CITY OF TUPELO

Design Standards
And
Construction Specifications
For
Streets, Storm Water, Water Distribution and Sanitary Sewer

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I. INTRODUCTION

The purpose of this manual is to document the design and review policies set forth by the the City of Tupelo Department of Development Services. Policies and procedures contained herein may not be expressly covered by the Code of Ordinances, Development Code or other published documents by the City of Tupelo. These policies are intended to provide direction to designers and clarification of the department's interpretation of the various codes, regulations and ordinances and particularly to support and articulate the standards expressed in the Tupelo Development Code. They are also intended to provide minimum specifications for the construction of public infrastructure such as streets, storm water conveyance facilities, sanitary sewer and water distribution. The policies and guidelines set forth herein are based on accepted engineering principles and past practices of the Division of Engineering and Department of Development Services.

Review of proposed projects, both public and private, by the Division of Engineering will be based upon the policies set forth herein. Exceptions may be applied for in writing to the Division of Engineering where requests will be reviewed by the City Engineer. Exceptions may be granted in cases where adherence to these guidelines and specifications will cause excessive physical hardship and constraints on the project in question. Exceptions will not be granted in cases where financial hardship is the only reason for applying.

SECTION 1. STREETS / HIGHWAYS

GENERAL NOTES

The following guidelines regarding street design and construction pertain to newly constructed corridors and reconstructed existing facilities. The design guidelines and procedures contained herein are considered minimum standards and are not intended to relieve the designer of his/her duty to perform the applicable calculations to determine an adequate roadway structure. The designer is expected to make investigations necessary to ascertain the physical characteristics of the site and make the proper design recommendations based upon those findings. As an accompaniment to this manual, the designer is referred to the following sources for design and construction criteria that may be referenced herein but are not intended to supersede the guidelines of this manual unless expressly mentioned.

"A Policy On Geometric Design Of Highways And Streets," 2001 ed. American Association of State Highway and Transportation Officials (AASHTO).

"Guide for the Development of Bicycle Facilities," 1999 ed. American Association of State Highway and Transportation Officials (AASHTO).

"Guidelines For Geometric Design Of Very Low-Volume Local Roads," 2001 ed. Association of State Highway and Transportation Officials (AASHTO).

"Mississippi Roadway Design Manual," 2001 ed. Mississippi Department of Transportation (MDOT).

"Mississippi Standard Specifications for Road and Bridge Construction." 2004 ed. Mississippi Department of Transportation (MDOT).

Before construction begins on any street or highway project within the City of Tupelo, two sets of construction plans shall be submitted to the City Engineer's office for review in accordance with these policies. The plans should include at a minimum the following:

~A title sheet indicating the project name and a vicinity map clearly showing the location and construction limits of the project. The title sheet should also bear the signature and stamp of the registered professional engineer in charge of the design and plan preparation for the project. All plans, unless otherwise allowed by the city engineer, should be prepared and stamped by a registered professional engineer in the State of Mississippi.

~A typical section sheet showing the proposed street cross section. Details on base and pavement materials and thickness should be clearly shown. In projects where an existing street is being reconstructed or over-laid, an existing cross section should also be shown.

~Plan and Profile sheets depicting the projects horizontal and vertical alignments and the design details of the same. Details regarding drainage facilities, rights-of-way, easements and adjacent property owners affected should be clearly shown.
~Additional sheets as necessary to convey details of traffic control and safety measures, erosion control and mitigation procedures.

Plans not meeting these minimum standards may be rejected. All plans should be submitted well before construction is scheduled to begin so that the city engineer has time to review the drawings and issue the applicable permits.

All work that is to be dedicated to the City of Tupelo as public infrastructure shall be inspected by a representative from the city engineer's office to ensure compliance with the approved plans and specifications. Work that is not inspected by the city engineer's office will be rejected. Applicable permits that are obtained and copies of the plans and specifications for the project should be kept on site during construction at all times. Prior to acceptance of any portion of the work (i.e. subgrade, base, pavement), the City Engineer shall inspect the work for material quality, course thickness and workmanship. Any portion of the work or materials found to be unacceptable shall be removed and replaced.

STREET CLASSIFICATIONS

For purposes of identifying a street or highway's intended or actual use, the Division of Engineering has established three separate street classifications. These classifications generally adhere to nationally accepted standards but are defined here for clarity.

ARTERIALS

Arterials may be classified as either principal or minor, but for purposes of this manual and within the context of the City of Tupelo, no such separate distinction will be made. Arterials are defined as corridors generating the highest traffic volumes with the longest trip desires and are commonly referred to as major thoroughfares. The arterial system generally will consist of multiple lanes of traffic, will serve the major centers of activity and will be the primary routes entering and leaving the urban area as well as providing routes for intra-area travel, such as between business districts and outlying residential areas. Gloster Street, Main Street and McCullough Boulevard are examples of arterials within the City of Tupelo. For design considerations of this manual all arterials within the City of Tupelo will be assumed to carry 5% heavy truck traffic.

COLLECTORS

The collector system provides land service access and traffic circulation within business districts, residential neighborhoods and industrial areas. A collector gathers traffic from within specific land use zones and distributes it to the arterial system. Collectors within the City of Tupelo may be classified as either major or minor. Major collectors function as

primary routes between land use zones and tie directly into the arterial system. They will carry high volumes of traffic (ADT > 2,000) both commercial and residential. Green Street, Thomas Street and West Jackson Street are examples of major collectors within the City of Tupelo. For design purposes of this manual all major collectors within the City of Tupelo will be assumed to carry 2% heavy truck traffic unless the designer is directed to accommodate a higher or lower percentage by the city engineer. Minor collectors generally serve outlying residential and smaller confined business districts. They will distribute traffic between neighborhoods and major collectors carrying less volume (ADT < 2,000) than a major collector. They may or may not tie into the arterial system. Butler Road, Lakeshire Drive and Wilson Street are examples of minor collectors within the City of Tupelo. Heavy truck traffic will be considered negligible on minor collectors unless special consideration is ordered by the city engineer.

LOCAL STREETS

Local streets comprise of all facilities that cannot be categorized into one of the other two classifications. These include mainly residential streets within distinct neighborhoods and subdivisions. They function to distribute traffic to the collector system and beyond and will often carry very low traffic volumes (ADT < 400). Except for industrial districts, local streets will be assumed to carry no truck traffic. In newly developed subdivisions local streets shall be designed so that blocks do not exceed 1,500 feet in length in the Agriculture/Open Space zone, 1,000 feet in the low-density residential zone or 750 feet in other residential zones unless severe topographic constraints or other unusual features make an excessive length necessary. Connections between streets shall be created in such a way that they do not encourage the use of such streets by substantial through traffic. A local street open at only one end should have a cul-de-sac turn around at the closed end. Such dead end streets should be kept to minimum length as possible and in no instance should a dead end street exceed 600 feet in length. Minimum design criteria for cul-de-sacs is shown on Figure 1.E.

ALLEYS

Alleys are small, low volume streets that provide access to the side or rear of individual parcels of land in medium to high density residential and commercial areas. They are categorized separately from local streets in that they are intended, in many cases, to serve only a few individual parcels. In commercial districts they may be used primarily for loading and unloading of goods and other materials. In residential districts they may serve as few as two or three separate homes and provide a safer alternative to on street parking on the primary local and collector routes. Traditional housing developments with alleys will be allowed. They should be aligned parallel or perpendicular to adjoining street property lines and it is desirable to situate them where they connect to a local street or collector on both ends. Dead end alleys may be permissible in certain situations and where allowed should be equipped with a turn around if their length exceeds 600 feet. Minimum design criteria for turnarounds is shown on Figure 1.E. Because of their intended use the geometric criteria for their design will be somewhat less intrusive than that of a local street and is illustrated in Figure 1.D.

GENERAL STREET DESIGN CRITERIA

HORIZONTAL & VERTICAL ALIGNMENT

Horizontal and vertical alignments for all streets shall be designed in accordance with the following resources:

"A Policy On Geometric Design Of Highways And Streets" 2001 ed. Association of State Highway and Transportation Officials (AASHTO).

"Guidelines For Geometric Design Of Very Low-Volume Local Roads", 2001 ed. Association of State Highway and Transportation Officials (AASHTO).

"Mississippi Roadway Design Manual", 2001 ed. Mississippi Department of Transportation (MDOT).

The designer, unless otherwise instructed by the city engineer, shall utilize the following design requirements based upon the functional classification of the street in question:

Type of Street	ROW Width, Ft. (min)	Pavement Width, Ft. (min)	Design Speed, mph	*Sidewalks Req'd	Curb & Gutter Req'd
Arterial	50-**80	24	55	Yes	Yes
Major Collector	50-**80	24	45	Yes	Yes
Minor Collector	50	22	45	Yes	Yes
Local	40	20	30	Yes	Yes
Alley	15	10	n/a	No	No

*See exceptions to sidewalk requirements in "SIDEWALKS" section
**See Figure 1.A

Streets shall be designed to intersect at approximate right angles (90 degrees). Skewed intersections shall be avoided and in no case shall the angle of intersection be less than 75 degrees. Street intersections and approaches shall be designed on as flat a grade as possible. Street gradients within 100 feet of intersections shall not exceed 4% and every reasonable effort shall be made to keep the gradient below 2%. The minimum curb radius permitted at intersections shall be twenty (20) feet for local streets, and twenty five (25) feet for collector streets and arterials. No more than two (2) streets shall intersect at any one point, unless the City engineer certifies to the permit issuing authority that such an intersection can be constructed with no extraordinary danger to public safety. Turning lanes shall be provided at heavily traveled intersections as determined by the City engineer. Care should be taken by the designer to provide the maximum amount sight distance possible at all intersections.

In cases where existing streets, which are slated to be reconstructed or widened, do not meet the above recommended design criteria, every effort should be made to during the design process to make the necessary adjustments to bring the street within these parameters. In

instances where this is not feasible due to physical restraints or right-of-way restrictions the designer shall notify the city engineer in writing and request a design exception for the project.

BASE AND PAVING - DESIGN CRITERIA AND CONSTRUCTION REQUIREMENTS

The base and pavement structure shall be designed in accordance with the following structure number guidelines:

CLASSIFICATION	STRUCTURE NUMBER (MINIMUM)
Arterial (Major Thoroughfare)	4.10
Major Collector	3.82
Minor Collector	3.38
Local Street (Residential)	2.66
Alleys	N/A (See Fig. 1-D)

The following coefficients shall be used in structure number calculations:

COMPONENT	COEFFICIENT (per inch)
Crushed Limestone	0.14
Clay Gravel	0.11
Hot Mix Asphalt (Where used as a base material)	0.34
Hot Mix Asphalt	0.44
Portland Cement Concrete	0.44

The following minimum conditions are to be considered in the pavement structure design:

1. Course thickness of a granular base material will be a minimum of 8 inches
2. Total thickness of hot mix asphalt will be a minimum of 4.5 inches except on local residential streets and alleys.
3. Course thickness for Portland cement concrete pavement will be a minimum of 6 inches.

For street designs involving arterials and major collectors, the design engineer shall submit to the office of the city engineer the intended structure number to be used in pavement design and how the structure number was derived. The structure number for a street or highway shall be calculated using the standard operating procedures of the Mississippi Department of Transportation. For all local streets and minor collectors, the design engineer may use the above referenced minimums. In instances where a streets classification is in question, the city engineer shall make the final determination based on traffic counts for existing corridors and traffic flow and impact studies for new streets or highways.

SUBGRADE

The subgrade for all new and reconstructed streets shall be shaped to the lines and templates shown on the plans and specifications for the project. Grading of excavation, placement and compaction of embankment/fill material shall conform to the specific requirements of Section 203 of the Mississippi Standard Specifications For Road And Bridge Construction, 2004 Edition, unless superceded by these specifications. All areas requiring embankment/fill greater than 6" shall be compacted to an average minimum of 95% of the Standard Proctor for the material being used. A field compaction report for embankment/ fill areas signed and sealed by the project engineer shall be furnished to the office of the city engineer. All areas of subgrade will be inspected and proof-rolled by personnel from the city engineer's office or a designated representative thereof prior to the placement of the base course. Areas that are found to be soft or unsuitable for traffic loads will be undercut to a depth specified by the city or project engineer and backfilled with suitable material. In lieu of extensive undercutting and backfilling, the use of approved Geogrids or Geotextile Fabrics will be acceptable. The installation of geogrids and geotextiles shall conform to the specific requirements found in Sections 204 and 209 of the Mississippi Standard Specifications For Road And Bridge Construction, 2004 Edition, respectively. Prior to the installation of geogrids or geotextiles the project engineer shall notify the city engineer of intent to make use of said materials and shall furnish drawings detailing their installation in accordance with the referenced specifications. Chemical stabilization of subgrades may be considered where use of such methods will not adversely affect existing neighborhoods, business districts or other sensitive areas.

BASE

The base course material shall be shaped to the lines and templates shown on the plans and specifications for the project. Base course material shall consist of crushed limestone and shall meet the requirements listed below:

Gradation Requirements for Crushed Limestone Base Course

Sieve Size	Percentage Passing
1"	100
3/8"	50 - 85
No. 4	35 - 65
No. 10	25 - 50
No. 40	15 - 30
No. 200	5 – 15

Other base course materials may only be used with special permission from the City Engineer and shall be limited to the following:

Clay Gravel (Class 4B or C)
Granular Material (Class 9A)
Hot Mix Asphalt, Base Course, 19 mm Mixture

Chemical stabilization of granular bases may be considered where use of such methods will not adversely affect existing neighborhoods, business districts or other sensitive areas. Specific requirements for the placement and compaction of granular base courses shall conform to Section 304 of the *Mississippi Standard Specifications For Road And Bridge Construction*, 2004 Edition. Thickness of the base course will developed using the appropriate structure number for the applicable street classification. A base course whose compacted thickness is designated to be more than 8 inches shall be constructed in two or more layers of approximate equal thickness. For crushed limestone, the average compacted density shall exceed or be equal to 99% of the standard proctor, with no single test below 95%. For clay gravel courses, the average compacted density shall be equal to 100% of the standard proctor, with no single test below 96%. A field compaction report signed and sealed by the project engineer shall be furnished prior to placement of the pavement courses. Base courses will be inspected and proof rolled by personnel from the office of the city engineer prior to placement of the pavement courses.

PAVEMENT

Pavement shall be placed to the lines and templates shown in the plans and specifications for the project. Design of pavements will be in accordance with the latest edition of *The Guide for The Design of Pavement Structures* published by the American Association of State Highway and Transportation Officials, AASHTO. Hot bituminous pavements will be mixed, placed and compacted in accordance with Division 400 of the *Mississippi Standard Specifications for Road and Bridge Construction*, 2004 Edition. Portland Cement Concrete pavements will be mixed and placed in accordance with Division 500 of the aforementioned reference. After placement of asphalt pavements, a field compaction report signed and sealed by the project engineer shall be furnished prior to acceptance of the street. Personnel from the office of the city engineer will be on site to inspect all paving operations.

TYPICAL SECTIONS

The typical sections shown on the following pages are examples of street cross section designs based upon the minimum guidelines discussed herein. For local streets and minor collectors, the design engineer may incorporate these typical sections into the design unless extenuating circumstances (i.e., heavy truck traffic) dictate the use of a higher structure number. Pavement structure designs for major collectors and arterials will be submitted to the office of the city engineer for approval.

CURB & GUTTER, DRIVEWAYS AND SIDEWALKS

CURB & GUTTER

Streets are normally designed with curb and gutter to allow for greater use of available width, control of drainage, protection of pedestrians, delineation and aesthetics. Use of curb and gutters should be considered for all streets and is required in medium to high density residential and commercial zones. Types of curbs and gutters allowed and corresponding dimensions are contained Figure 1.E

Concrete curbs and curbs and gutters may be constructed with forms or a curb forming extruding machine. Forms, except for the divider plates, may be either wood or metal. Forms used shall be set to the line and grade shown on the plans and rigidly held in place by stakes or braces. The depth of the forms shall be equal to the depth of the curb, gutter or combination curb and gutter. Concrete used for construction of curbs, gutters or combinations curbs and gutters shall be a minimum 3,000 psi mix design. The concrete shall be placed on a moist grade and consolidated by vibration or other approved methods. Expansion and tooled joints will be placed in accordance with the plans. Once the concrete has been placed and consolidated, the concrete surface shall receive a floated finish. Special consideration should be given to protect fresh concrete at least for the first 72 hours after initial placement. Refer to Section 609 of the *Mississippi Standard Specifications for Road and Bridge Construction, 2004 Ed.* for procedures on finishing and curing concrete used in curb and gutter construction.

DRIVEWAYS AND TURNOUTS

Driveways and turnouts that connect to public streets either concurrent with or after the time of construction of the street shall be built in accordance with the following: Residential driveways and turnouts shall be a minimum of 10 feet wide and have a curb radius of not less than 7.5 feet as measured to the back of the curb. Commercial driveways and turnouts shall be a maximum of 24 feet wide and have a curb radius of not less than 12 feet as measured to the back of the curb. Industrial driveways and turnouts shall be a maximum of 50 feet wide and have a curb radius of not less than 25 feet as measured to the back of the curb. Spacing between driveways on all streets shall be a minimum of twenty-five (25) feet as measured from outside edge to outside edge.

Driveways and turnouts shall be constructed with materials and workmanship equal to or better than the adjoining curbs and gutters. The owner of the lot at which the driveway turnout is being constructed shall be responsible for any violation of the above requirements. No material will be placed in the street gutter that will impair the flow of storm water. Refer to Section 614 of the *Mississippi Standard Specifications for Road and Bridge Construction, 2004 Ed.* for procedures on finishing and curing concrete used in driveway and turnout construction.

CONCRETE SIDEWALKS

Sidewalks will be required on all newly constructed and reconstructed roads and streets. Sidewalks shall be constructed along the entire distance of all street frontages and will be set back a minimum of three (3) feet from the back of curb. Handicapped access ramps, complying with the requirements of federal law, shall be provided for all sidewalks. Sidewalks shall not installed in such a manner that they conflict with or are obstructed by power lines, telephone poles, fire hydrants, traffic/street signs, mailboxes, trees, buildings or any other structure. When there is an anticipated obstruction, the sidewalk shall be installed around the object and shall provide the required sidewalk width. When utility layouts are required as part of a plat, the location and extent of sidewalks within the subdivision shall be shown on the utility layout and shall be subject to the approval of the Director of Development Services and the utility agencies.

The planning commission may waive all or part of the sidewalk requirements in the following situations:
-When the Director of Development Services determines that the sidewalks will interfere with or disrupt drainage.
-When the Director of Development Services determines that public construction that requires sidewalk replacement will take place within three (3) years.
-In single or two family residential subdivisions with a density less than one dwelling unit per acre.
-In instances where the Director of Development Services determines that sidewalks would incur excessive costs to the developer due to topographic or natural resource constraints.

Where the requirement for sidewalk construction is waived, adequate right-of-way shall be provided for future installation of sidewalk if necessary.

Concrete sidewalks may be constructed by the use of forms (wood or metal) or an approved automatic extrusion type paving machine. Forms used shall be set to the line and grade shown on the plans and rigidly held in place by stakes or braces. The depth of the forms shall be equal to the depth of the sidewalk. Sidewalks shall be a minimum of five (5) feet in width. Excavation shall be made to the required depth of the sidewalk and wide enough to permit the placement of forms and braces. The subgrade shall be compacted and moistened prior to placement of any concrete. Any soft or spongy soil shall be removed and replaced with acceptable material. At no time will concrete be placed on top of mud. Concrete used for construction of sidewalks shall be a minimum 2,500 psi mix design. Tooled joints will be placed at a spacing of five (5) feet. Expansion joints are to be placed at intervals of twenty-five (25) feet. Once the concrete has been deposited and consolidated, the concrete surface shall receive a float and broom finish. Refer to Section 608 of the *Mississippi Standard Specifications for Road and Bridge Construction, 2004 Ed.* for procedures on finishing and curing concrete used in sidewalk construction.

SECTION 2. STORM WATER MANAGEMENT

PURPOSE

Proposed construction for commercial, industrial, governmental, residential, parks or recreational type developments that will result in an increase in runoff from the pre-developed or existing conditions shall be governed as specified herein. Existing and new developments that are constructed in phases and will increase runoff amounts from the pre-developed or existing conditions shall be governed as specified herein.

The intent of this section is to serve as a reference for the City staff and practicing professionals in designing storm drainage facilities within the City of Tupelo. Criteria listed herein are the general policy of the City of Tupelo and may not be applicable in every situation. Each project will be evaluated on a case-by-case basis with regard to site-specific characteristics, existing storm drain facilities, and how future development on and around the site might be affected.

GENERAL NOTES

Before beginning construction on any project, plans and specifications must be submitted for approval to the office of the City Engineer. The plans shall be accompanied by a stormwater report prepared by a professional engineer registered in the State of Mississippi. The report is to include, but not be limited to, the following:

1. A narrative describing how storm runoff entering, generating from and exiting the proposed site will be controlled and conveyed and to what extent the development will impact existing conditions both on and off site.
1. Pre and post development topographic map(s) showing all on site and off site contributing drainage areas.
2. Basis for determining runoff coefficients and times of concentration.
3. Inflow hydrographs with peak flows for the 10, 25 and 100-year storm frequencies.
4. Stage/storage/discharge tables for all proposed detention or retention facilities.
5. Details and calculations for all outlet control structures.
6. Hydraulic routing of the 10, 25 and 100 year storms through the proposed system(s).
7. Summary.

The stormwater report must also include an analysis of the offsite properties that may require anticipating future development in addition to addressing existing conditions. Where storm drainage facilities, particularly pipe culverts, serve basins that include areas likely to develop in the future, runoff calculations must assume higher values of runoff coefficients based on estimated increased impervious areas. All maps and other exhibits shall be shown at a satisfactory scale and sufficient in quantity and scope to define the boundaries of the site relative to any applicable watercourses, drainage divides, drainage structures and other pertinent features. The site plan, submitted in conjunction with the stormwater report, shall depict all streams, lakes, wetlands and other bodies of water as well as boundaries of the 100-

year flood plain. The floodplain boundary information must be obtained using Federal Emergency Management Agency (FEMA) guidelines. Proposed developments located in approximate A zones that will be greater than 50 lots or 5 acres, whichever is lesser, must provide 100-yr base flood elevation data. This data should be obtained using appropriate methodologies accepted by FEMA.

Methods used for computing runoff and generating hydrographs must be by one of the following methods: 1) Rational Method for drainage areas up to 100 acres or 2) Soil Conservation Service (SCS) Method (TR55) for small and medium size water sheds containing up to 10,000 acres. Other methods may be used upon prior approval of the City Engineer. All street and local drainage facilities shall be designed using the 25-year storm unless more stringent requirements apply.

Pipes used in the construction of drainage facilities shall have a minimum equivalent size of 15 inches in diameter. Inlet and outlet headwalls and toe walls are required for all pipe structures. Design velocities for pipes should be kept to a minimum and, if practical, should not exceed 5 feet per second when flowing full; however, if outlet velocities exceed 5 feet per second, then energy dissipation devices and/or channel protection must be provided.

Pipes and box culverts used for open cross drains shall be designed to convey at a minimum the 50-year storm discharge. Headwater and tailwater elevations resulting from the 100 year discharge should be checked to insure that water surface elevations do not encroach upon the traveling lanes of a roadway. If applicable, this requirement will be the controlling design criteria for open crossdrains.

Street catch basins may be designed for gutter spread using the 10-year storm provided a maximum **four (4)** minute time of concentration is used and the remainder of the system is designed for the 25-year storm. Inlet capacity at sags, where relief by curb overflow is not provided, shall allow for debris blockage by providing twice the computed opening for the 10-year storm. Curb inlets in the roadway shall be placed in such a way that the spread of water from the 10-year storm does not exceed one half of a lane width on 2 or 3 lane streets and one lane width on wider streets. When the typical section includes a full shoulder or parking lane, encroachment onto the travel lane is not to be accommodated.

All drainage structures that are to convey discharge from streams designated as Special Flood Hazard Areas (SFHA) as defined on the Flood Insurance Rate Maps (FIRM) must be designed using the 100-year (1% chance) flood event. Designs for structures lying within streams where a regulatory floodway exist shall be accompanied by a no-rise/impact analysis and certification by the designing professional engineer. All no-rise/impact studies shall be conducted in accordance with FEMA guidelines.

DETENTION/RETENTION

Whenever the stormwater report indicates that adverse stormwater runoff related impact is expected to result from the development of a property, that project shall be required to provide

a stormwater detention/retention facility or facilities so that peak flows from the developed site do not exceed those associated with the pre-developed site. The detention facility shall be designed to accommodate a 25-year post development event with the discharge structure designed to release the 10-year pre development flow. Larger projects, in excess of 15 acres, may be designed to release the 25-year pre development flow. Detention and retention ponds shall be designed with adequate freeboard to protect against overtopping of the dam or levee from the 100-year storm. A variety of methods of achieving stormwater management goals are acceptable in providing detention facilities. The type of facility provided shall be based on the following criteria:

1. The type of development for which the detention facility is intended to protect.
2. Volume of stormwater to be stored.
3. Origin and magnitude of the flows to be managed.
4. Topographic opportunities and limitations.
5. Safety considerations.
6. Maintenance requirements.
7. Aesthetic considerations.
8. Likelihood of facility operation interfering with access to public or private facilities.
9. Proximity of facility to property lines, utilities, buffers, etc.
10. Similar site-specific constraints as necessary.

When a detention structure is over 4 feet deep and in a location that constitutes a danger to human habitation, it shall be protected by a permanent fence or barrier and warning signs. Fences shall be at a minimum 6 feet high chain link or other approved material with a 10-foot wide gate. Fences shall be located on the outside edge of the perimeter easement.

Where a facility is to be dedicated to the City of Tupelo, drainage easements suitable for the construction, maintenance and access of the drainage system shall be provided. The acceptance of any detention facility will be the sole discretion of the City of Tupelo. A minimum of 15 feet in width will be required for any drainage easement along a drainage pipe, ditch, stream or other area that is designated for stormwater to flow. No obstruction shall be built, constructed or planted that would inhibit proper function of the drainage system. Fences and/or shrubbery may be placed within a drainage easement, provided an indemnification agreement is provided to the City of Tupelo.

PIPE CULVERTS

The following type pipe culverts are approved for use on drainage projects within the City of Tupelo. Specific requirements, considerations and guidelines may pertain.

Sidedrains, Laterals (No traffic loads)

1. Reinforced concrete pipe (RCP), reinforced concrete arch pipe (RCAP), reinforced concrete elliptical pipe (RCEP)
2. Corrugated metal pipe (CMP), polymer coated or aluminized only
3. Corrugated high density polyethylene (HDPE), ADS N-12 or approved equivalent
4. Corrugated poly vinyl chloride (PVC), Contech A-2000 or approved equivalent

Crossdrains (Structures under traffic loads)

1. Reinforced Concrete Pipe (RCP), Reinforced Concrete Arch Pipe, (RCAP), Reinforced Concrete Elliptical Pipe (RCEP)
2. *Corrugated Steel Pipe (CMP), Polymer Coated or Aluminized only
3. * **Corrugated High Density PolyEthylene (HDPE), ADS N-12 or approved equivalent

*For uses where a minimum of one (1) foot of cover is provided to the bottom of the pavement structure.
**For uses on collectors and local streets with ADT of $\leq$ 1,000 and a maximum size of 36".

INLETS AND CATCH BASINS

The following materials may be used for the construction or placement of inlets and catch basins:

1. Reinforced Concrete (Class "B" Mix Design, Cast-in-Place or Precast)
2. *®Nyloplast PVC Inlets and Catch Basins, or equivalent

*®Nyloplast PVC inlets and catch basins are not to be used where heavy traffic loads will be encountered unless special permission is granted by the City Engineer. They may be used for curb inlets on streets of all classifications.

The specific requirements relating to laying of pipe and construction / placement of inlets is to be governed by Division 600 of the *Mississippi Standard Specifications for Road and Bridge Construction, 2004 Ed.*

EROSION CONTROL

Before beginning projects that will encompass a disturbed area greater than **five (5)** acres the developer/builder shall submit a Storm Water Pollution Prevention Plan (SWPPP) to the Mississippi Department of Environmental Quality (MDEQ) for a Large Construction Storm Water General Permit. The permit certificate must be obtained and a copy provided to the city before work can begin. Projects that will have a total disturbed area of less than **five (5)** acres, but greater than **one (1)** acre shall be covered under a Small Construction Storm Water General Permit. Permits shall remain on site at all times for inspection by city or MDEQ personnel. Projects that disturb an area of less than **one (1)** acre shall not be required to obtain storm water permits, but shall be expected to follow best management practices regarding erosion and sediment control and will be required to submit a SWPPP to the city before beginning construction. Specific guidance and procedures for the preparation of a SWPPP can be obtained on the website of MDEQ. Minimum erosion control standards for projects within the city are contained hereafter.

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise control runoff in order to prevent pollutants from leaving the project rights of way. As a minimum, the Contractor shall provide straw bales or silt fences as a temporary structural practice to minimize erosion and sediment runoff. Straw Bales and silt fences shall

be properly placed to effectively retain sediment in each independent runoff area; then, as work progresses, shall be removed/replaced/relocated as needed. Bale rows used to retain sediment shall be turned uphill at each end of each row. Silt fences or rows of straw bales shall be provided as follows:

1. Along the downhill perimeter edge of areas disturbed.

2. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.

3. Along the toe of cut slopes and fill slopes of the construction areas.

4. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc., that traverse disturbed areas or carry runoff from disturbed areas. Rows shall be spaced a maximum of 100 feet apart in such existing drains that are within the limits of the work.

5. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced a maximum of 200 feet apart in drains with slopes equal to 5 % or less and 100 feet apart in drains with slopes 5% or steeper.

6. At the entrance to culverts that receive runoff from disturbed areas.

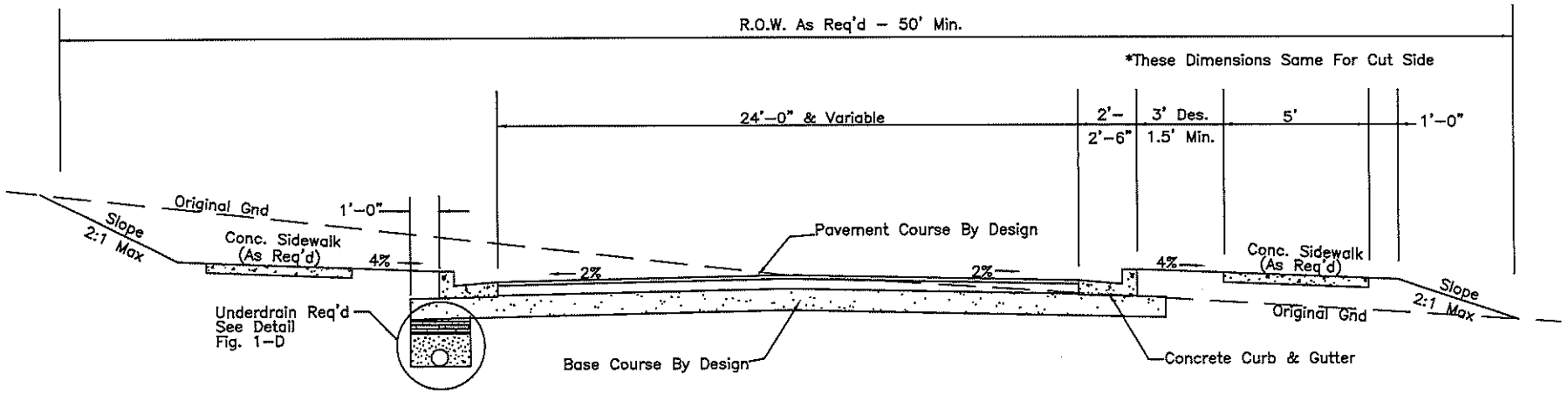
The height of a silt fence shall be a minimum of 18 inches and a maximum of 34 inches above the ground surface. Filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 degrees F to 120 degrees F. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together only at a support post with a minimum 6-inch lap and securely sealed. Wooden posts shall have a minimum length of 5 feet and a minimum diameter of 2 inches when oak is used and 4 inches when pine is used. Steel posts (standard "U" or "T" section) shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 feet. Wire fence reinforcement for silt fences using standard strength filter fabric shall be a minimum of 14 gauge and shall have a maximum mesh spacing of 6 inches. When wire support is used, standard strength filter fabric may be used. Posts for this type of installation shall be placed a maximum of 10 feet apart. The wire mesh shall be fastened securely to the upslope side of the posts using heavy duty wire staples at least 1 inch long, tie wires or hog rings. The standard strength fabric shall be stapled or wired to the wire fence. When wire support is not used, extra strength filter fabric shall be used. Posts for this type of fabric shall be placed a maximum of 6 feet apart. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the proposed location of the silt fence. The filter fabric shall be fastened securely to the upslope side of the posts using 1 inch long (minimum) heavy duty wire staples or tie wires. The fabric shall be extended into the trench a minimum of 8 inches; the trench backfilled and the soil compacted over the filter fabric. The fabric shall not be stapled to existing trees.

Bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales shall be either wire bound or string tied. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier. Each bale shall be securely anchored by at least 2 stakes (minimum dimensions 2 inches x 2 inches x 36 inches) or standard "T" or "U" steel posts (minimum weight of 1.33 pounds per linear foot) driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum of 18 inches deep into the ground to securely anchor the bales. The gaps between bales shall be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw may be scattered over the area immediately uphill from a straw bale barrier to increase barrier efficiency.

DIVERSION DIKES

Diversion dikes shall have a maximum channel slope of 2 % and shall be adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. Diversion dikes shall be located to minimize damages caused by construction operations and traffic.

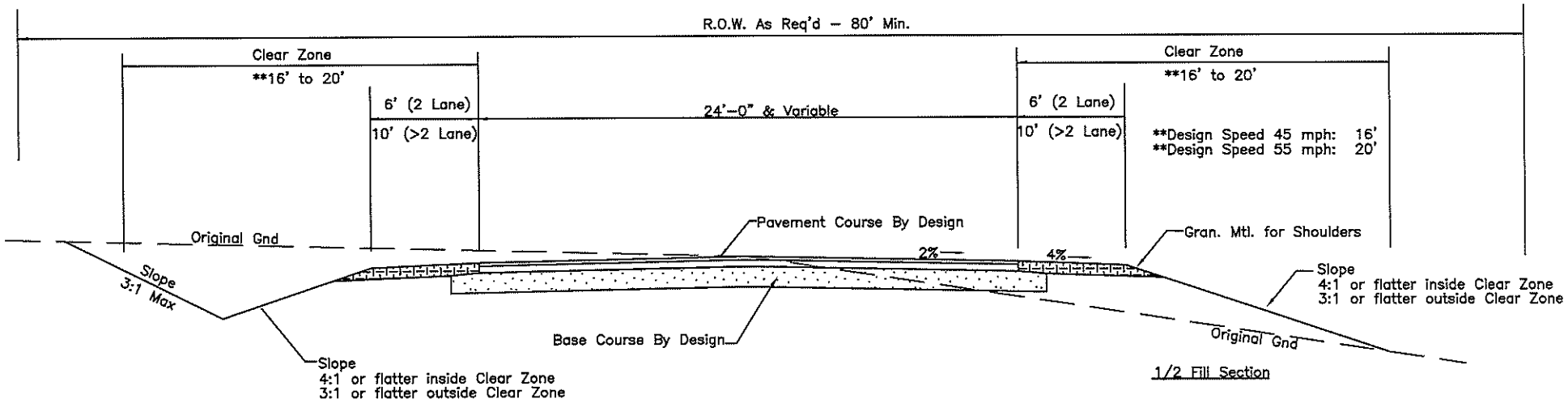
The use of erosion control methods to contain all materials on each project site is mandatory. If a hazardous situation arises and control measures are not in place, the developer/builder will be given 24 hours to comply. If it is not of an urgent nature, the developer/builder will be allowed 7 calendar days to comply. If the clean up of material involves the City Streets and the developer/builder refuses to provide the clean up, the Public Works Department may perform the work and seek compensation from the developer/builder.



1/2 Cut Section

WITH CURB & GUTTER

1/2 Fill Section



1/2 Cut Section

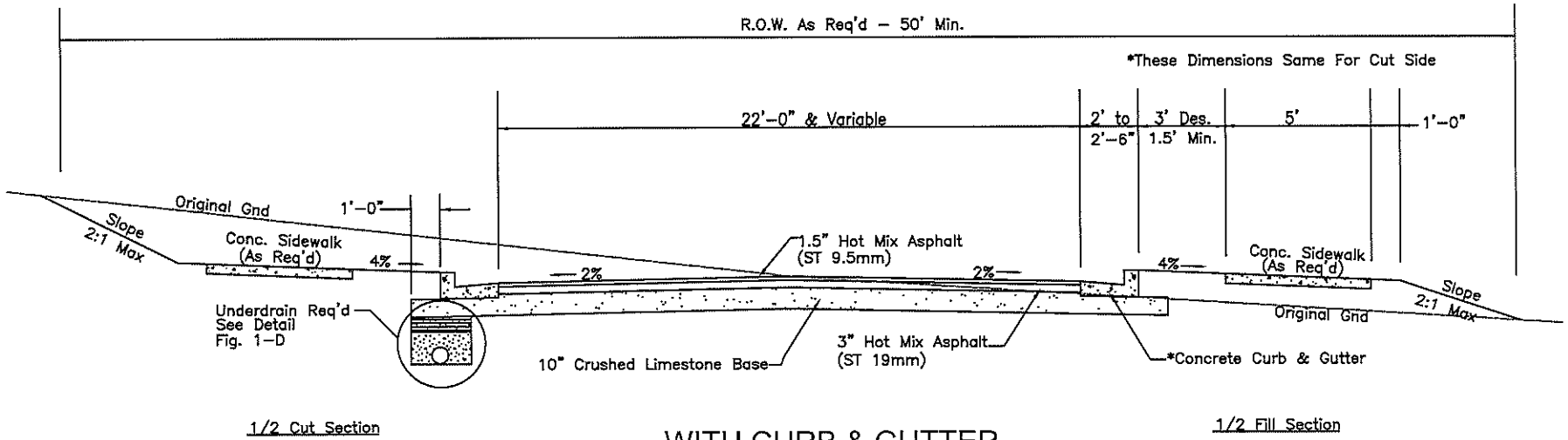
WITHOUT CURB & GUTTER

1/2 Fill Section

FIGURE 1.A

MAJOR COLLECTOR / ARTERIAL

NOT TO SCALE



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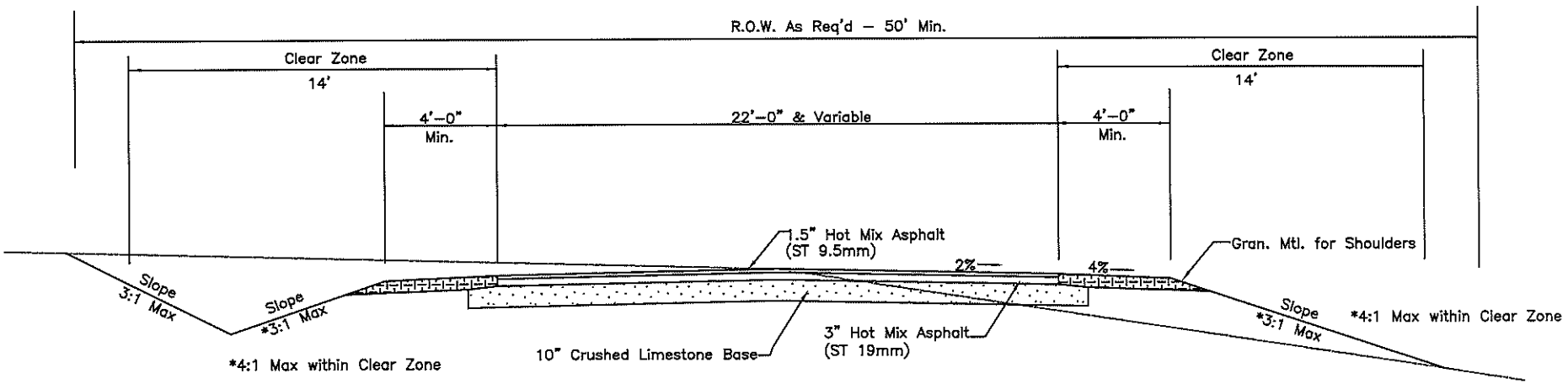
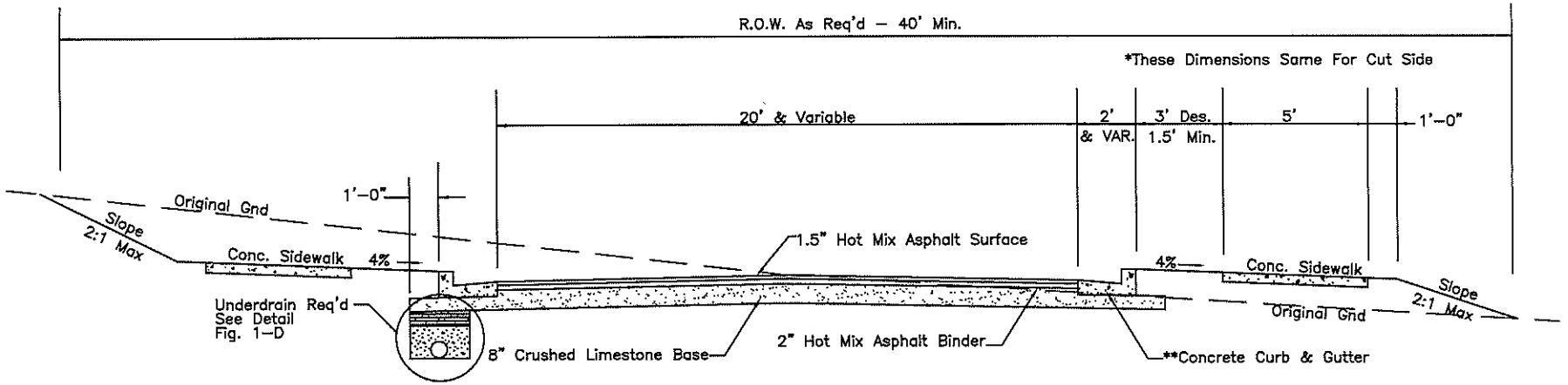


WITHOUT CURB & GUTTER

FIGURE 1.B

MINOR COLLECTOR / COMMERCIAL STREET

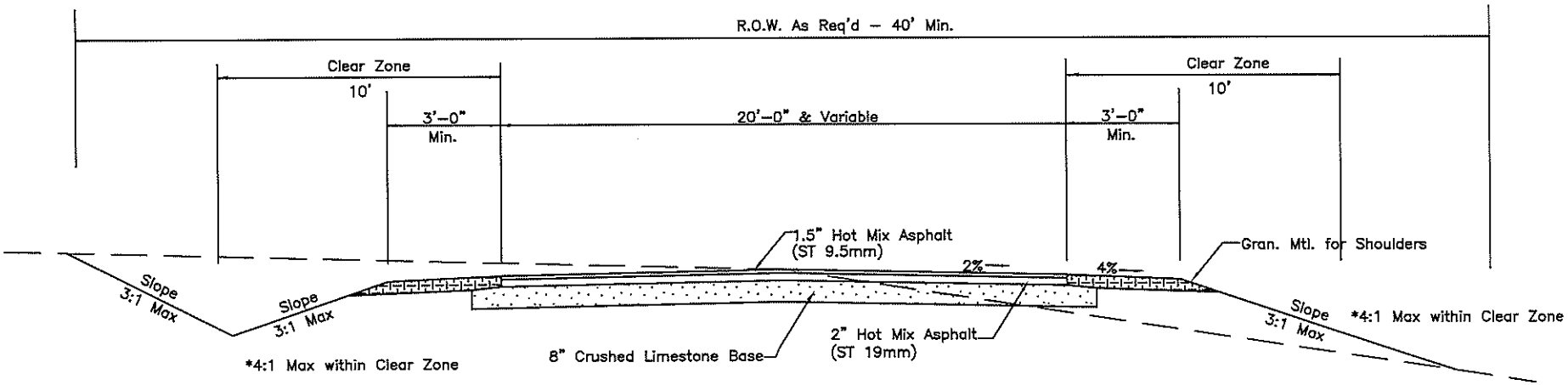
NOT TO SCALE



WITH CURB & GUTTER

1/2 Cut Section

1/2 Fill Section

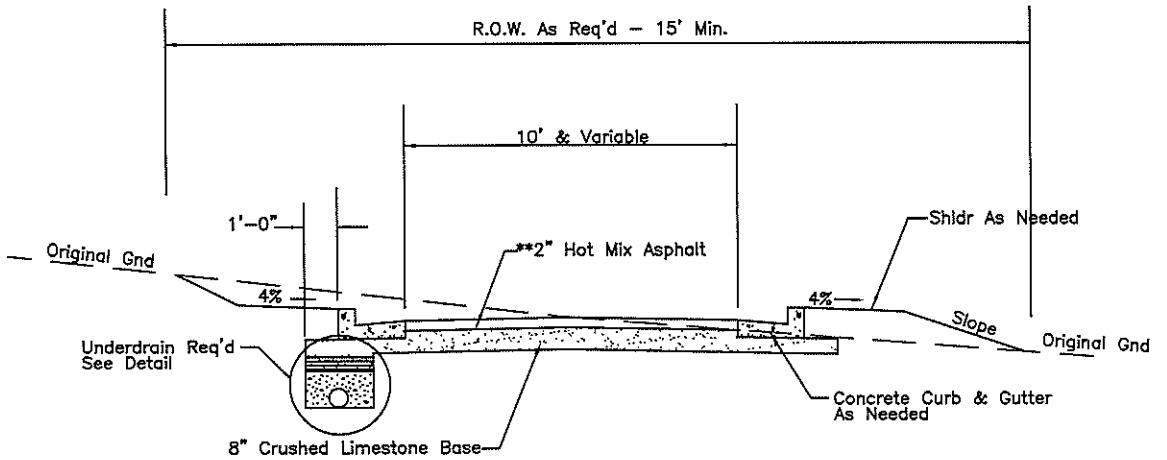


WITHOUT CURB & GUTTER

FIGURE 1.C

LOCAL / RESIDENTIAL STREET

NOT TO SCALE



TYPICAL SECTION - ALLEY

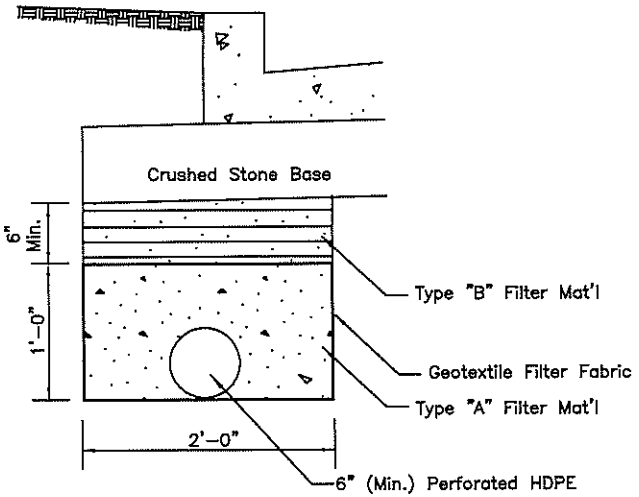
FIGURE 1.D

SPECIAL CONSIDERATIONS

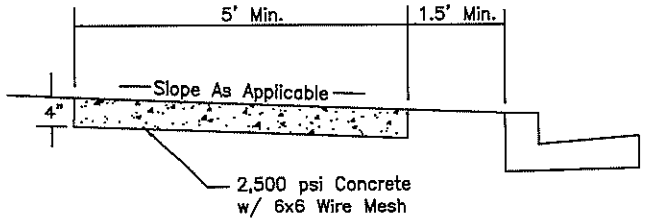
**Stucture Thickness shown is minimun required. Consideration should be given to purpose and need of the alley in designing the pavement structure.

Widths shown are typical. In some instances, such as commercial applications, curbs may not be required. Sidewalks may be utilized where needed.

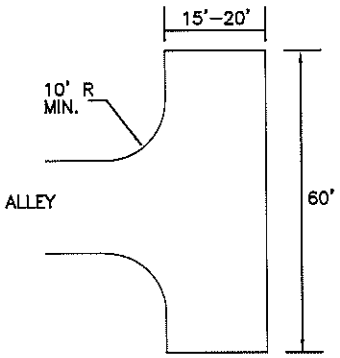
ALLEYS
NOT TO SCALE

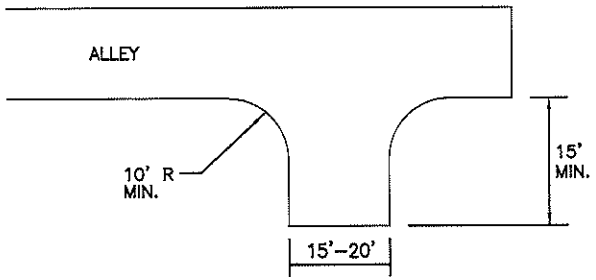


UNDERDRAIN DETAIL

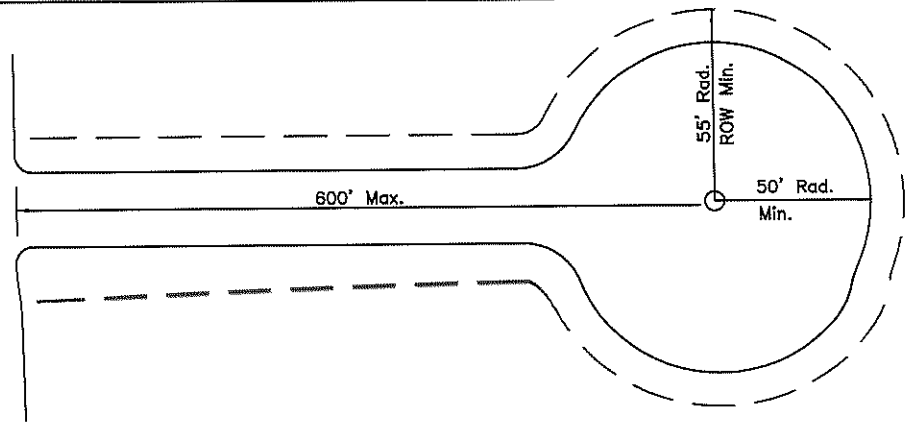


SIDEWALK DETAIL

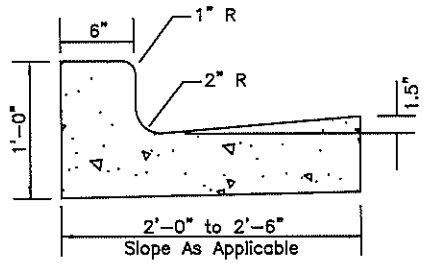




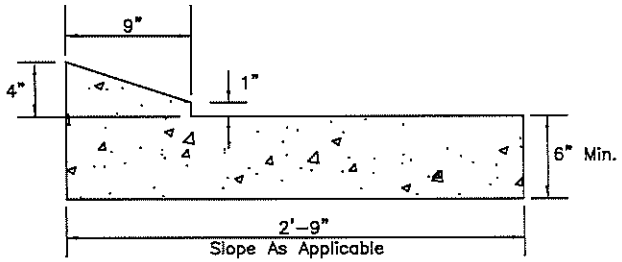
ALLEY TURNAROUNDS



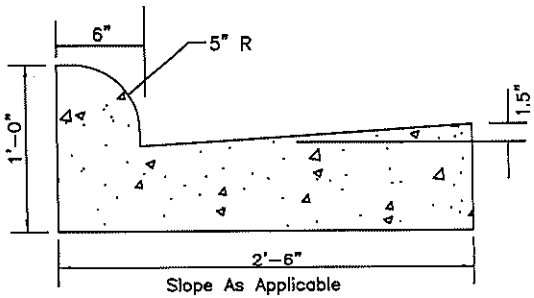
CUL-DE-SACS



TYPE I CURB & GUTTER
3,000 psi Concrete



TYPE 2 CURB & GUTTER
3,000 psi Concrete



TYPE 3 CURB & GUTTER
3,000 psi Concrete

MISCELLANEOUS DETAILS

NOT TO SCALE

FIGURE 1.E