard Proctor" (ASTM D-698).

D. WATER FOR SPRINKLERING AND DUST CONTROL

Sprinklering shall be performed with an approved type of equipment for the sprinklering of water on roadways during construction. Equipment

shall be so constructed that it will spray the surface lightly and uniformly and so equipped that the delivery may be regulated and controlled at all times of application of water to roadway surface. Calcium Chloride may not be used.

E. FINAL GRADE

Before final acceptance the entire project area shall be graded by mechanical means to final finish, contour, or grade as shown on the plans and as required herein. The area shall be free of any weeds and all scattered debris, spoil or waste. Any area showing wash or erosion shall be scarified, backfilled, graded, and recompacted to the required density or densities.

VI. STANDARDS AND SPECIFICATIONS FOR CRUSHED STONE

A. SCOPE

1. This section includes the furnishing of all labor, equipment, materials, tools, supplies, transportation, construction drainage, and incidentals of any nature necessary for the placement of a crushed stone base.
2. Street construction standards for the Tullahoma Planning Region for which the developer is responsible shall meet the following requirements: [all reference numbers are taken from the Tennessee Department of Transportation (TDOT) **Standard Specifications for Road and Bridge Construction**, latest edition].

B. MATERIALS

The stone base section of the road shall be constructed with compacted Grading D Pug Mill Mix. All base stone shall be placed and compacted according to Section 303, TDOT **Standard Specifications for Road and Bridge Construction**, latest edition.

C. GENERAL REQUIREMENTS

1. All manholes, water line valve boxes, and appurtenances shall be adjusted to an elevation which corresponds to the finished grade for the binder course of asphalt.
2. Once the developer has sufficient stone depth, compaction, and proper adjustment of all castings, the developer shall notify the City or County Engineer or Road Superintendent at least twenty-four (24) hours in advance that the stone base is ready for inspection including castings. Once the base stone and castings

have been approved, a Certificate of Inspection shall be issued by the inspecting authority, permitting the paving, it will be the responsibility of the developer to make the proper adjustments prior to paving, should the developer fail to comply with his requirement, the developer shall still be responsible for expense of the same and a Stop Work Order shall be issued by the inspecting authority until such time as the corrective work has been completed, either by the developer or the appropriate authority and, in the case of corrective work being completed by the appropriate governmental authority, payment in full for said work has been received from the developer.

VII. STANDARDS AND SPECIFICATIONS FOR BITUMINOUS PRIME COAT AND TACK COAT

A. SCOPE

This section includes furnishing of all labor, equipment, materials, tools, supplies, transportation, construction drainage, and incidentals of any nature necessary for the placement of a bituminous prime coat upon the crushed stone base.

B. MATERIALS

1. Prime Coat

The bituminous prime coat of emulsified asphalt, Grade AE-P, or cutback asphalt, Grade RC-250 shall conform to Section 402, **TDOT Standard Specifications for Road and Bridge Construction**, latest edition.

2. Tack Coat

The bituminous tack coat of emulsified asphalt, Grade RS-2, or cutback asphalt, Grade RC-250 shall conform to Section 403, **TDOT Standard Specifications for Road and Bridge Construction**, latest edition.

C. CONSTRUCTION METHODS

1. Prime Coat

The crushed stone base, prepared as outline in this standard, shall be sprinkled lightly with water to settle any loose dust. A bituminous prime coat shall then be applied uniformly over the surface of the base by the use of an approved bituminous distributor. The prime coat shall be applied at the rate of three-

tenths (3/10) gallon per square yard, and shall be immediately covered with (No.8) crushed stone chips at the rate often (10) pounds per square yard. The chips shall be applied with a suitable spreading device to prevent the tires of the trucks from running over the fresh bituminous material.

2. Tack Coat

The asphalt surface shall be dry and cleaned and free of any dirt or debris. The tack coat material shall be applied at a rate not to exceed 0.05 gallon of residual bitumen per square yard for all materials except asphalt cement. When asphalt cement AC-20 is used, the application rate shall be 0.05 to 0.10 gallon per square yard.

VIII STANDARDS AND SPECIFICATIONS FOR BITUMINOUS BINDER AND SURFACE COURSE

A. SCOPE

1. This section includes the furnishing of all labor, equipment, materials, tools, supplies, transportation, construction drainage, and incidentals of any nature necessary for the placement of a bituminous binder or surface course.
2. Street construction standards for the Tullahoma Planning Region for which the developer is responsible shall meet the following requirements: [all reference numbers are taken from the Tennessee Department of Transportation (TDOT) **Standard Specifications for Road and Bridge Construction**, latest edition].

B. MATERIALS

1. The bituminous base material (binder) required for the construction of this specification shall be of Grading "A" or "B-Modified" in conformance to Section 307, TDOT **Standard Specifications for Road and Bridge Construction**, latest edition, and as called for on the Standard Drawings contained in these specifications. All placing and compaction of asphalt binder shall adhere to TDOT Specifications.
2. The asphaltic concrete surface course required for the construction of this specification shall be Grading "D" or "E" in conformance with Section 411, TDOT Standard Specifications for Road and Bridge construction, latest edition. All placing and compaction surface course shall adhere to TDOT Specifications.

C. GENERAL REQUIREMENTS

Inspection, maintenance, and assurance for completion of bituminous binder and surface course shall conform to Section IV of this document.

IX. TECHNICALNICAL SPECIFICATIONS -- CONCRETE WORK

A. SCOPE

The work shall include all required forms for construction of the concrete work to the profiles and grades shown, screens for striking concrete off at proper grade, forms for slabs, walls and curbs, reinforcing bars and mesh and all necessary troweling to obtain the finished surfaces specified. The work shall include all necessary protection and curing of the concrete work immediately following the finishing thereof and for as long a period as may be deemed necessary by the Engineer for the proper protection of finished surfaces. The work shall include the setting of all required dowels, inserts, ferrules, and similar items to build into the concrete construction.

B. GENERAL CONDITIONS

The contractor shall examine the drawings and specifications for this portion of the work, and for other work affecting his own, and shall report to the Engineer for adjustment any discrepancies found to exist. Before starting the work he shall check all lines, levels, and previous work. He shall check shop drawings to see that they conform to his work and assist other craftsmen in their work. The contractor shall be in charge of forms and centering, placing reinforcement, pouring concrete, and removal of forms and centering. The contractor shall be responsible for laying out all concrete work, set lines and establish correct levels therefore, and be responsible for the accuracy of same. The contractor shall see to it that at no time is the concrete structure subject to loading, or overloading, with materials and apparatus by other contractors, or by his own operations.

C. MATERIALS

Cement except as noted, shall be Portland cement of American Manufacture, and shall meet all the requirements of the standard specifications for Portland cement of the American Society for Testing Materials (ASTM) ASTM C-150. The same brand of cement shall be used for all exposed concrete above grade. Air entraining Portland cement may be used and shall conform to the specifications of ASTM C-175.

Fine aggregate shall conform to specifications for Concrete Aggregate, ASTM C-33. The sand shall be similar to size #33 of the Tennessee State Highway Department Specifications. The weight removed by decantation shall not be more than 3% and all sand shall be screened and washed and the use of bank sand shall **not** be permitted.

Course aggregate shall conform to specifications for Concrete Aggregate, ASTM C-33. The course aggregate shall be similar to size #14 of the Tennessee

State Highway Department Specifications.

Water used for mixing concrete shall be clean and fresh, free from oil, acid, injurious vegetative matter, alkalis or other salts. It shall be perfectly equal in all physical and chemical properties to potable water.

Admixtures shall be a resin gum, air-entraining agent, Darex, or other similar and equal product mixed in the proportions recommended by the manufacturer. It shall conform to Specifications for Air-Entraining Admixtures for Concrete, ASTM A-377.

Reinforcing bars and dowels shall be of new billet steel or intermediate grade of the deformed type, conforming to ASTM A-15. Reinforcing steel shall be unpainted and uncoated, free from loose rust or scale, corrugated or deformed for the entire length while being rolled. Deformations shall conform to ASTM A-305. Bars shall be of the forms and sizes as shown on the drawings. Beam stirrups, column hoops and ties shall be of new steel, bent to shape around pins having diameter of not less than four times the least dimension of the bar. Accessories shall be of approved and standard type chairs and spacers for beams and slabs of the proper depth to provide the required embedment for the bars.

Membrane curing compounds for all slabs, when used, shall be of the White Pigmented Type II, equal to or similar to that manufactured by W. R. Meadows 1600 Sealtight or Hunt Process Corporation, shall meet the Specifications of ASTM C-309 Type II, and shall be applied at a minimum rate of one (1) gallon per 200 square feet.

All materials used in the work shall be stored and handled in such a manner as will prevent deterioration or the intrusion of foreign matter. Any material which has deteriorated or has been damaged shall be immediately and completely removed from the work. Manufactured materials, such as admixtures, cement, etc., shall be delivered and stored in the original packages, plainly marked with the brand and the maker's name.

When requested, the contractor shall submit samples of any or all materials used in the construction work for inspection and or further testing at the expense of the contractor. Materials furnished for such inspection and testing shall be in accordance with requirements for testing of such materials.

D. PROPORTIONS FOR CONCRETE

Concrete shall be composed of Portland cement, fine aggregate, and coarse aggregate, admixture, and water. The mix shall be designed to secure concrete

having the following compressive strength at the age of 7 and 28 days as determined by breaking test specimens in accordance with procedures set forth in the ASTM Designation C39-49 except where otherwise specified. For simplification, the following mix ratios may be used in lieu of detailed analysis unless otherwise authorized:

| <u>CLASS</u> | <u>CEMENT: SAND: GRAVEL RATIO</u> |
|--------------|-----------------------------------|
| CLASS "A" | 1:2:3 |
| CLASS "B" | 1:2:4 |
| CLASS "C" | 1:2 1/2:5 |

**TABLE 3
MINIMUM COMPRESSIVE STRENGTH
AT AGE OF 7 AND 28 DAYS BY CLASS**

| CLASS | Compressive Strength for Design Purposes (psi) | Average for any 5 consecutive cylinders (pounds per square inch -- psi) | | Any one cylinder (pounds per square inch -- psi) | |
|-------|--|---|----------|--|----------|
| | | 7 - day | 28 - day | 7 - day | 28 - day |
| | | A | 4,000 | 2,800 | 4,000 |
| B | 3,000 | 2,100 | 3,000 | 2,100 | 3,000 |
| C | 2,500 | 1,750 | 2,500 | 1,750 | 2,500 |

The slump shall be in accordance with ASTM C-143, and the methods shall be as follows:

| TYPE OF STRUCTURE | SLUMP IN INCHES | |
|--|-----------------|---------|
| | MINIMUM | MAXIMUM |
| Massive Sections, Pavement Slabs on Ground | 3 | 6 |
| Heavy Slabs, Walls and Footings | 4 | 6 |

If tests show excessive slumps the proportion of materials and the method

of mixing shall be modified as necessary to reduce slump. Suitable means shall be provided for controlling and accurately measuring the water. Free water from moisture carried by aggregates shall be included as part of the mixing water.

Class "A" and Class "B" concrete shall be acceptable if they are designed in accordance with the American Concrete Institute (ACI) Standard Recommended Practice for the Design of Concrete Mixes (ACI 613.44) with an approved cement dispersing agent, pozzolith, or equal, which reduces the water required for a given consistency and complies with water-cement ratio laws, except that no reduction in cement will be allowed for Class "A" concrete. The cement dispersing agent shall be applied in solution. The strengths and slumps shall be as specified. The concrete mixture shall be so designed that the materials will not segregate and excessive bleeding will not occur.

Classes of concrete shall be noted on all plan documents. Generally, all structural, reinforced concrete shall be Class "A" except that Class "B" concrete may be used for slabs on ground other than in manhole bases, pipe piers and footings. Class "C" concrete may be used for unreinforced, non-structural concrete fill, pipe encasement, and thrust blocks.

The proportions in all mixtures, to meet the essential requirements, must be such that the sand and cement form a rich, strong, mortar consistency sufficient to thoroughly bond in the coarse aggregate making it inert in the mass when set. No concrete having initial set or concrete temperature in excess of 90 degrees F shall be used anywhere on the construction site.

E. FORMS

Forms are required for all concrete work, except that earth banks may be substituted for footing forms, exterior wall forms, tops of pedestals, etc., where soil will form the concrete to true dimensions. Forms shall conform to shapes, lines, grades, and dimensions indicated and shown on the drawings, shall be substantial and made tight to prevent leakage and sufficiently strong to withstand and support without deflection all work and materials as conditions require, and all dead and live loads thereon. Forms shall be smooth and even throughout the surface to be in contact with the concrete with all offsets, bevels, chamfers, miters, etc., carefully fastened together. Forms shall conform to the American Concrete Institute's recommended practice for concrete framework (ACI 347.63).

Forms may be of metal or wood and shall be furnished in sufficient quantity to expedite the work without endangering the safety or strength of any part of the construction. Matched and dressed lumber, or plywood forms, if wood is used

therefore, shall be used for exposed work on both inside and outside surfaces not exposed in completed work. All forms shall be fastened to studs at each bearing. Exposed outside angles of walls, columns, piers, etc., shall be chamfered except where same build in flush with wall or floor surfaces. Furnish and place all necessary wooden fastening blocks or other attachments as may be necessary to be placed in the forms for securing of other branches of the work before concrete is poured. Particular care shall be taken to keep all lines on exposed work straight and true. All walls shall be plumb and true.

Forms shall be lightly sprayed or mopped with an approved form coating before concrete is poured, extreme care being exercised to keep the coating off the reinforcing steel. After such use, the forms shall be thoroughly cleaned and recoated. In the reuse of wood forms, sections showing loose knots, warp or other defects likely to cause irregularities in the exposed concrete surfaces, shall be removed from construction work. Joints in forms for reuse shall be made tight to prevent leakage and shall be filled where necessary to make tight and smooth.

Forms shall be properly tied or braced together to maintain position and shape, and to conform to shape, lines, and dimensions shown on the drawings or required to insure safety of workers. Temporary openings shall be provided in the inside face of all wall forms and column forms to facilitate cleaning and inspection immediately before depositing concrete into the forms.

Form ties used shall be of a type approved by the Engineer. They shall have a minimum working strength when fully assembled of at least 3,000 pounds at 2 foot lifts. Ties shall be so adjustable in length as to permit tightening the forms and of such type as to leave no metal closer than 1-1/2 inches of the surface, and they shall not be fitted with any device to act as a spreader within the form which will leave a hole larger than 3 inch in diameter. Wire ties will not be permitted as a means of fastening forms together.

Concrete shall not be placed in any form until such form has been inspected by the City or County Engineer or Road Superintendent and permission given to start placing, nor shall forms be removed until permission is obtained from the City or County Engineer or Road Superintendent. The period during which forms will be required to remain in place after pouring concrete will vary with the type of construction, span, weather conditions, and other factors. In general, unloaded wall forms may be removed when the concrete has hardened to 60% of design to prevent damage, but in no case less than 16 hours at 40 degrees F. or 48 hours below 32 degrees F.

F. PLACING REINFORCEMENT

Metal reinforcement before placing shall be thoroughly cleaned of mill scale, rust, and coatings that would destroy or reduce the bond. Bars shall be of the required size, fabricated to the required shape and form.

The contractor shall receive reinforcement on the job and lay out bars according to identification in good order to expedite location for placing in permanent position. Reinforcement bars or members shall have identification tags attached corresponding to marks or numbers designated for same on the approved shop drawings.

The workers responsible for placing the reinforcement shall be supplied with adequate copies of the approved shop drawings and bar lists for the project. Care shall be exercised to avoid substitutions of bar sizes and a stock of straight bars of the commonly used sizes shall be maintained on the job site by the contractor for use in the construction where required and as may be directed by the City or County Engineer or Road Superintendent.

Metal reinforcement shall be accurately positioned and secured against displacement by using tie wires of annealed wire not less than No. 16 gauge or suitable clips at all intersections, and shall be supported in a manner that will keep all metal away from the exposed surfaces of the walls or members. Slab reinforcement shall be supported on a sufficient number of metal chairs and bars, to hold the reinforcement rigidly while placing concrete. Bars in footings poured directly on the ground shall be supported on small precast concrete blocks of the required depth.

The minimum clear distance between any reinforcing and the surface of concrete shall be in accordance with ACI - 318.

G. MIXING AND PLACING CONCRETE

All concrete may be mixed on the site in an approved type of power operated mechanical batch mixer of ample capacity to handle complete batches of measured materials. At no time shall mixer be charged above its rated capacity, and no fractional sack mixer shall be used on the work. The mixer shall be equipped with approved water storage and measuring device. Dry concrete materials shall be placed in the mixer drum and rotated a few times before water is added. The mixing shall be continued after water is added for a sufficient length of time to insure uniform distribution of the material throughout the mass, but not less than 5 minutes for a 4" slump, 2 minutes for a 2" slump.

No concrete shall be drawn from the mixer until the full mixing time has elapsed and no aggregates shall be added to a batch during mixing. Retempering of the concrete with the addition of water or remixing of partially hardened concrete will not be permitted. Mixers shall be kept clean and free from accumulated material on the interior of the drum. In general, had mixing will not be allowed, except to complete a pour in the event of breakdown of mechanical mixer.

As soon as the concrete has been mixed it shall be discharged from the mixer, conveyed and placed in the forms in such a manner as will require a minimum of handling. Movement of fresh concrete from point of deposit to final position, where necessary, shall be by shoveling rather than by raking and crowding.

Such methods shall be employed in conveying and handling concrete to insure that no mortar will be lost, and that the concrete as placed is dense and uniform throughout with no segregation of the aggregates and no lack or excess of mortar at any place. Concrete shall not be placed in forms in such condition that it will flow more than 6 feet in any direction and shall be deposited as nearly as practical in its final position to avoid rehandling.

In the placing of concrete with the aid of mechanical vibrators, the vibration shall be transmitted directly to concrete and in no case shall it be transmitted through the forms. Vibration shall be supplemented by forking or spading by hand adjacent to the forms on exposed faces in order to secure smooth, for the dense, even surfaces without "honeycomb."

Should any honeycomb concrete be disclosed upon removal of the forms, the contractor shall cut out said honeycomb portion back to solid concrete and shall fill the opening with concrete to the same proportions as that specified section of work in which the fault occurred. No pointing of honeycomb areas shall be done until the surfaces have been inspected by the City or County Engineer or Road Superintendent.

Where concrete is placed on the ground, the subgrade shall be smooth and firm and fine graded to the exact required depth below the finished concrete surface. Reinforcing bars and subgrade shall be moist, but not wet, and shall be moistened with water ahead of the concrete pouring to prevent loss of entrained water in the concrete mix.

Ready mix concrete shall be mixed and delivered to the site in accordance with specifications for ready mix concrete contained in ASTM C-94.

The time lapse from the addition of water to the dry mix until the final deposit of concrete in the forms shall in no case exceed 45 minutes, or 300 revolutions and in no case with concrete temperature in excess of 95 degrees F.

H. WATER CONTENT

The amount of water to be used in mixing concrete shall at all times be the minimum amount necessary to produce a plastic mixture of the strength specified, of the desired density, uniformity and workability. In general, the consistency of any batch shall be that required for the specific placing conditions and method of placement and ordinarily the slump shall be between 3 inches and 5 inches for structural concrete placed in forms and/or with reinforcement, and from 2 inches to 3 inches for slabs and other concrete poured directly on the ground.

In general, for dry aggregates the average amount of water required to produce concrete having a compressive strength of 4,000 psi at 28 days should not exceed 5 gallons of water per bag of cement or 30 gallons per cubic yard of concrete, or water / cement ratio of 0.6 by weight..

I. CURING

Provisions shall be made for maintaining fresh concrete in a moist condition for a period of at least five (5) days after placement. Longer periods of curing may be required by the City or County Engineer or Road Superintendent when air temperatures are below 50 degrees Fahrenheit. Curing shall commence as soon as concrete has hardened sufficiently. Curing may be accomplished by ponding; wet burlap; sprinkling and covering with a non-staining sealed waterproof paper or plastic; or membrane curing.

J. INSPECTION

No concrete shall be placed until forms, reinforcement, subgrade, etc., have been inspected and approved by the City or County Engineer or Road Superintendent. Notification of required inspection shall be the responsibility of the Contractor. Failure to have inspections may result in removal of sufficient amounts of material to determine whether concrete was placed in conformance with applicable standards and specifications.

K. CONSTRUCTION JOINTS

Construction joints shall be horizontal or vertical and keyways installed as shown on the approved drawings, or as directed by the City or County Engineer or Road Superintendent. Joints not indicated on the approved drawings shall be so

made and located as to least impair the strength and appearance of the structure. Where a horizontal joint is to be made any excess water and laitance shall be removed from the surface after concrete is deposited.

Construction joints between walls and footings shall be keyed in all cases. No horizontal construction joints will be permitted in vertical walls. Bulkheads shall not be removed until the concrete has set hard and before concrete work is resumed all debris shall be removed from the forms adjacent to the bulkheads.

Joints in slabs supported on the earth shall be made in the manner as shown on the approved drawings, and as directed by the City or County Engineer or Road Superintendent. Reinforcement shall be carried through the joints and keyways formed to prevent lateral or vertical displacement of adjacent sections at the joint due to unequal settlement of the supporting earth subgrade.

L. CONCRETE FINISH, SCREEDS, HARDENER

After forms are removed, cut away all projections and point up all depressions while concrete is still fresh, using a rich mortar composed of cement and silica sand. Use cement of the same brand as used in the concrete. Thoroughly wet surfaces before pointing, then rub surfaces with carborundum of medium fineness. Use plenty of water during rubbing and remove cement from surface.

The top surfaces of column footings, wall footings and concrete at other similar locations shall be floated to a smooth and level surface. Grade stakes or nails shall be set to designate the levels to which concrete is to be poured.

For establishing the correct level of finish for all slabs, screeds shall be provided and set. Screeds for supported slabs may be metal strips or steel pipe spaced not over 100 feet on centers and supported on metal adjustable screed chairs which may be left in the concrete.

M. ADMIXTURES

All concrete work required under this standard shall contain a resin gum admixture similar to or equal to Darex. Admixture shall be applied in strict accordance with the directions of the manufacturer.

N. EXPANSION JOINTS

The contractor shall provide and install (tooled) expansion joints through concrete slabs at locations shown on the approved drawings, same to consist of

performed asphalt saturated fiber of thickness shown.

O. TEST SAMPLES

The contractor shall at his expense provide for test cylinders to be cast daily by a qualified representative of a certified commercial laboratory. These samples shall be cast, cured and tested in accordance with current ASTM Specifications. Testing ages shall be 7 and 28 days unless otherwise specified by the City or County Engineer or Road Superintendent. Laboratory cylinders shall be used to determine the structural quality of the concrete materials used. For daily pours up to 50 cubic yards four (4) cylinders per pour shall be provided, both of which shall be laboratory cured. For daily pours of over 50 cubic yards at least four (4) test cylinders per pour shall be cast and laboratory cured. Field cylinders to be used as a gauge for early safe removal of forms shall be cast where contractors request earlier removal than that set out in the specifications. The contractor shall be responsible for the safe transportation of the cylinders to the laboratory.

X. TECHNICAL SPECIFICATIONS -- CONCRETE SIDEWALKS

A. SCOPE

This section covers all labor, tools, equipment, and materials, including minor excavation and fine grading required to provide concrete sidewalks on previously prepared grade at the locations shown on approved drawings and as hereinafter specified.

B. GENERAL REQUIREMENTS

Preparation of Subgrade -- All 6" boulders and larger rock, organic materials, soft clay, spongy material, and any other objectionable material shall be removed and replaced with approved materials. The subgrade shall be properly shaped, rolled and uniformly compacted to conform with the accepted cross-section and grades.

Forms for Concrete -- The forms for the concrete shall be of wood or metal, straight, free from warps or kinks and of sufficient strength. They shall be staked securely enough to resist the pressure of the concrete without spring. When ready for the concrete to be deposited they shall not vary from the approved line and grade and shall be kept so until the concrete has set.

Concrete Sidewalks -- The concrete shall be proportioned, mixed and placed in accordance with the requirements contained in Section VII of this Standard, and

shall contain fibermesh (1 lb. Per cubic yard). Concrete for sidewalks shall have a minimum 28-day strength of 3,000 psi with 4% to 8% air entrainment on surfaces where vehicular traffic does not cross and a utilize a thickened cross-section of concrete on those portions of the sidewalk where vehicular traffic is likely to cross or may increase the strength of the concrete on that particular section to have a minimum 28-day strength of 4,000 psi. The minimum slump shall be three (3) inches and maximum slump shall be five (5) inches, unless otherwise approved. All sidewalks shall meet ADA Regulations.

The concrete sidewalks shall have a minimum thickness of four (4) inches except where vehicular traffic is likely to cross in which case the sidewalk shall be thickened to a minimum six (6) inches unless otherwise approved. Sidewalks shall be a minimum of four feet (4'-0") in width unless otherwise required by the City or County Engineer or Road Superintendent. See Figure 15 contained in Appendix A in this Standard for design details and standards and specifications. The surface of concrete walks shall be cut into flags by marking with an edging tool having a radius of 1/4 inch. Flags shall be no longer than the width of the sidewalk.

Expansion Joints -- One half (1/2) inch transverse expansion joints with pre-molded filler shall be installed as directed by the City or County Engineer or Road Superintendent, but maximum spacing shall not exceed twenty-five (25) feet. Expansion joints shall be installed where walks terminate at curbs, at both the top and bottom of steps around utility structures and at sidewalk intersections. Such expansion joints are not required (except at curb returns) between walks and contiguous parallel curbs.

Turn-downs -- Sidewalks shall be formed to "turn down" their own thickness at terminal points or ending points. The turn down or extra thickness shall extend for the width of the sidewalk. On steep grades or at soft spots in the subgrade post holes eight (8) inches in diameter and eighteen (18) inches in depth shall be poured monolithically with the sidewalk slab when so directed by the City or County Engineer or Road Superintendent.

At the request of the City or County Engineer or Road Superintendent, slight adjustments shall be made by the Contractor in the grades and cross-slopes of walks to connect with existing sidewalks or other work, and/or to improve drainage. Grade stakes not more than 25 feet apart shall be provided for all sidewalk work. Short vertical curves shall be introduced at all summits and valleys where the algebraic difference in grade equals or exceeds two percent (2%).

C. FINISH

Concrete sidewalks shall be tamped and screeded sufficiently to bring the necessary water to the surface for finishing. All sidewalks shall be given a steel trowel finish with light brooming. All edges, including edges at dummy joints and expansion joints, shall be rounded to a 1/4 inch radius.

Where "washed" or exposed aggregate sidewalk or slab is called for on the plans, the washing of the concrete surface shall be accomplished by removing the surface paste with brushes and water from a garden hose. After the depth of aggregate exposure has been approved by the City or County Engineer or Road Superintendent the same pattern or texture shall be carried out throughout the entire slab areas and every effort shall be made to have the same workers finish adjoining slabs in order to assure uniformity of workmanship. If a chemical retardant is planned for use in or near the slab surface the product must be approved by the City or County Engineer or Road Superintendent prior to application, and must be applied strictly in accordance with the manufacturers directions.

D. CURING AND PROTECTION

Curing -- Curing of concrete sidewalks shall conform to the requirements specified under Section VIII of this Standard, unless otherwise authorized.

Protection -- Concrete shall be protected as specified under Section VIII of this Standard. Under no circumstances shall the contractor allow traffic of any type on concrete sidewalks until at least seven (7) days have elapsed after placing the concrete. The contractor shall be responsible for any damage incurred as a result of such traffic upon sidewalks including the repair and or replacement of such damaged sections of the sidewalk.

Backfilling -- Backfill shall be of suitable selected material and shall be placed and tamped until firm and solid against concrete work. Backfilling shall follow immediately after the concrete forms have been removed.

Seasonal Limits -- No concrete shall be poured on a frozen or thawing subgrade or during unfavorable weather conditions, or when the temperature is 40 degrees Fahrenheit and falling without adequate protection.

XI. TECHNICAL SPECIFICATIONS -- CONCRETE CURB AND GUTTER

A. SCOPE

This section covers all labor, tools, equipment, forming and materials required for the installation of concrete curb, concrete gutter, combined concrete curb and gutter and integral curb at the locations shown on approved construction plans and as hereinafter specified.

All concrete items included in this section shall be proportioned, mixed and placed in accordance with Section VIII of this Standard, except as hereinafter modified. Concrete shall have a minimum 28-day strength of 4,000 psi, with a minimum slump of one (1) inch and a maximum slump of four (4) inches, unless otherwise approved or directed by the City or County Engineer or Road Superintendent. See Figures 10 through 14 in Appendix A of this Standard for further design details and standards and specifications.

B. GENERAL REQUIREMENTS

Curbs and gutters shall be constructed to the sizes and dimensions shown on approved plans. Existing curbs and gutters which have been cut and removed for construction purposes shall be replaced at the contractors expense with curbs and gutters of the same section as the portion removed unless otherwise authorized by the City or County Engineer or Road Superintendent.

The limits of the work shall be as shown on the approved plans. The area within such limits shall be carefully graded and tamped with suitable materials to the required line and grade. The final subgrade surface shall be compacted to 95% of Standard Proctor and even density and firmness and shall be made smooth and true to line and grade just prior to concrete placement.

After the subgrade has been properly prepared the forms shall be set carefully with their top edges true to line and grade of the finished work and shall be rigidly held in place by stakes or braces. The ends of the forms shall be flush and securely fastened together. Forms shall be cleaned and oiled before they are set in place. If a facing board is used it shall be so shaped and constructed that its lower edge will conform to the radius called for on the approved plans. Forms shall be tight to prevent leakage of wet concrete.

Curbs and gutters shall be constructed in sections of uniform length. The length of section may be reduced where necessary to make closures but in no case shall a section be less than six (6) feet long. Curved curbs at intersections shall extend entirely around the curve and one (1) foot beyond at each end. Sections shall

be separated by steel templates set normal to the face and top of the curb. Templates shall be 1/8 inch thick and to full width of the gutter and at least 2 inches deeper than the curb or gutter. Special turn-out sections shall be constructed as shown on the approved plans at all intersecting driveways.

Preformed bituminous joints shall be set in new construction at intervals of approximately 50 feet along the curb or gutter and at intersections with sidewalks, storm drainage inlets, other curbs, and buildings. Preformed joints shall be set normal to the finished surface.

C. FINISH AND CURING

After the subgrade has been prepared and the forms set they shall be inspected and approved by the City or County Engineer or Road Superintendent just prior to concrete placement. The concrete shall be thoroughly tamped or vibrated so as to produce a dense homogeneous mass and to bring the mortar to the surface, after which it shall be struck off with a template cut to the design of the curb or gutter. Before initial setting begins the surfaces shall be finished with a wooded float so as to compact the mass and produce a true, even surface. Plastering with mortar to build up or finish uneven surfaces or excessive troweling with a steel trowel shall not be permitted. The surface shall be checked with a ten (10) foot straight-edge and all irregularities corrected with not more than 1/4 inch tolerance. The upper edges of curb and gutter shall be rounded with an approved edging tool with a 1/2 inch radius. The joint templates shall remain in place until the concrete has set sufficiently to permit removal without damage to the concrete and shall then be removed while the forms are still in place.

After the concrete has set sufficiently, and in no case less than 24 hours after placement, the forms shall be removed and all minor defects or irregularities in the surface corrected. When the finishing operations have been completed to the satisfaction of the City or County Engineer or Road Superintendent the exposed surfaces shall be covered with wetted burlap or other approved material and kept continuously moist for a period of not less than five (5) days after concrete placement so as to permit the concrete to cure properly and prevent it from drying too rapidly. The concrete shall be protected from damage during the curing process and thereafter until finally accepted by the City or County. Any section of curb or gutter that is damaged during construction and before final acceptance by the City or County shall be replaced in a satisfactory manner by the developer or contractor at his expense.

After the curing process has been completed the spaces along the sides of the curb and gutter shall be backfilled with suitable material and then tamped and compacted to the required elevation. Backfill material shall be compacted with

approved tamps and shall be made smooth and even with the pavement or other material adjacent to the new work. All excess materials and debris shall then be removed from the construction site and the area left in a neat condition.

XII. TECHNICAL SPECIFICATIONS -- STABILIZATION OF DITCHES

A. SCOPE

This section covers all labor, tools, equipment, forming materials, seeding, sodding, and other materials to provide the stabilization of ditches. All concrete work included in this section shall be in accordance with Section VIII of this Standard. All seeding and sodding work in this section shall be in accordance with Sections XII and XIII, respectively.

B. GENERAL REQUIREMENTS

All open ditches shall be stabilized in accordance with the requirements outlined in the City of Tullahoma Storm Drainage Design Standards and Specifications.

Concrete linings, when required, shall be constructed of Class "A" concrete. All ditch cross-sections shall be constructed in a workman like manner as shown on the approved construction plans. Ditches that require lining with concrete shall be lined to a height above the bottom of the ditch not less than one-half ($\frac{1}{2}$) the diameter of the nearest culvert upstream. However, in no case shall the lining extend less than one foot above the bottom of the ditch. Slopes of ditches shall not exceed 3:1 to insure proper maintenance and stability of ditch.

Any ditch section that must traverse or cross through a street section shall have installed appropriate sized and dimensioned concrete headwall structures that include wing walls and toe slabs to collect and disperse stormwater uniformly. All concrete utilized shall be adequately reinforced using steel reinforcement as noted on the illustration and shall have a 28-day strength of 4,000 psi. All exposed edges shall have a $\frac{3}{4}$ inch chamfer.

XIII. TECHNICAL SPECIFICATIONS -- SEEDING

A. SCOPE

Seeding shall include the preparation of the ground, application of fertilizer and sowing of seeds including furnishing of labor, machines, tools, fertilizers, seed and other materials incidental to providing for an acceptable growth of grass in the area or areas shown on the approved plans or as directed

by the City of County Engineer or Road Superintendent.

B. DEFINITION OF ACCEPTABLE GROWTH

The growth of grass shall be termed acceptable by the City or County Engineer or Road Superintendent when (a) a uniform dense growth is secured over the entire area designated to be seeded, and (b) the grass has the appearance of healthy growth. An erosion control matting shall be used in areas subject to erosion such as drainage ways and slopes.

C. PREPARATION OF GROUND

The ground to be seeded shall be loosened to a depth of four (4) inches by raking, disking, or harrowing, or any suitable means until the soil is friable, well pulverized and acceptable to the City or County Engineer or Road Superintendent. Where top soil has been redistributed over the area, all clods, roots, stones, etc., exceeding one (1) inches in any dimension shall be removed. This operation shall be performed only at such time when the moisture content of the soil to be worked is within the acceptable limits for satisfactory results.

D. APPLICATION OF FERTILIZER

After the ground has been prepared in accordance with the above section, commercial fertilizer shall be distributed uniformly over the area at a minimum rate of 500 pounds per acre. The fertilizer shall be incorporated into the soil to a depth of three (3) inches by raking, disking, or any acceptable method. Care will be exercised to avoid over fertilizing an area to the extent of damaging or retarding growth. The fertilizer used shall be an approved manufacturer and shall be "Vertigreen" or "Vigaro" or equal. It shall contain not less than five percent (5%) nitrogen, ten percent (10%) phosphorous and four percent (4%) potash. All fertilizers shall comply with all laws governing the sale and manufacture of fertilizer.

E. PLANTING

The area shall be seeded by means of a drill or a mechanical distributor, or any other approved sowing equipment / or method. The mixture of seed used shall meet the latest requirements of the Tennessee Department of Transportation. The mixture of seed selected shall be suitable for the area to be sown and such as to give the required acceptable growth.

Where practical, one-half (1/2) of the seed shall be sown with the sower moving in one direction and the other half with the sower moving at right angles to

give the required acceptable growth.

Where practical, one-half (1/2) of the seed shall be sown with the sower moving in one direction and the other half with the sower moving at right angles to the first sowing. The seed shall be covered to a depth of not over 1/2 inch by means of a flexible tooth weeder, harrow, or any approved device. At terraces, berms, ditches, or other locations highly susceptible to erosion, the City or County Engineer or Road Superintendent may direct that the rate of application be increased. No sowing shall be done in windy weather or when the ground is wet or otherwise non-tillable.

F. PLANTING SEASON

Unless otherwise permitted in writing by the City or County Engineer or Road Superintendent, the seeding operations shall be limited to the following periods:

SPRING: March 1st to June 1st
FALL September 1st to November 1st

G. RESEEDING AND MAINTENANCE OF AREA(S)

The developer and/or contractor shall be required to secure an acceptable growth of grass on all areas designated to be seeded. Locations where acceptable growth is not obtained on the first planting shall be reseeded until such growth is secured. If the City or County Engineer or Road Superintendent so directs the ground shall be reworked and refertilized before reseeding. This practice shall be avoided unless the previous planting was less than fifty percent (50%) successful.

The developer and/or contractor shall maintain the area(s) until an acceptable growth is established, and if any erosion occurs during the construction period, the developer and/or contractor shall be required to restore the area(s) where such erosion may have occurred. No mowing or other maintenance of the grass will be required unless otherwise directed by the City or County Engineer or Road Superintendent.

XIV. TECHNICAL SPECIFICATIONS -- SODDING

A. SCOPE

This section includes all labor, equipment, sod and other materials, final preparation of soil surface required to plant the areas shown on the approved plans with solid sod as herein specified. Unless otherwise authorized or directed, all

areas between sidewalks and curb adjacent to streets shall be sodded.

B. DEFINITION

Area sodding shall consist of planting an entire area with sod. Strip sodding shall consist of planting narrow strips in continuous lines. Spot sodding shall be planted as indicated on the approved plans. Sod, strip sod, or spot sod shall be planted on areas indicated on the approved plans and in accordance with these specifications, and/or as directed by the City or County Engineer or Road Superintendent.

C. MATERIALS

Sod shall consist of live, dense, well rooted growth of permanent grasses, free from Johnson grass, Nut grass, and other obnoxious grasses, of suitable character for the purpose intended and for the soil in which it is to be planted. It shall be uninjured at the time of planting. Sod containing Bermuda grass will be accepted only when indicated on the approved plans or when approved by the City or County Engineer or Road Superintendent. If Bermuda grass is approved, it shall be native to the area being planted. Sod must be free of weeds, bind weeds, or other matter which has a tendency to kill the grass.

Sod for area sodding shall be at least eight (8) inches wide and twelve (12) inches long and shall have at least a three (3) inch thickness of dirt on its roots.

Sod for strip sodding shall be at least three (3) inches wide and twelve (12) inches long and have at least a three (3) inch thickness of dirt on its roots.

Sod for spot sodding shall be at least three (3) inches square and have at least a three (3) inch thickness of dirt on its roots.

Fertilizers used in area, strip or spot sodding shall comply with Section XIII, D., of this Standard.

D. PLANTING SEASON AND SOIL CONDITIONS

Unless otherwise permitted in writing by the City or County Engineer or Road Superintendent the sodding operations shall be limited to March 1st through November 1st. All sod shall be planted only when the soil is moist and otherwise favorable to growth.

E. AREA SODDING

The area to be sodded shall be constructed to the lines and grades indicated on the approved plans. The surface shall be loosened to a depth of not less than three (3) inches with a rake or other device. If necessary it shall be sprinkled until saturated at least one (1) inch in depth and kept moist until the sod is placed. Immediately before placing sod, the fertilizer shall be uniformly applied at the rate of 500 pounds per acre. The entire area shall be thoroughly covered with sod.

Sod shall be placed on the prepared surface with the edges in close contact and, so far as possible, in a position to break joints. Each sod laid shall be fitted in the space and shall be pounded into place with wooden tamps or other approved implements.

The sod shall be maintained moist from the time of removal until reset, but shall be placed as soon as practical after removal from the place where it had been grown. Immediately after placing, it shall be rolled and hand tamped to the satisfaction of the City or County Engineer or Road Superintendent. On steep slopes, or where necessary, pinning or pegging will be required to hold the sod in place.

F. STRIP SODDING

Strip sod shall be laid in a continuous line not more than twelve (12) inches apart. Before placing strips, the furrows shall be thoroughly watered and fertilizer applied uniformly in the furrows at the rate of 500 pounds per acre. The sodding strips shall be reset as soon as practical after removal from the location where they were grown and shall be maintained moist until they are reset.

After setting, the strips shall be lightly covered with earth and thoroughly rolled and hand tamped. After tamping and rolling the sod shall be carefully raked, to the satisfaction of the City or County Engineer or Road Superintendent, in order to break up the crust or earth formed by rolling or tamping.

G. SPOT SODDING

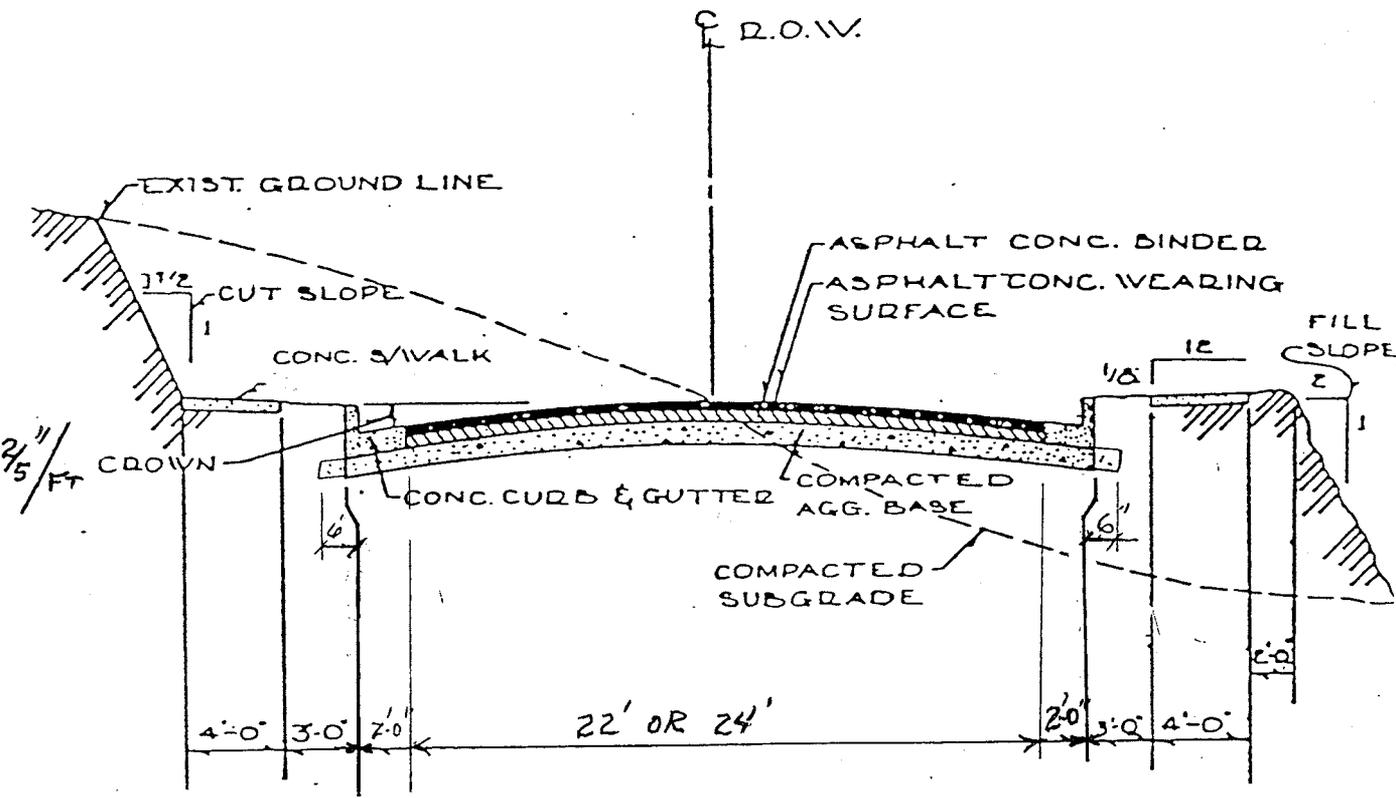
The area to be spot sodded shall be constructed to the lines and grades indicated on the approved plans. Holes shall be dug not less than four (4) inches square and four (4) inches deep and not more than twelve (12) inches apart. The entire area shall be thoroughly wetted until all holes hold water to one-third (1/3) of their depth. Fertilizer shall be applied after wetting at the rate of 500 pounds per acre. One half of the fertilizer shall be evenly distributed and placed in the holes due for spot sodding. After sod has been placed in holes, any openings remaining shall be filled and the entire area thoroughly rolled and hand tamped.

H. WATERING AND MAINTENANCE

The sod shall be watered for a period of two weeks after setting. The developer and/or contractor shall not allow any equipment or material on any area planted with sod and shall erect barricades and guards if necessary, to prevent any damage from unauthorized traffic on or over any planted area. It shall be the obligation of the developer and/or contractor to secure acceptable growth of grass before final acceptance of the project by the City or County.

**APPENDIX A.
SUMMARY OF FIGURES**

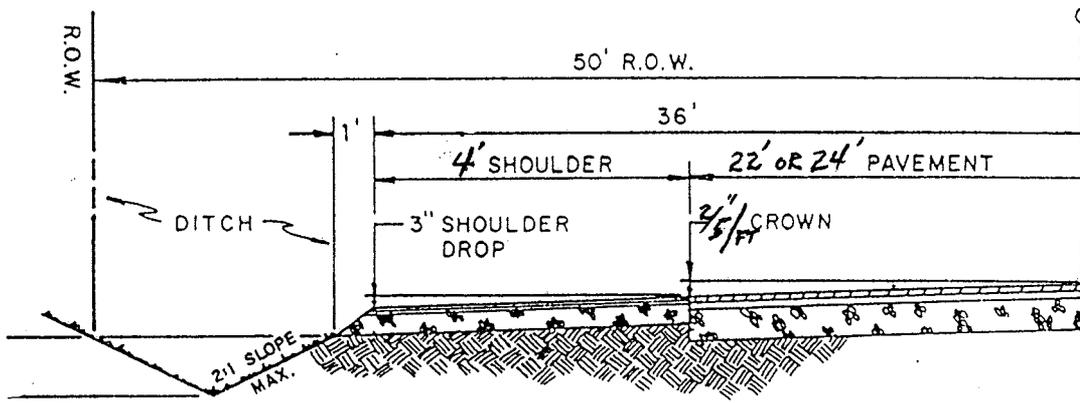
| | |
|-----------|---|
| Figure 1 | Typical Section --Residential Street (50' R.O.W.) |
| Figure 2 | Typical Section -- Residential Conventional Roadway (50' R.O.W.) |
| Figure 3 | Typical Section -- Collector Street (60' R.O.W.) |
| Figure 4 | Typical Section -- Arterial Street (80' R.O.W.) |
| Figure 5 | Standard Residential Cul-De Sac Detail |
| Figure 6 | Standard Cul-de-sac Detail (Residential) |
| Figure 7 | Concrete Swale Approach Apron |
| Figure 8 | Driveway Connection to Non-Curbed Streets |
| Figure 9 | Non-Residential Driveway Ramp (Concrete) |
| Figure 10 | Extruded Curb Detail (Residential) |
| Figure 11 | Rollover Curb, Gutter, & Sidewalk Detail (Residential) |
| Figure 12 | 24" Concrete Curb and Gutter Detail (Collector) |
| Figure 13 | Post Curb Detail (Collector) |
| Figure 14 | 30" Concrete Curb and Gutter Detail (Arterial / Industrial) |
| Figure 15 | Standard Concrete Sidewalk |
| Figure 16 | Standard Handicap Ramp (Side Mountable) |
| Figure 17 | Standard Concrete Sidewalk at Return With Grass Strip and Handicap Ramps |
| Figure 18 | Standard Concrete Sidewalk at Return With No Grass Strip and Handicap Ramps |
| Figure 19 | Handicap Ramp Locations |
| Figure 20 | Trench Pavement Repair Details |
| Figure 21 | Residential Driveway Ramp Detail |



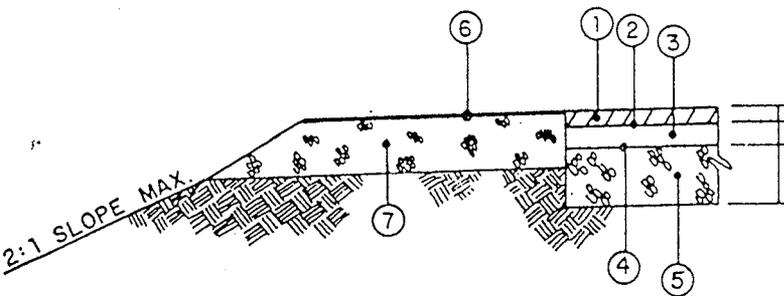
NOTE:

1. THE THICKNESS OF ASPHALT CONC. WEARING SURFACE, BINDER, AND CRUSHED AGGREGATE BASE, SHALL BE IN ACCORDANCE WITH SECTION III, OF THESE STANDARDS.
2. THIS SECTION IS INTENDED TO SET FORTH A MIN. SPEC. FOR STREET CONSTRUCTION. PARKWAY TYPE STREETS, IMPROVED SLOPES AND ANY OTHER DETAILS EXCEEDING THE MIN. WILL BE CONSIDERED FAVORABLE BY THE PUBLIC WORKS DEPT.

| | |
|--|----------|
| TYPICAL SECTION -- LOCAL STREET | |
| (50' R.O.W.) | |
| Scale: None | FIGURE 1 |
| Date: 9/10/97 | |



HALF - SECTION



PAVEMENT & SHOULDER COURSES
NOT TO SCALE

PAVEMENT

- ① ASPHALTIC CONCRETE SURFACE (411E)
- ② TACK COAT
- ③ ASPHALTIC CONCRETE BASE (B-MODIFIED)
- ④ PRIME COAT
- ⑤ STONE (GRADING D PUG MILL MIX)

SHOULDER

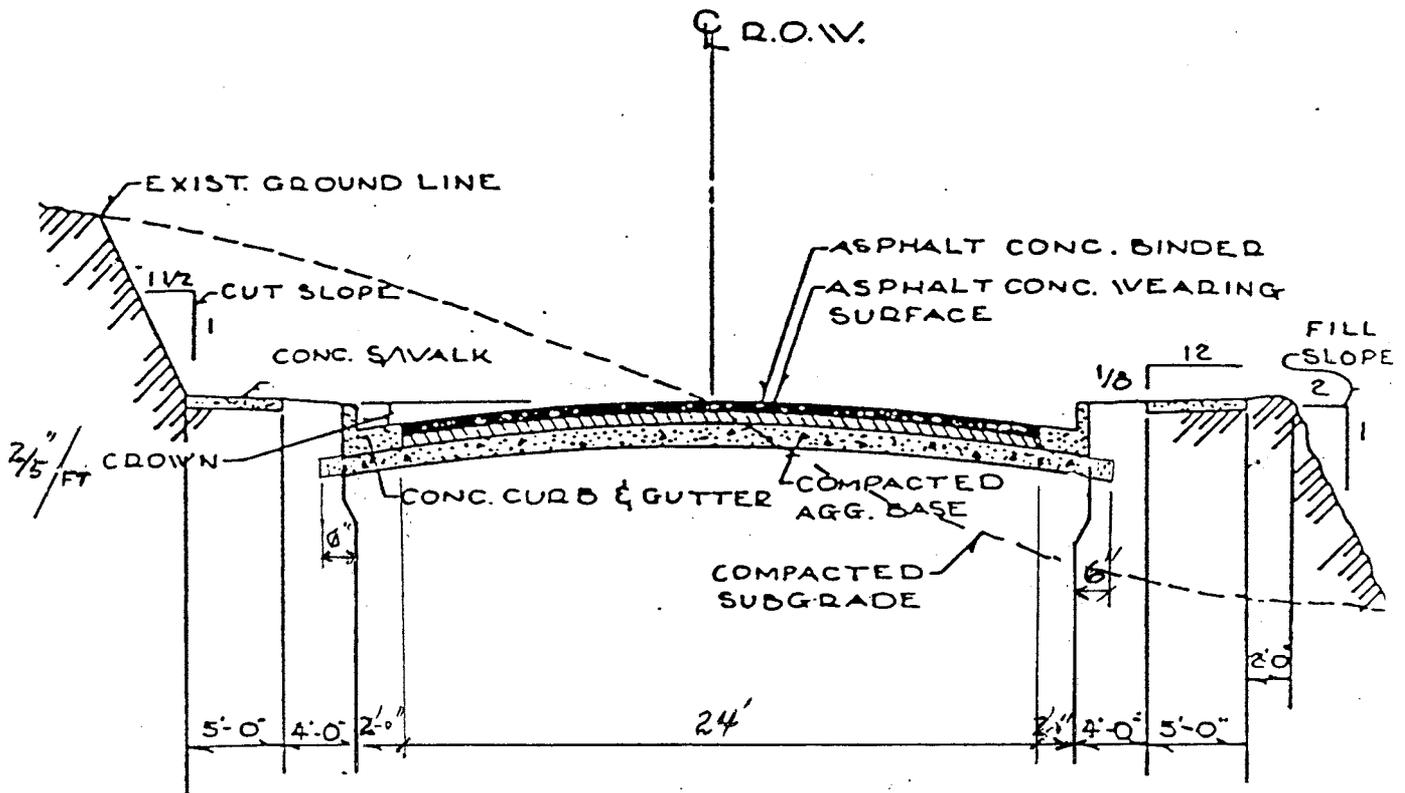
- ⑥ DOUBLE BITUMINUS SURFACE TREATMENT
- ⑦ 7" CRUSHED STONE BASE

TYPICAL SECTION -- LOCAL CONVENTIONAL ROADWAY

Scale: 1" = 5'

Date: 9/10/97

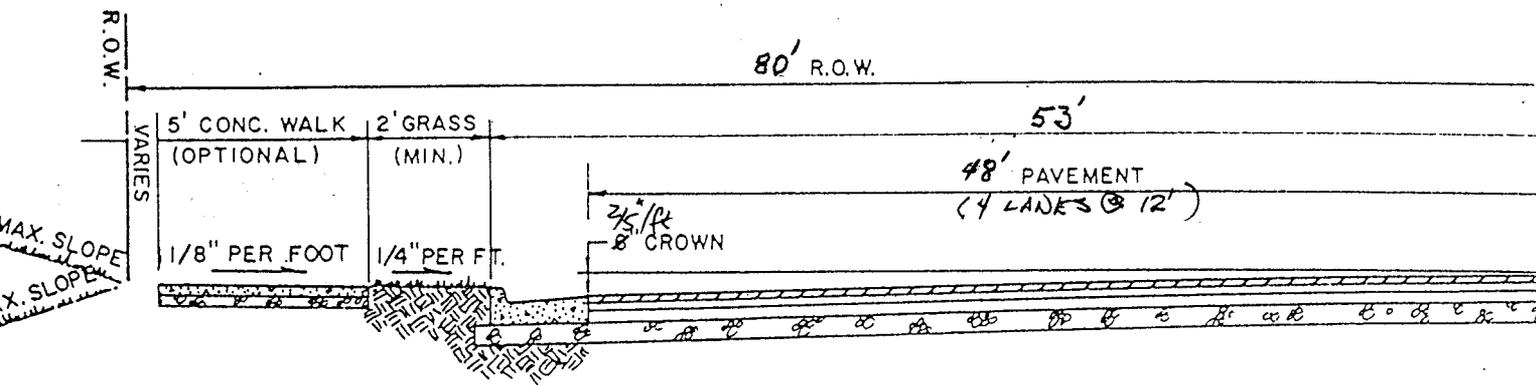
FIGURE 2



NOTE:

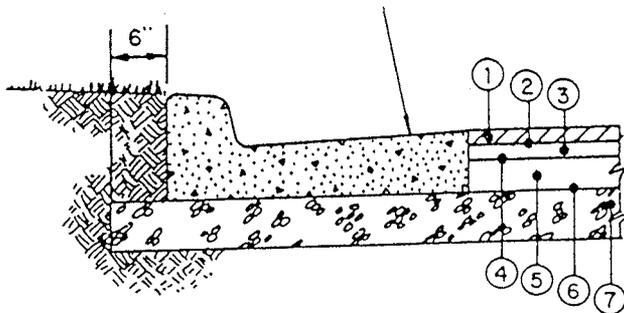
1. THE THICKNESS OF ASPHALT CONC. WEARING SURFACE, BINDER, AND CRUSHED AGGREGATE BASE, SHALL BE IN ACCORDANCE WITH SECTION III OF THESE STANDARDS.
2. THIS SECTION IS INTENDED TO SET FORTH A MIN. SPEC. FOR STREET CONSTRUCTION. PARKWAY TYPE STREETS, IMPROVED SLOPES AND ANY OTHER DETAILS EXCEEDING THE MIN. WILL BE CONSIDERED FAVORABLE BY THE PUBLIC WORKS DEPT.

| | |
|---|----------|
| TYPICAL SECTION – COLLECTOR STREET | |
| (60' R.O.W) | |
| Scale: None | |
| Date: 9/10/97 | FIGURE 3 |



HALF - SECTION

STANDARD CURB WITH GUTTER



PAVEMENT COURSES

NOT TO SCALE

- ① ASPHALTIC CONCRETE SURFACE (411E)
- ② TACK COAT
- ③ ASPHALTIC CONCRETE BASE (B-MODIFIED)
- ④ TACK COAT
- ⑤ ASPHALTIC CONCRETE BASE (307A)
- ⑥ PRIME COAT
- ⑦ STONE BASE (GRADING D PUG MILL MIX)

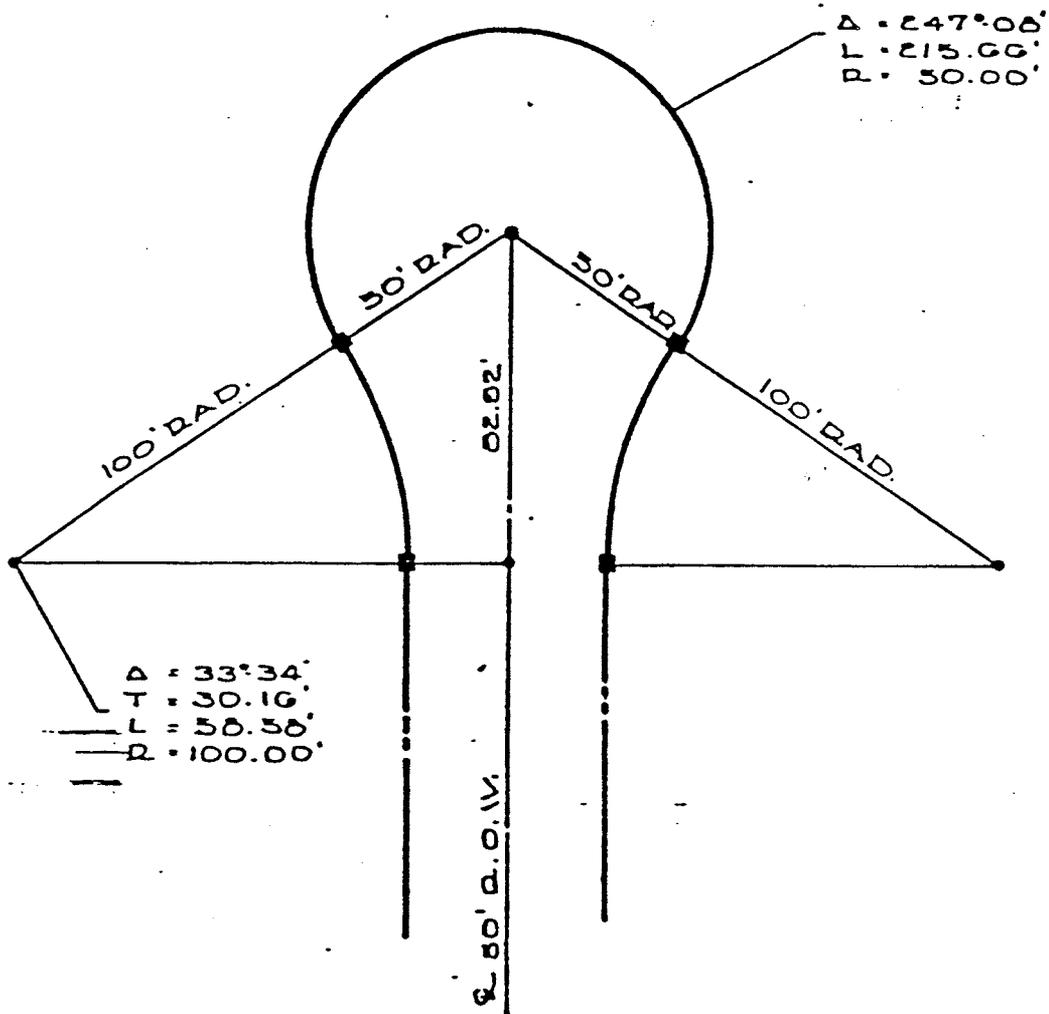
TYPICAL SECTION -- ARTERIAL STREET

(80' R.O.W)

Scale: 1" = 5'

Date: 9/10/97

FIGURE 4

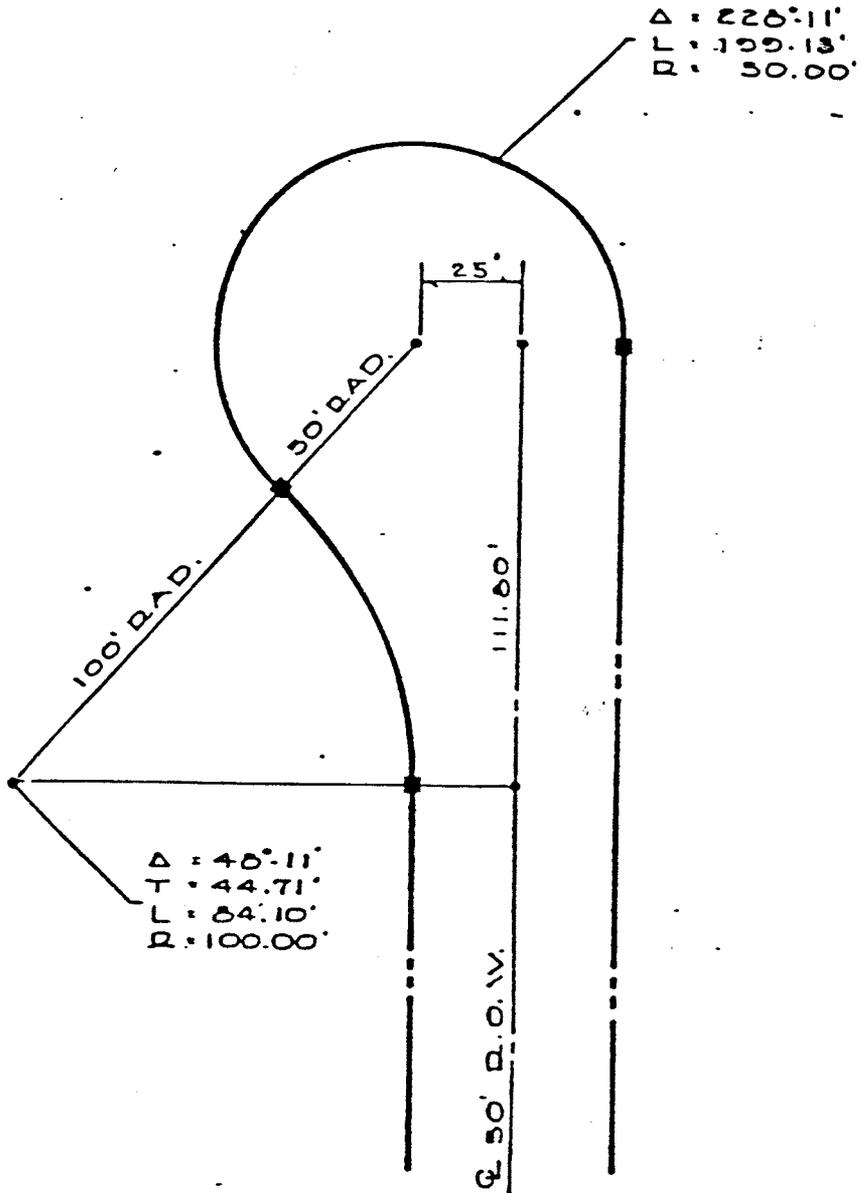


STANDARD RESIDENTIAL CUL-DE SAC DETAIL

Scale: 1" = 50'

Date: 9/10/97

FIGURE 5



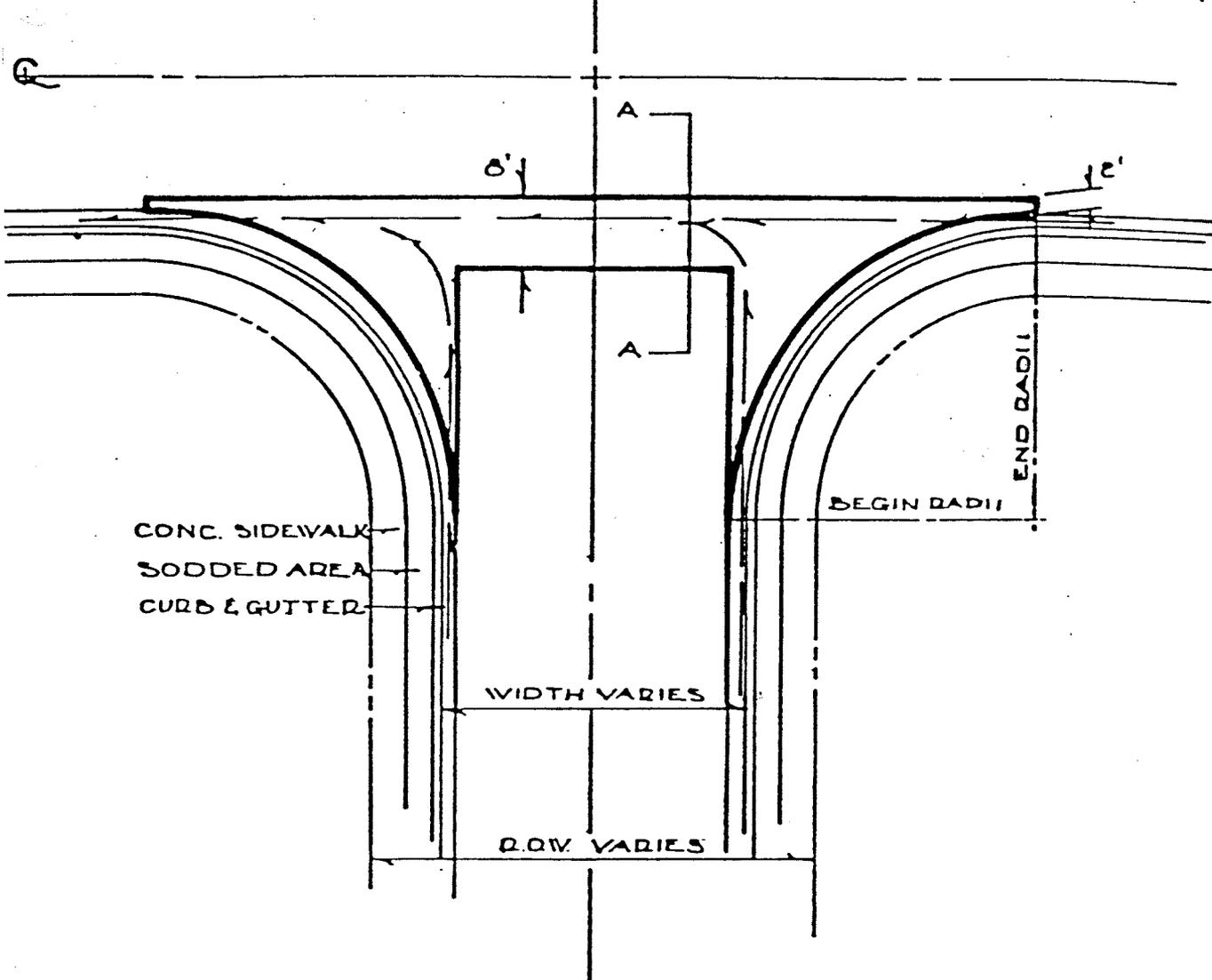
STANDARD OFFSET CUL-DE SAC DETAIL

(RESIDENTIAL)

Scale: 1" = 50'

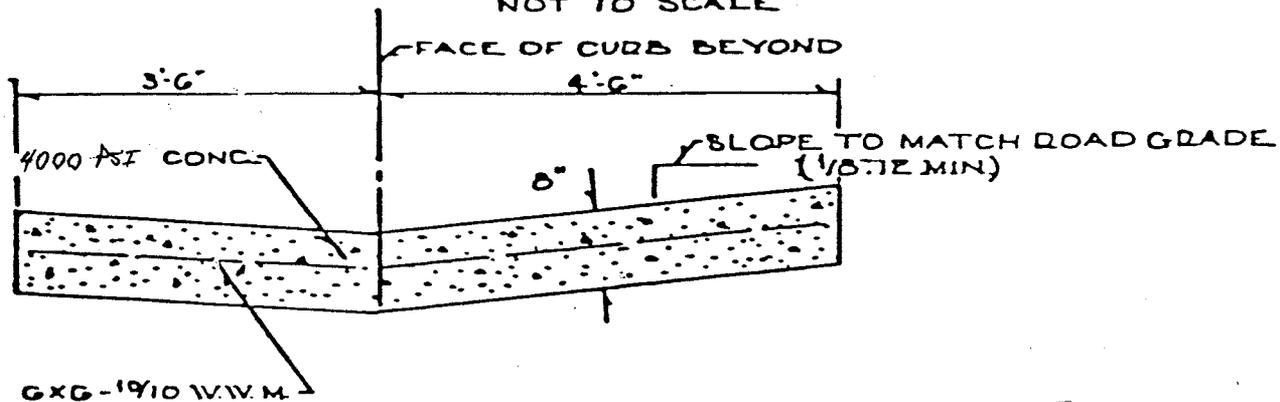
Date: 9/10/97

FIGURE 6



PLAN

NOT TO SCALE

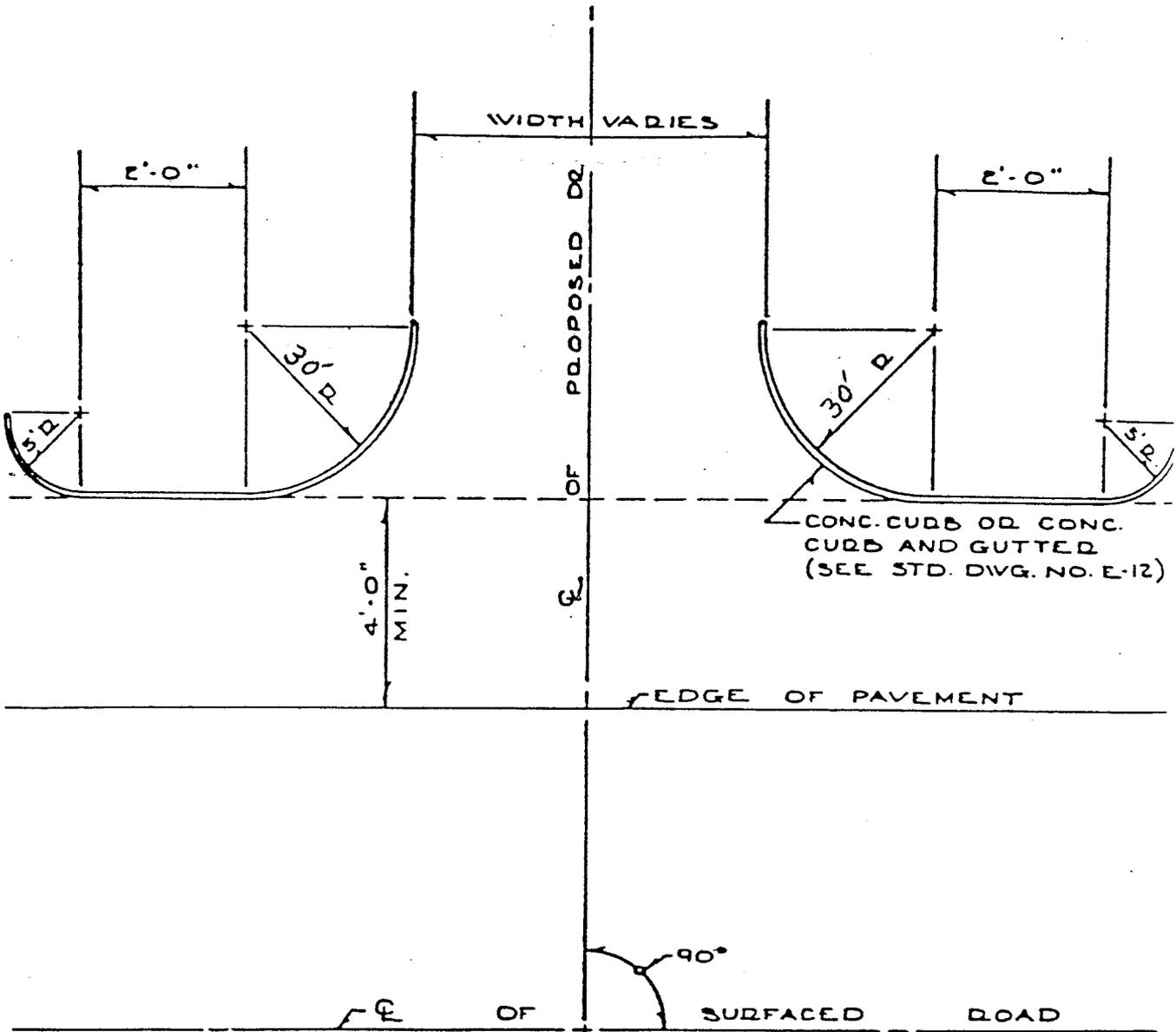


CONCRETE SWALE APPROACH APRON

Scale: None

Date: 9/10/97

FIGURE 7

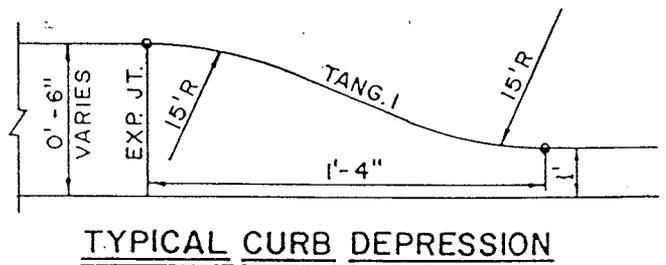
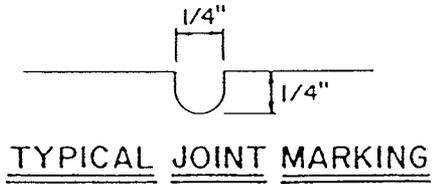
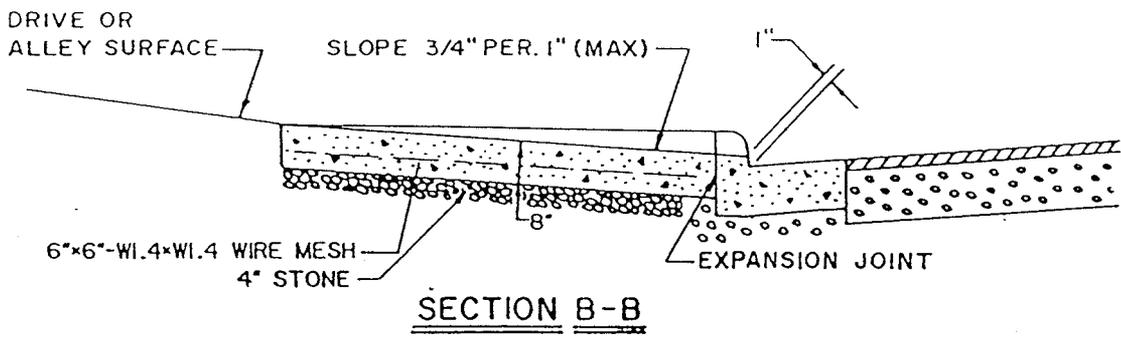
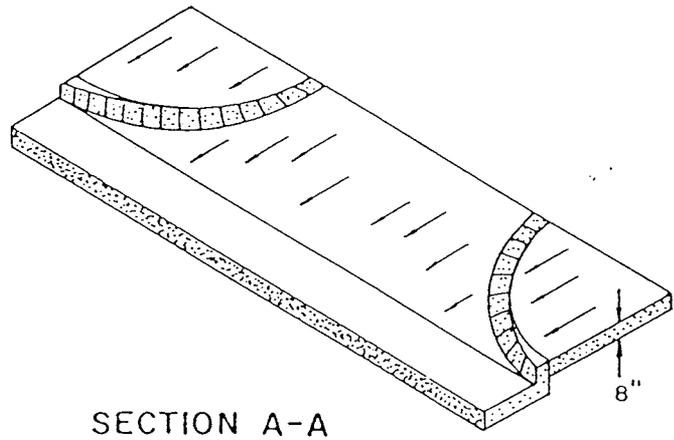
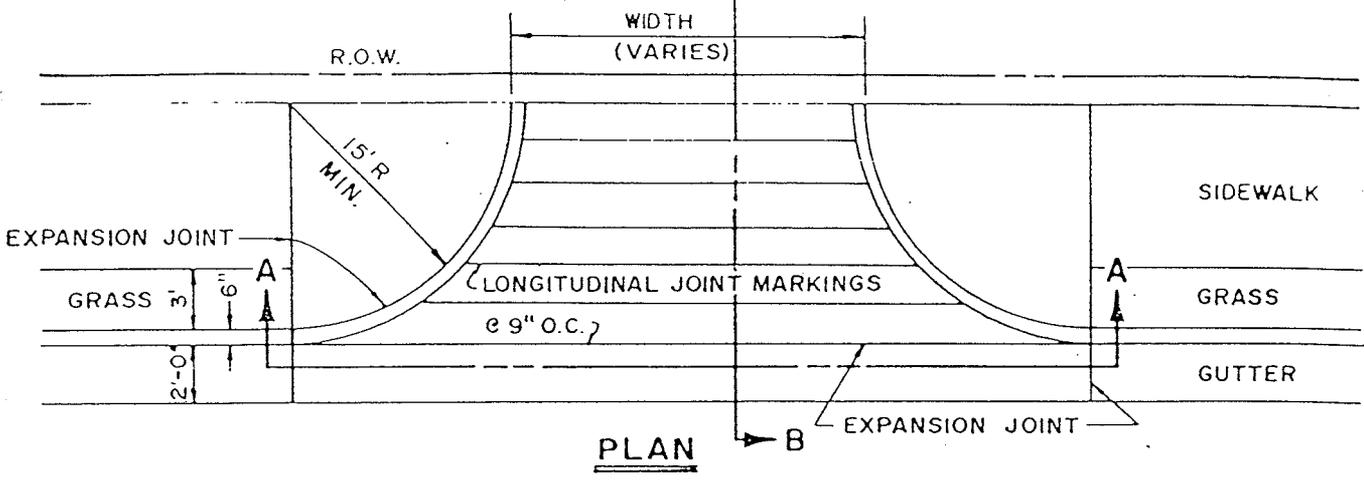


DRIVEWAY CONNECTION TO NON-CURBED STREETS

Scale: None

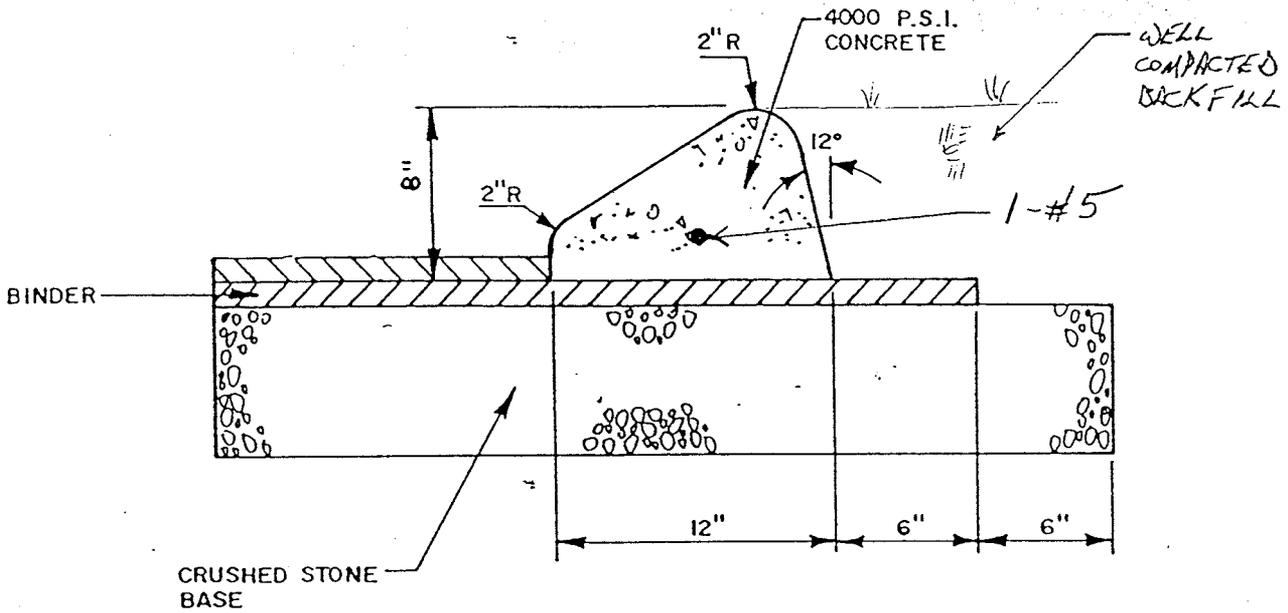
Date: 9/10/97

FIGURE 8



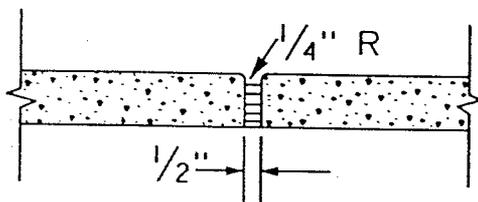
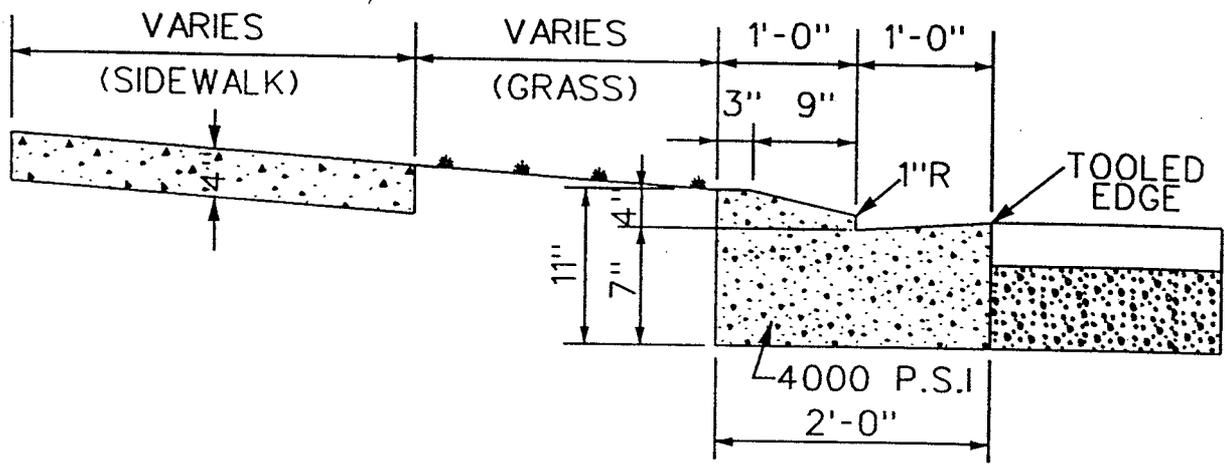
NOT TO SCALE

| | |
|--------------------------------------|-----------------|
| NON-RESIDENTIAL DRIVEWAY RAMP | |
| (CONCRETE) | |
| Scale: None | FIGURE 9 |
| Date: 9/10/97 | |

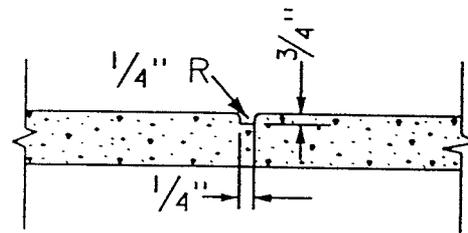


1. CONSTRUCTION JOINTS CONSISTING OF ½" PREFORMED EXPANSION JOINT MATERIAL SHALL BE PLACED AT A MAXIMUM OF 50 FEET INTERVALS.
2. PREFORMED ½" EXPANSION JOINT MATERIAL SHALL BE PLACED BETWEEN CURB AND DRAINAGE INLETS OR OTHER STRUCTURES, TANGENT POINTS, AND DRIVE RAMPS.
3. 1/4" CONTRACTION JOINTS SHALL BE SPACED 10 FEET ON CENTER BETWEEN EXPANSION JOINTS.

| EXTRUDED CURB DETAIL (RESIDENTIAL) | |
|---|-----------|
| Scale: None | FIGURE 10 |
| Date: 9/10/97 | |



TYPICAL EXPANSION JOINT



TYPICAL CONTRACTION JOINT

PREFORMED 1/2" EXPANSION JOINTS SHALL BE EQUALLY SPACED AT 50' ON CENTER (MAX.) WITH 1/4" CONTRACTION JOINTS EQUALLY SPACED AT 10' ON CENTER BETWEEN EXPANSION JOINTS. JOINTS IN SIDEWALK TO BE IN LINE WITH JOINTS IN CURB AND GUTTER.

PREFORMED 1/2" EXPANSION JOINT MATERIAL SHALL BE PLACED BETWEEN CURB AND GUTTER AND DRAINAGE INLETS, TANGENT POINTS, AND DRIVE RAMPS.

CONCRETE SHALL CONTAIN FIBERMESH REINFORCING AT 1 POUND PER CUBIC YARD.

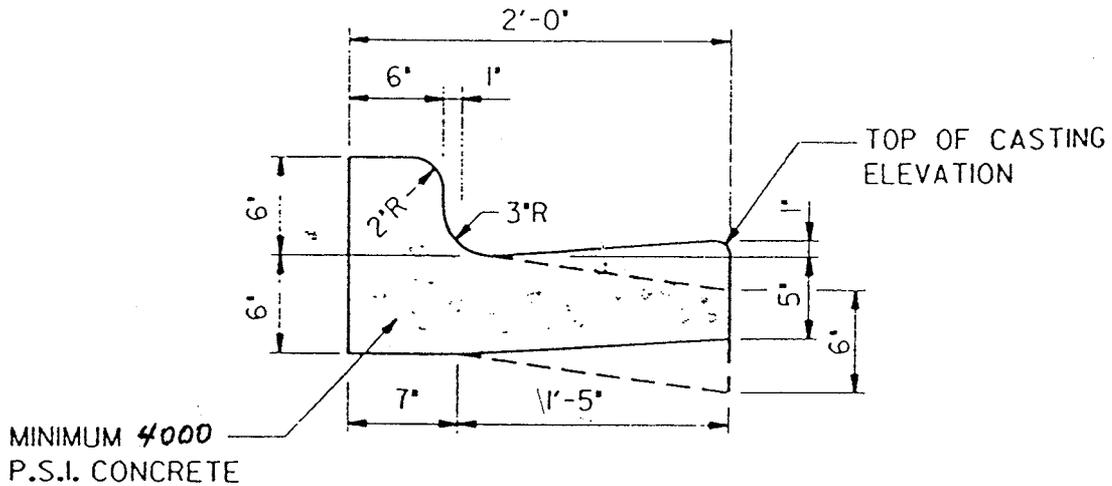
ROLLOVER CURB, GUTTER, & SIDEWALK DETAIL

(RESIDENTIAL)

Scale: None

Date: 9/10/97

FIGURE 11



NOTE: WHEN PAVEMENT SLOPES AWAY FROM CURB AND GUTTER, USE TILT OUT CURB AND GUTTER

1. CONSTRUCTION JOINTS CONSISTING OF ½" PREFORMED EXPANSION JOINT MATERIAL SHALL BE PLACED AT A MAXIMUM OF 50 FEET INTERVALS.
2. PREFORMED ½" EXPANSION JOINT MATERIAL SHALL BE PLACED BETWEEN CURB AND DRAINAGE INLETS, TANGENT POINTS, AND DRIVE RAMPS.
3. 1/4" CONSTRUCTION JOINTS SHALL BE SPACED 10 FEET ON CENTER BETWEEN EXPANSION JOINTS.
4. CONCRETE SHALL CONTAIN FIBERMESH REINFORCING AT 1 POUND PER CUBIC YARD.

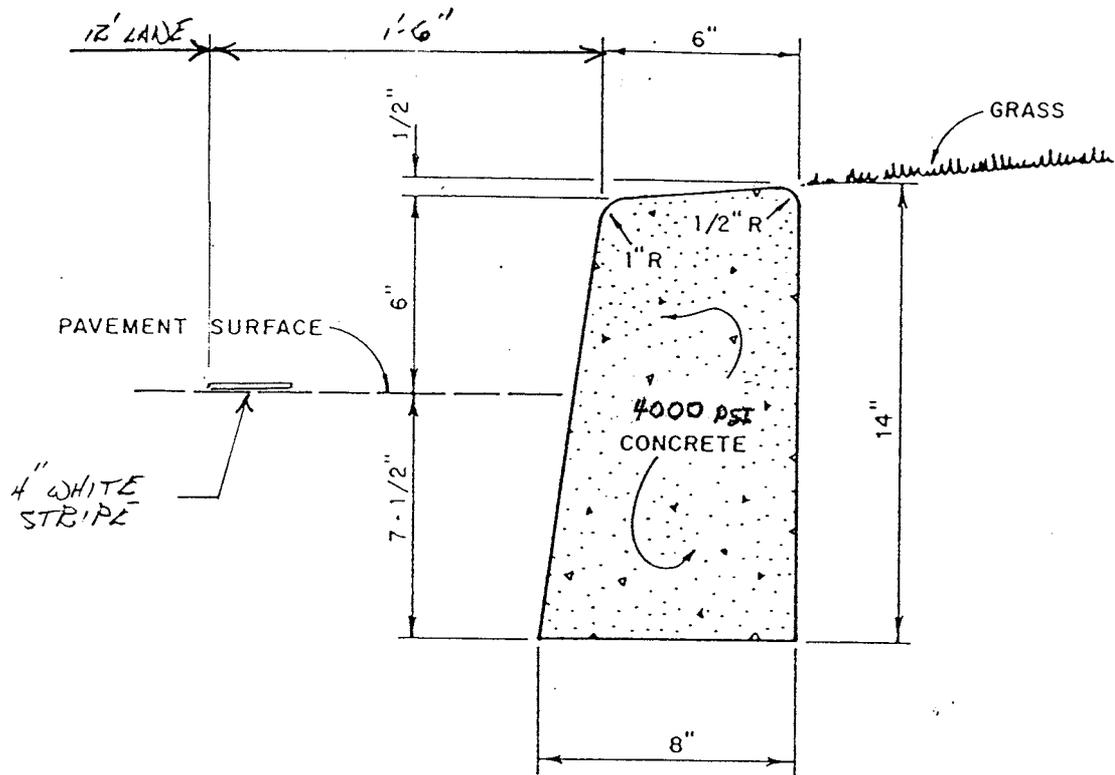
24" CONCRETE CURB & GUTTER DETAIL

(COLLECTOR)

Scale: None

Date: 9/10/97

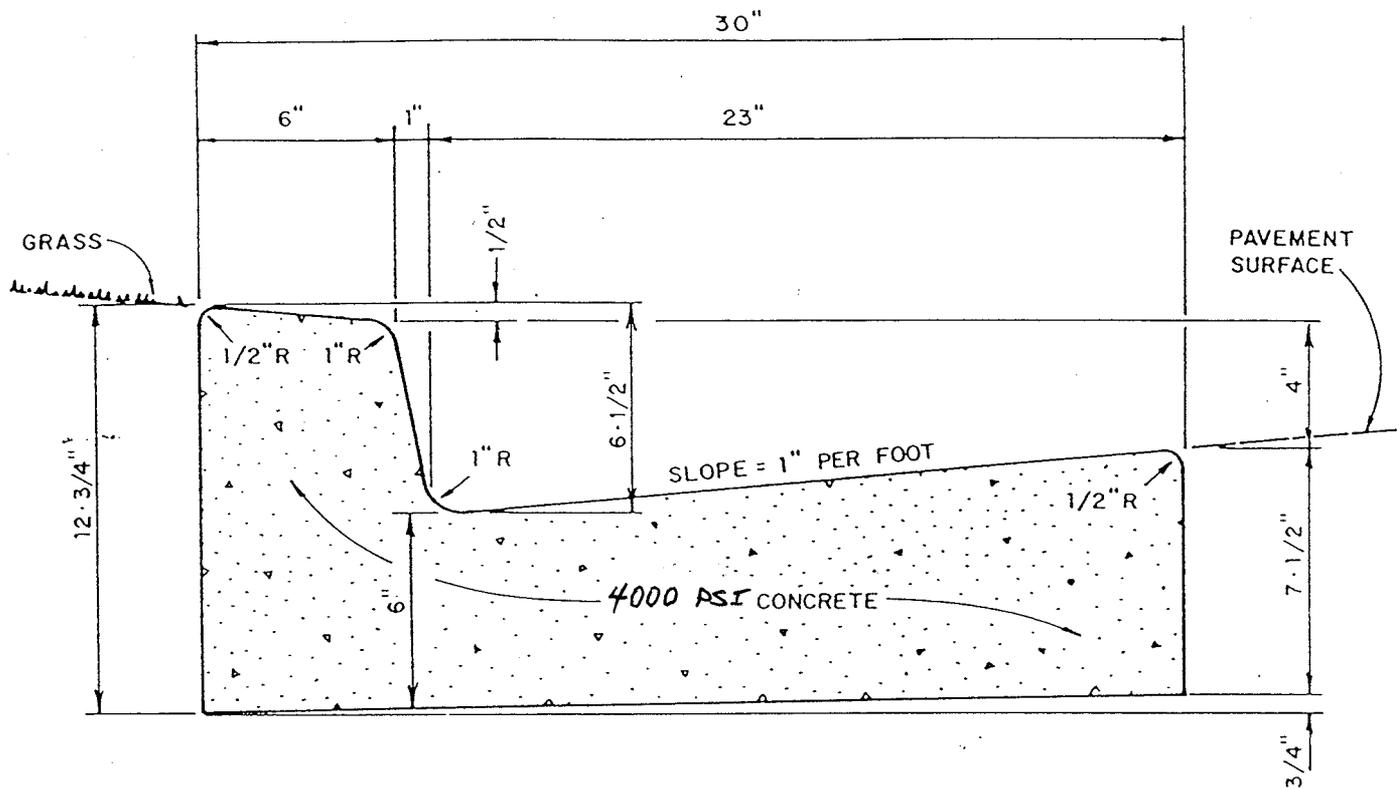
FIGURE 12



TYPICAL CROSS - SECTION

1. EXPANSION JOINTS TO BE SPACED A MAXIMUM OF 50' APART OR AS DIRECTED BY THE ENGINEER.
2. EXPANSION JOINTS WILL ALSO BE REQUIRED AT TANGENT POINTS, DRIVE RAMPS AND INLETS.
3. CONSTRUCTION JOINTS ARE TO BE CUT INTO CURB AND GUTTER EVERY 10' TO A DEPTH OF D/4.
4. CONCRETE SHALL CONTAIN FIBERMESH REINFORCEMENT OF 1 POUND PER CUBIC YARD.

| | |
|-------------------------|------------------|
| POST CURB DETAIL | |
| (COLLECTOR) | |
| Scale: 1" = 6" | |
| Date: 9/10/97 | FIGURE 13 |



TYPICAL CROSS - SECTION

1. EXPANSION JOINTS TO BE SPACED A MAXIMUM OF 50' APART OR AS DIRECTED BY THE ENGINEER.
2. EXPANSION JOINTS WILL ALSO BE REQUIRED AT TANGENT POINTS, DRIVE RAMPS AND INLETS.
3. CONSTRUCTION JOINTS ARE TO BE CUT INTO CURB AND GUTTER EVERY 10' TO A DEPTH OF D/4.
4. CONCRETE SHALL CONTAIN FIBERMESH REINFORCEMENT AT 1 POUND PER CUBIC YARD.

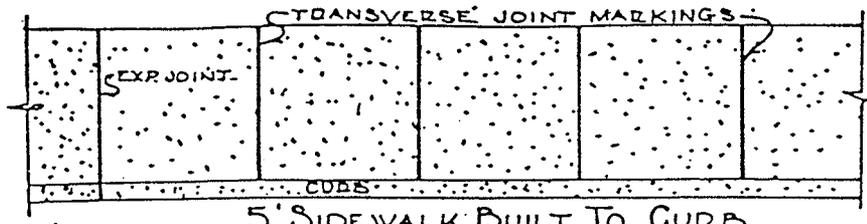
30" CONCRETE CURB AND GUTTER DETAIL

(ARTERIAL / INDUSTRIAL)

Scale: 1" = 6"

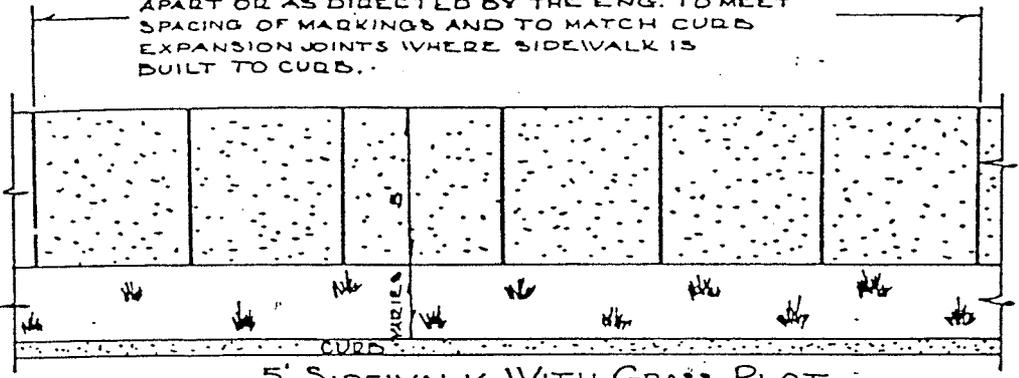
Date: 9/10/97

FIGURE 14



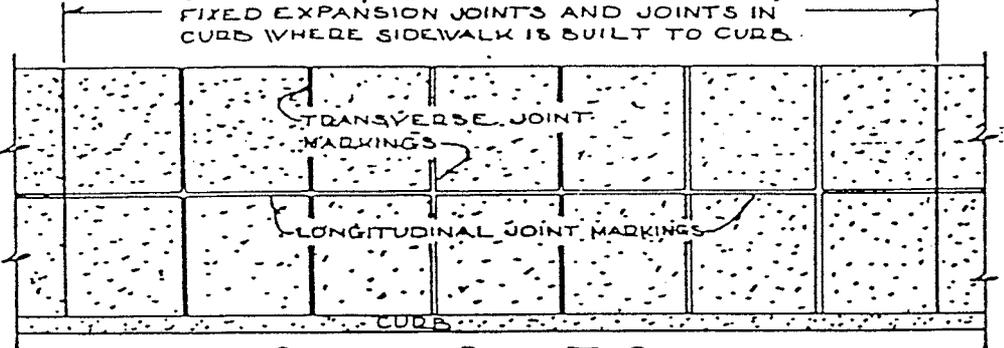
5' SIDEWALK BUILT TO CURB

EXPANSION JOINT TO BE SPACED A MAX. OF 25' APART OR AS DIRECTED BY THE ENG. TO MEET SPACING OF MARKINGS AND TO MATCH CURB EXPANSION JOINTS WHERE SIDEWALK IS BUILT TO CURB.



5' SIDEWALK WITH GRASS PLOT

EXPANSION JOINT TO BE SPACED A MAX. OF 25' APART, DEPENDING ON MARKINGS, FIXED EXPANSION JOINTS AND JOINTS IN CURB WHERE SIDEWALK IS BUILT TO CURB.

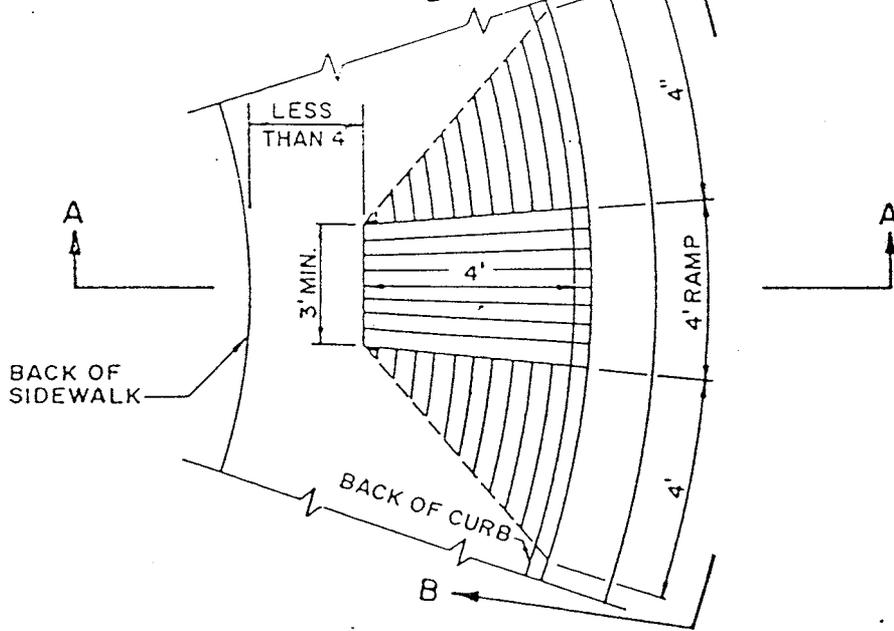


SIDEWALK BUILT TO CURB (WIDTH GREATER THAN 6')

NOTE:

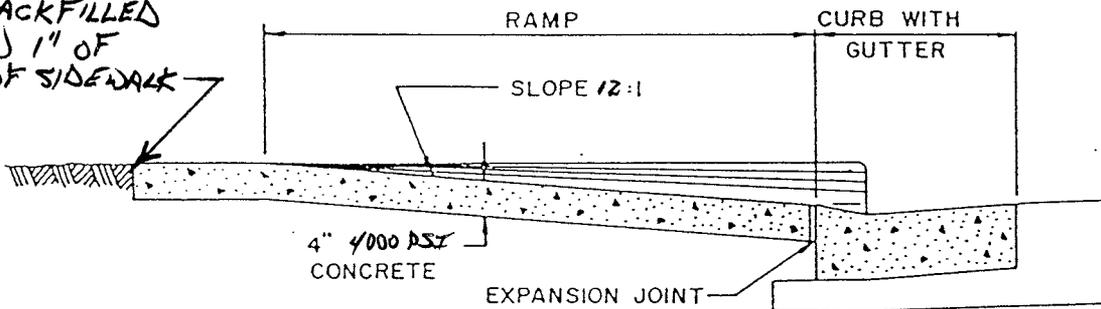
ONE LONGITUDINAL JOINT MARKING REQUIRED ON SIDEWALK OVER 6' IN WIDTH TO LESS THAN 8'. TWO LONGITUDINAL JOINTS FOR SIDEWALKS 10' TO 12'. TRANSVERSE JOINT MARKINGS TO FORM SQ. BLOCKS IF PRACTICAL AS DETERMINED BY FIXED EXP. JOINTS. SIDEWALKS SHALL BE 4" MIN. THICKNESS.

| | |
|-----------------------------------|-----------|
| STANDARD CONCRETE SIDEWALK | |
| (ARTERIAL / INDUSTRIAL) | |
| Scale: None | |
| Date: 9/10/97 | FIGURE 15 |

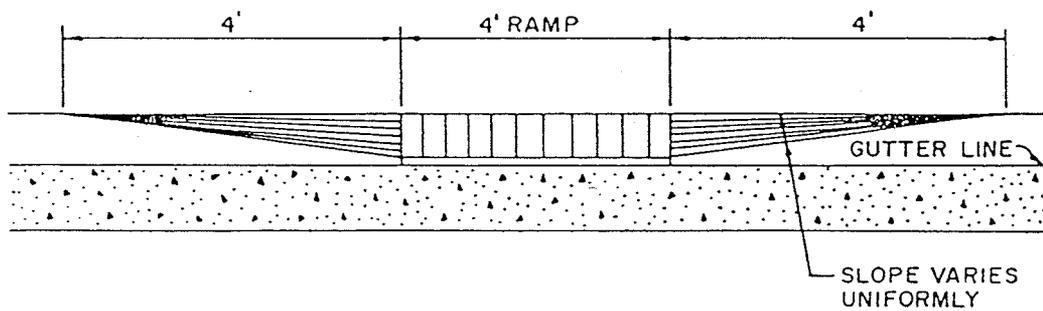


PLAN

TOPSOIL SHALL
BE BACKFILLED
WITHIN 1" OF
TOP OF SIDEWALK



SECTION A-A



SECTION B-B

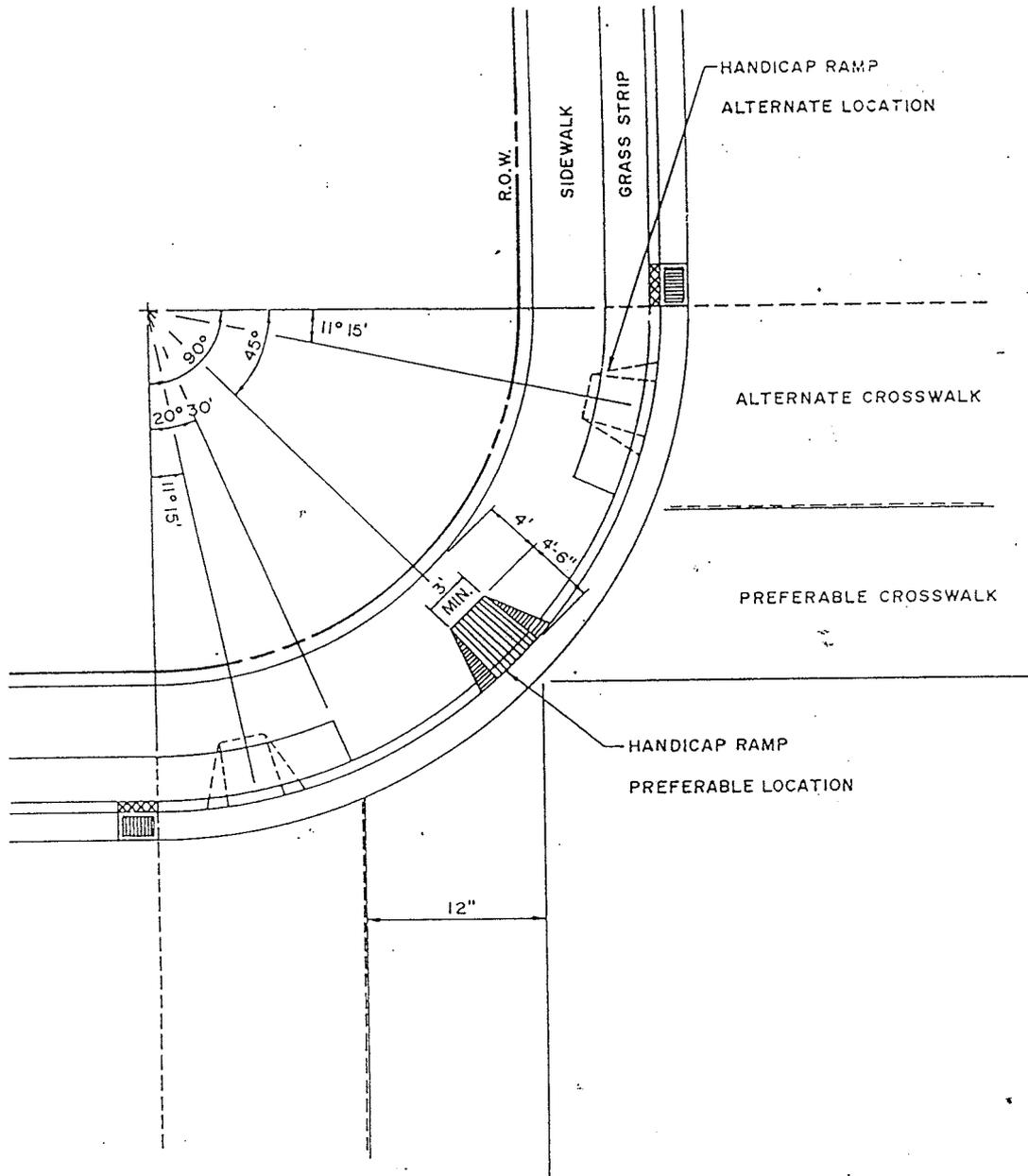
STANDARD HANDICAP RAMP

(SIDE MOUNTABLE)

Scale: 1" = 20'

Date: 9/10/97

FIGURE 16

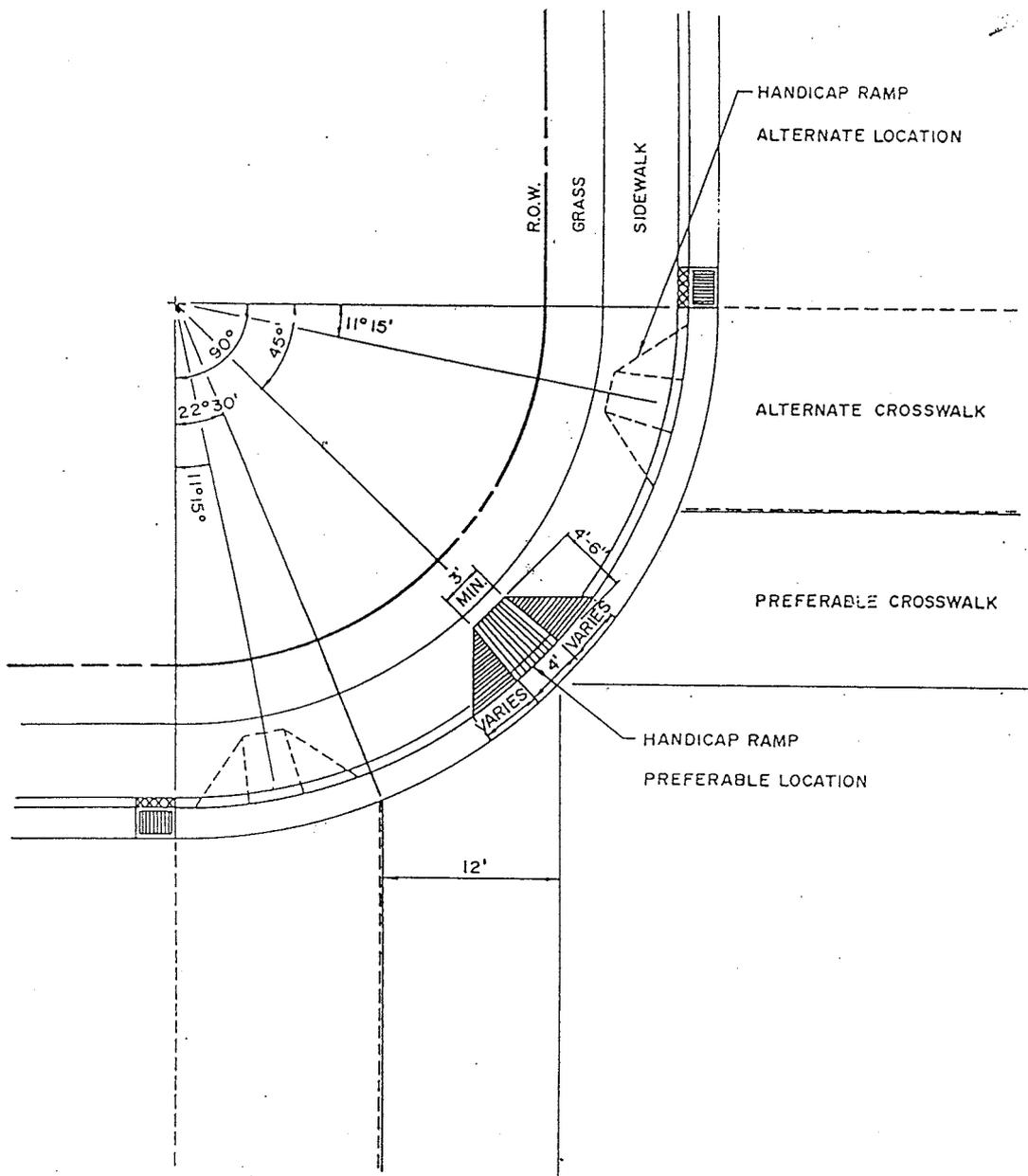


STANDARD CONCRETE SIDEWALK AT RETURN WITH GRASS STRIP AND HANDICAP RAMPS

Scale: 1" = 10'

Date: 9/10/97

FIGURE 17

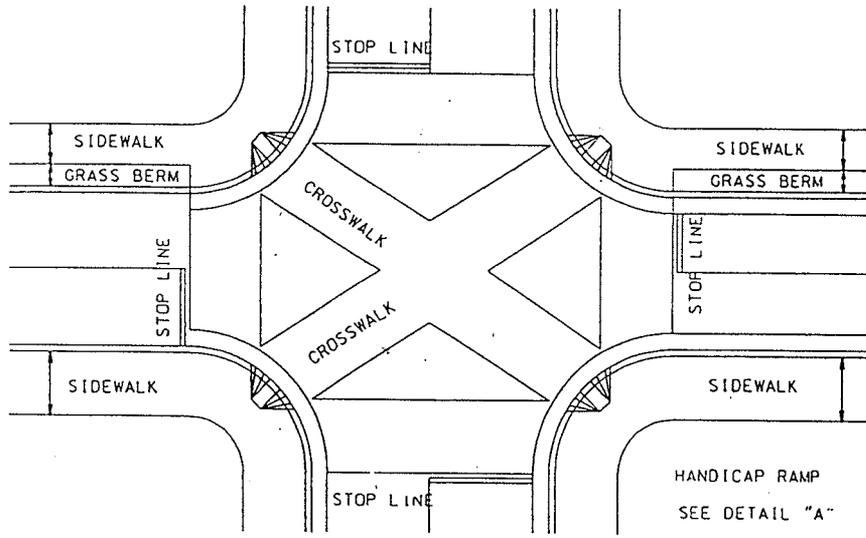


STANDARD CONCRETE SIDEWALK AT RETURN WITH NO GRASS STRIP AND HANDICAP RAMPS

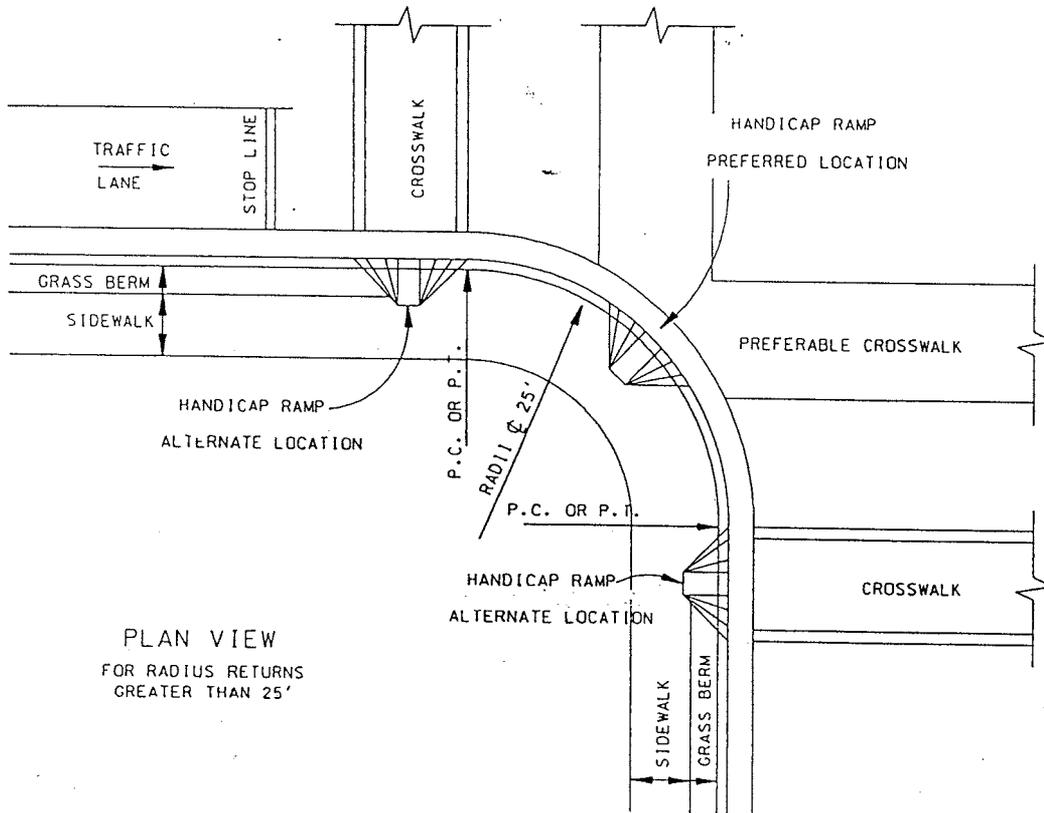
Scale: 1" = 10'

Date: 9/10/97

FIGURE 18



PLAN



PLAN VIEW
FOR RADIUS RETURNS
GREATER THAN 25'

HANDICAP RAMPS LOCATIONS

Scale: None

Date: 9/10/97

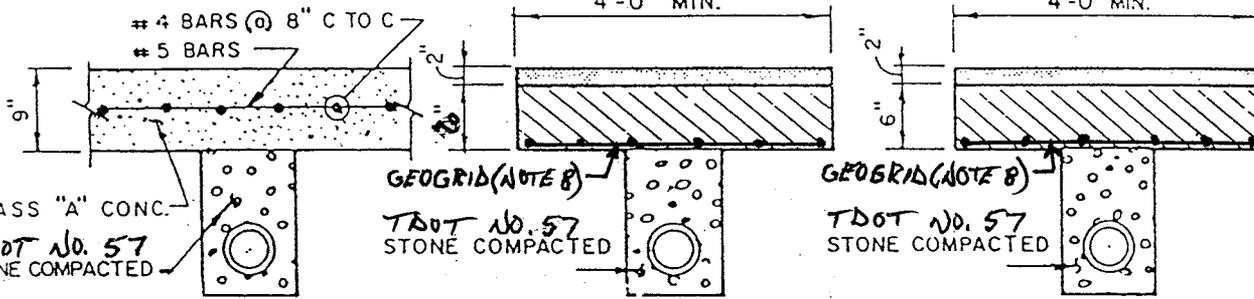
FIGURE 19

2" ASPHALTIC TOPPING
6" ASPHALTIC BINDER

2" ASPHALTIC TOPPING
6" ASPHALTIC BINDER

4'-0" MIN.

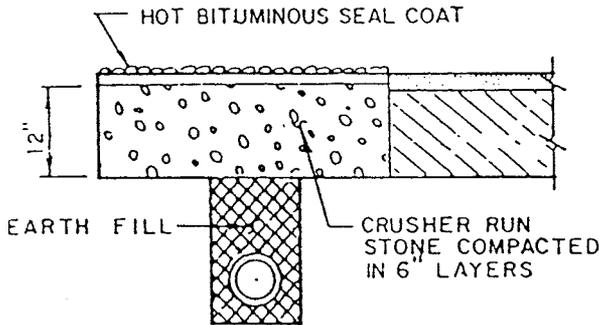
4'-0" MIN.



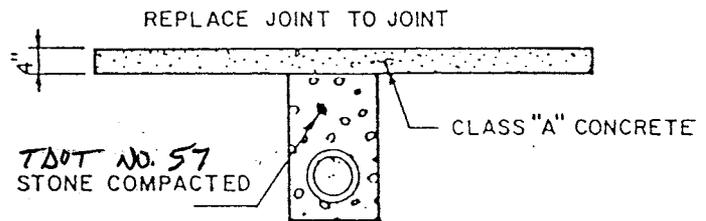
CONCRETE PAVEMENT

ASPHALTIC SURFACE
(CROSSINGS)

ASPHALTIC SURFACE
(PARALLEL CUTS)



SHOULDER REPLACEMENT



SIDEWALK REPLACEMENT

NOTES:

1. ALL WORK SHALL BE FIELD CHECKED AND APPROVED BY THE PUBLIC WORKS DEPARTMENT PRIOR TO ITS BEGINNING AND AFTER COMPLETION THEREOF.
2. INSPECTION PERSONNEL OF THE DEPARTMENT SHALL BE NOTIFIED AT LEAST TWO (2) DAYS PRIOR TO COMMENCING WORK.
3. THE WORK SPECIFIED HEREON SHALL BE FREE FROM WORKMANSHIP DEFECTS FOR A PERIOD OF ONE YEAR AFTER COMPLETION.
4. EXISTING PAVEMENTS, BASES, CURBS AND GUTTERS AND SIDEWALKS SHALL BE CUT AND BROUGHT TO A NEAT LINE BY USE OF AN AIR HAMMER OR OTHER SUITABLE EQUIPMENT. EXPANSION JOINTS REMOVED SHALL BE REPLACED.
5. THE MINIMUM WIDTH TO BE TRIMMED ON EACH SIDE OF THE TRENCH LINE, AS SEEN IN THE SECTION MAY BE WAIVED OR AMENDED UPON APPROVAL OF THE INSPECTOR, HOWEVER, A MINIMUM WIDTH OF REPLACEMENT SHALL BE 4'-0" ALLOW FOR A ROLLER.
6. IF PERMANENT PAVEMENT REPAIRS CANNOT BE MADE WITHIN THREE (3) DAYS, THEN TEMPORARY REPLACEMENT SHALL BE MADE WITH 2" COLD MIX OR HOT BITUMINOUS SEAL COAT OVER COMPACTED CRUSHER RUN STONE.
7. ALL EXCAVATIONS MADE WITHIN PUBLIC RIGHT-OF-WAY REQUIRE EXCAVATIONS AND STREET CLOSURE PERMITS FROM THE PUBLIC WORKS DEPARTMENT PRIOR TO COMMENCING WORK.
8. INSTALL GEOGRID A MINIMUM OF 1'-0" BEYOND EDGE OF TRENCH. GEOGRID SHALL BE ADVANCED DRAINAGE SYSTEM, INC. PRODUCT NO. 2211 OR APPROVED EQUAL.
9. EXCAVATIONS EXCEEDING 2 FOOT IN WIDTH SHALL BE BACKFILLED WITH 4"-6" STONE TO SUBGRADE ELEVATION.

TRENCH PAVEMENT REPAIR DETAILS

Scale: None

Date: 9/10/97

FIGURE 20

DRIVEWAY:

BS/SQ. YD.

1" CRUSHED LIVESTONE
FACE

CONCRETE 4" THICK -

EXISTING DRIVEWAY WIDTH VARIES

R.O.W.

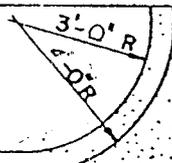
OMIT EXPANSION JOINT FOR GRAVEL
OR ASPHALT DRIVEWAY

TRANSITION TO
EXIST. DRIVE
WAY WIDTH

CONCRETE SIDEWALK 4" THICK THROUGH
DRIVEWAY SECTION.

1/2" BITUMINOUS EXPANSION
JOINT REQUIRED.

15'-0" STANDARD (MINIMUM)
4" THICK



6 X 6 X 10 GR.

RESIDENTIAL DRIVEWAY RAMP DETAIL

ve
97

FIGURE 21