

CITY OF VAN BUREN
MINIMUM STREET STANDARDS
VAN BUREN, ARKANSAS

JANUARY, 2002

Adopted January 28, 2002 by Ordinance No. 2-2002
Section 8 revised November 15th, 2010 by Ordinance No. 19-2010

TABLE OF CONTENTS

SECTION	TITLE
1	Scope and Definitions
2	General Requirements
3	Design Data and Plan Submission
4	Street Classification
5	Geometric Design
6	Pavement Design
7	Utility Crossings
8	Traffic Control
9	Erosion Control
10	Inspection & Testing
11	Appendices:
	A. Geometric Design Criteria
	B. Pavement Design Criteria
	C. Construction Details
	D. Inspection and Testing Requirements

SECTION 1 - SCOPE AND DEFINITIONS

1.1 SCOPE

No public street shall be constructed, altered, or reconstructed within a subdivision, planned development, or within a public right-of-way or easement, or within a subdivision or planned development within the planning jurisdiction of the City of Van Buren, without first obtaining approval of the City of Van Buren, and all such construction shall meet the requirements of the following minimum standards.

1.2 DEFINITIONS

A. CITY shall be the City of Van Buren, Arkansas and its employees expressly authorized by the Mayor to accomplish the specified tasks discussed herein.

B. DEVELOPER shall be any person, firm, partnership, corporation or other entity planning, constructing, altering or reconstructing a public street.

C. ENGINEER shall be a professional engineer registered to practice in the State of Arkansas.

D. "Approved by the City", "submitted to the City for approval" or similar terms when used herein refers solely to the action of the City in reviewing a street construction project proposed by a Developer for the purpose of determining whether the proposal conforms with the minimum requirements of these standards. Such review and approval shall not be construed to indicate that the City has engineered the project, has independently examined or reviewed the engineering design of the project, that the City has thoroughly inspected construction, that purchasers from the Developer should rely on the City's action as indicating the project is properly designed or constructed, nor to indicate any other level of review, inspection or supervision in excess or in addition to review of the project to determine that it meets the minimum requirements of these standards. All acts of "approval" shall be accomplished only by the employees of the City expressly authorized by the Mayor to accomplish such tasks of approval. Further, in approving the proposed project as meeting the minimum requirements of these standards, the City shall rely on the statements and representation made in the engineer's report, design, plans and specifications. In case any statement or representation in the aforementioned documents is found to be incorrect, the City's approval may be revoked.

1.3 EXISTING REGULATIONS

The requirements of these street standards shall supersede any conflicting City of Van Buren street design criteria including those given in existing ordinances, subdivision regulations, and zoning requirements.

1.4 VARIANCES

Where extraordinary hardships or practical difficulties may result from strict compliance with these street standards, the City Engineer may approve a variance to the standards provided that such variance shall not have the effect of nullifying the intent and purpose of these standards. Request for variances of these standards shall be administered according to the procedures set forth in the current Subdivision Regulations. Such requests shall be accompanied by sufficient data or information to fully explain the requests. Denial of a variance request by the City Engineer may be appealed to the Planning Commission.

SECTION 2 - GENERAL REQUIREMENTS

2.1 RESPONSIBILITIES OF DEVELOPER

The Developer shall be responsible for all design and construction of streets including all costs associated.

- A. Relationship to City. All formal agreements entered into by the City will be with the Developer only.
- B. Principals of Developer. Agreements entered into between the City and the Developer will bind each principal of the Developer regardless of the Developer's form of organization.
- C. Design and Construction. The Developer will provide all engineering services required for planning, design, investigations, inspection, testing and related activities necessary for street development. The Developer will be responsible for construction of street improvements in accordance with the design approved by the City.
- D. Assurance for Completion of Improvements. Assurance for completion of improvements shall be provided in accordance with Article V, paragraph g of the Subdivision Regulations.
- E. Coordination with City. The City shall have the right of access to sites during the planning, design and construction phases of street development. The Developer shall schedule all activities to provide the City with adequate notice and review time.
- F. Maintenance warranty. The Developer shall provide a maintenance warranty to the City as specified in the subdivision regulations.

2.2 ENGINEERING SERVICES

- A. Design. Engineering services including planning and design, investigations, inspection and testing shall be under the supervision of a registered professional engineer. Design submittals shall bear the seal of a registered professional engineer who is registered to practice in the State of Arkansas.
- B. Testing. Soils investigations, materials testing and quality control testing shall be performed by a laboratory approved by the City.
- C. Construction. The Engineer shall certify that materials and construction conform to the plans and specifications approved by the City. Inspection and testing requirements are outlined in Section 10 of these standards.

2.3 PLAN SUBMITTAL

Plans, specifications and data submitted shall constitute a complete design. Approval by the City will not be issued until all requirements have been fulfilled.

Approval of plans and specifications shall remain in effect for one year from the date of approval by the city. The City Engineer may grant a one year extension to the original plan approval.

2.4 PROJECT CHANGES

Changes in the design or construction of a project or development including changes in the plans or specifications shall be submitted to the City for approval. The City shall be notified immediately of field changes in order that a timely approval may be issued.

2.5 INSPECTION BY CITY

Inspection of street construction by the City is outlined in Section 10 of these standards. The City reserves the right to inspect the construction at all times.

2.6 ACCEPTANCE BY CITY

Acceptance of street improvements by the City will be acknowledged in writing upon completion of all requirements.

SECTION 3 - DESIGN DATA AND PLAN SUBMISSION

3.1 GENERAL

The submittal shall be complete with all necessary information included for review of the project. This shall include but not be limited to the design report, the plans and specifications.

3.2 DESIGN REPORT

The design report shall include all information not normally shown on the plans or given in the specifications. The design report should include design calculations, test results and any other design data used in the development of the plans and specifications.

3.3 ELEVATIONS

All elevations shall be based upon United States Geological Survey datum with location of each bench mark given.

3.4 PLANS

The plans submitted shall be of uniform size for each set submitted. Where it is practical, prints shall be submitted on sheets 22" x 34" or 24" x 36".

A. Plan Layout. Plans of each proposed street improvement at a scale of not less than 1" = 50' showing horizontal layout shall include:

1. Rights-of-way
2. Width of Pavement
3. Curve Data Including:
 - A. P.C., P.I., P.T.
 - B. Degree of Curve
 - C. Deflection Angles
 - D. Radius
 - E. Curve Length
 - F. Tangent Lengths
4. Stationing
5. Location and size of existing and proposed utilities
6. Location and size of existing and proposed drainage facilities
7. Intersection Radii
8. Soil Boring Locations
9. Soil Test locations (results to be given in Design Report)
10. Elevations at the beginning, mid-point, and end of the radius returns at all intersections
11. A table of typical symbols used in the plans
12. Lot lines shall be shown

B. Profiles. Profiles of all streets at a scale of not less than 1" = 50' horizontal and 1'=5' vertical unless prior scale approval is obtained. The profiles shall include but not be limited to the following:

1. Existing ground elevations (see Section 3.3)
2. Proposed top of curb grades on each side of the street
3. Vertical Curve Data
 - A. Curve Length
 - B. "e" value at maximum vertical offset
 - C. P.C., P.I., P.T.
4. Proposed drainage and utility line crossings (size and location)
5. Finish grades
6. Cross Sections shall be provided at every 50 feet (maximum) when the cut or fill slopes extend beyond either right-of-way line

C. Typical Sections. A typical street section shall be included in the plans and shall show the following:

1. Pavement type, width and thickness
2. Cross slope or crown amount
3. Location of profile grade
4. Curbs
5. Cut and fill slopes
6. Rights-of-way width
7. Sidewalks (if required)

3.5 SPECIFICATIONS

Technical specifications shall include material requirements and methods of construction. Specifications shall include quality control requirements, sampling and testing procedures and frequency as delineated in other sections of these standards.

3.6 REVISIONS

Revisions to drawings shall be indicated adjacent to the title block and shall show the nature of the revisions and the date made.

SECTION 4 - STREET CLASSIFICATION

4.1 MASTER STREET PLAN

The Master Street Plan shall be the plan made and adopted by the Planning Commission and approved by the City Council of the City of Van Buren classifying certain streets within the planning area jurisdiction.

Classification of streets shall conform to the Master Street Plan with regard to location and general requirements.

STREET CLASSIFICATION

Streets shall be classified in accordance with the following categories and shall meet the following criteria:

<u>Classification</u>	<u>Width, Feet</u>		<u>Maximum Lots</u>
	<u>R/W</u>	<u>Pavement</u>	
Arterial (Principal)	80	52	NA
Arterial (Minor)	80	52	NA
Collector (Class I)	60	37	NA
Collector (Class II)	60	32	NA
Local	50	27	100

- Note:
- 1) Width of pavement is measured back to back of curb.
 - 2) Maximum length of a dead end street and cul-de-sac is 600 feet.
 - 3) Local streets that are the only access into a subdivision or that serve more than 100 lots must be designed to a collector street standard.

SECTION 5 - GEOMETRIC DESIGN

5.1 GENERAL

The geometric design of streets shall conform to the requirements of these standards. Street classifications and other characteristics shall be as defined in other sections of these standards.

Parking, sidewalk, and driveway requirements are specified in separate ordinances and are not included in these standards.

5.2 ALIGNMENT

A. Horizontal Alignment. Horizontal curves shall be circular curves with minimum centerline radii as shown in Appendix A.

Two streets intersecting a common street ("T" intersection) shall have a minimum centerline offset of 150 feet.

B. Vertical Alignment. Grades, vertical curves and related criteria shall conform to the minimum requirements tabulated in Appendix A.

All vertical curves shall be symmetrical parabolic type curves. Minimum vertical curve lengths shall be determined by the following formula:

$$L = KA$$

Where

L = Length of vertical curve, feet

K = Coefficient from Appendix A

A = Algebraic Difference in Grades, Percent

5.3 CROSS SECTION

Pavement cross section shall conform to the details included in these standards in Appendix D.

Pavement cross slope for streets shall conform to the slope ranges provided in Appendix A.

On the elevated side of tipped streets the gutter may slope toward the street centerline provided gutter cross slope does not exceed cross slope of the adjacent lane.

Transitions from normal crown to tipped sections shall provide for minimum longitudinal grades.

5.4 INTERSECTIONS

Intersections shall be graded to provide positive drainage and shall conform to the alignment and grading requirements stated above and in Appendix A.

Cul-de-sac cross slopes shall conform to the pavement cross slope requirements.

5.5 RAILROAD CROSSINGS

At-grade railroad crossings shall provide for the minimum stopping sight distances stated in Appendix A.

SECTION 6 - PAVEMENT DESIGN

6.1 GENERAL

Street pavement structure shall be flexible type with an asphalt concrete surface or rigid type consisting of a Portland cement concrete surface. Flexible pavements may be conventional construction composed of a crushed stone base course with an asphalt concrete surface or a full-depth asphalt structure utilizing a bituminous base course. All subdivision interior streets shall have Portland cement concrete curb and gutter. Where existing exterior or adjoining streets have Portland cement concrete curb and gutter, Portland cement concrete curb and gutter shall be extended and connected to the existing adjacent curb and gutter system.

Pavement structures shall be designed in accordance with the procedures and criteria defined in Section 6.3. Typical sections and construction details are given in Appendix D. Quality control and testing procedures are discussed in Section 10.

Reference to various material, construction and testing standards shall be to the latest edition and shall include the following:

- ASTM American Society for Testing and Materials
- AASHTO American Association of State Highway and Transportation Officials
- AHTD Arkansas State Highway and Transportation Department (Arkansas State Highway Commission)

6.2 PAVEMENT MATERIALS AND CONSTRUCTION

A. Subgrade Stabilization. Pavement subgrade shall be stabilized by conventional mechanical compaction or by other methods including but not limited to fabrics, chemical stabilization, etc. Where alternative methods of stabilization are used the design data and specifications shall substantiate adequacy of the procedure selected.

The adequacy of in-situ soils as a pavement subgrade shall be evaluated in accordance with Section 6.3. Soils classified A-6 and A-7 (AASHTO) and located within the upper 16 inches of the flexible pavement structure shall be replaced (undercut) or improved by chemical stabilization or other methods.

Soils within the upper 16 inches of the flexible pavement structure shall not be highly susceptible to frost action unless modified with cement, lime or other methods. Methods and procedures for establishing the depth of soil replacement or other improvement shall be specified in the design data. Subgrade compaction requirements must be specified including moisture-density relationship and control.

B. Subbase Course. Pavement designs which use a subbase course shall provide test data and specifications for the subbase material. Subbase material shall conform to the requirements of the AHTD Specifications.

C. Base Course. Base course materials for flexible pavement structures shall be crushed stone base course or plant mix bituminous base conforming to the requirements of the AHTD Specifications.

D. Surface Course. Flexible pavement surfacing shall be asphalt concrete surface course, Type 2, conforming to AHTD Specifications except where Type 3 or an alternative asphalt mixture is approved. Alternative surfacing mixtures shall be plant mix, hot mix asphaltic concrete designed in accordance with the Marshall Method (AASHTO T 245 or ASTM D 1559).

Rigid pavement shall be non-reinforced or reinforced Portland cement concrete, air entrained, with a minimum 28 day flexural strength of 500 psi (AASHTO T97 Third Point Loading).

E. Curb and Gutter. Curb and gutter shall be Portland cement concrete, air entrained, with a minimum 28 day compressive strength of 3,500 psi. Rigid pavements may have either integral curbs or independent curb and gutter.

F. Subsurface Drainage. Pipe underdrains shall be installed at all locations as shown in Appendix C. When a streets longitudinal grade exceeds three percent (3%) transverse underdrains may also be required. The Engineer may request that the City approve a reduction in the underdrain requirements based on subsurface investigations. The Engineer shall perform adequate subsurface investigations to properly evaluate the presents of subsurface water during wet weather conditions.

G. Intersections. The intersections of all streets which intersect a through street shall be Portland cement concrete as shown in Appendix C.

6.3 PAVEMENT THICKNESS DESIGN

A. Design Method. Pavement thickness shall be designed by the AASHTO Guide for Design of Pavement Structures, latest edition (AASHTO Guide). Other design methods may be approved on an individual basis. Thickness design criteria for the AASHTO method is provided in Appendix B.

Minimum criteria for thickness design is based on street classifications as defined in Section 4 of these standards. Streets classified as arterial (principal), arterial (minor), and collector must be designed on an individual basis and all criteria utilized must be documented.

B. Design Period. A minimum design period (traffic analysis period) of 20 years shall be used for pavement designs.

C. Traffic Analysis. Minimum traffic volumes and equivalent 18 kip axle loads (EAL) shall be as provided in Appendix B. Traffic data shall be submitted for all street classifications where minimum criteria are not provided. The basis for traffic projections shall be included in data submitted.

D. Subgrade Investigation and Evaluation. The investigation and evaluation of subgrade soils shall be an integral part of the pavement design and shall include the following minimum requirements. All testing and related work shall be accomplished by a geotechnical firm approved by the City.

1. Sampling and Testing. The investigation and sampling of soils shall conform to ASTM D 420 and sampling procedures referenced therein.

Sampling of subgrade soils shall be accomplished by boring or by excavation of test pits. A minimum of one boring or test pit shall be provided for each 600 linear feet of street. Depth of borings or test pits shall be a minimum of four feet below the proposed subgrade elevation.

Additional investigation will be required where a variation in soil types or other subsurface conditions exist.

A. Soils Classification. Subgrade soils shall be classified in accordance with the AASHTO System (AASHTO M 145). All tests required for classification of soils as referenced in AASHTO M 145 shall be performed and reported unless specific tests are waived by the City. Select material used in subgrade or subbase construction shall be tested and classified.

B. Load Bearing Strength. Load bearing strength of soils shall be determined by the California Bearing Ratio Test (AASHTO T 193 or ASTM D 1883) or the Resilient Modulus Test (AASHTO T292). A minimum of one test shall be performed for each 600 linear feet of street; additional tests will be required where significant variation in soil conditions occurs. Samples for California Bearing Ratio or Resilient Modulus tests shall be obtained at the proposed subgrade elevation. Additional tests for depths below the proposed subgrade elevation shall be taken if soil borings indicate a significant variation in soil conditions.

CBR tests will be required for all select materials utilized in the subgrade and subbase construction.

2. Subgrade Support Capacity. Subgrade support capacity for flexible type pavements determined from the California Bearing Ratio (CBR) of the soils shall be based on the correlation contained in the "AASHTO Guide" except where other correlation data are approved by the City.

Subgrade support capacity for rigid type pavements determined from the California Bearing Ratio (CBR) of the soils shall be based on the correlation contained in the "AASHTO Guide" except where other correlation data are approved by the City.

SECTION 7 - UTILITY CROSSINGS

7.1 GENERAL

The Developer shall be responsible for coordinating the installation of franchise utility lines and water, wastewater and storm drain lines relative to street development.

Design and installation of water, wastewater and storm drainage facilities shall conform to the current design criteria and related regulations for those types of facilities.

7.2 FRANCHISED UTILITY LINES

All franchised utility lines, which are underground, shall be installed in an encasement pipe under streets. The encasement pipe shall be installed by either the developer or the utility before the subgrade is completed.

A. Encasement Length. The encasement length shall be determined by adding a minimum of twelve (12) feet to the back curb width of the street with a minimum of six (6) feet being required in the back of each curb.

B. Encasement Depth. The minimum depth of cover for encasement pipes shall be twenty-four (24) inches measured from the top of the encasement pipe to the top of the subgrade.

7.3 WATER, WASTEWATER AND STORM DRAIN LINES

Water, wastewater and storm drain lines shall be installed before the subgrade is completed.

7.4 BACKFILL OF UTILITY LINES

Placement and stabilization of backfill for franchised utility lines and water, wastewater and storm drain lines installed by the Developer's contractor will be the responsibility of the Developer. Placement and stabilization of backfill for franchised utility lines installed by the individual utility companies will be the responsibility of each individual utility company. Backfill compaction and testing requirements are outlined in other sections of these standards.

SECTION 8 - TRAFFIC CONTROL

8.1 GENERAL

The Developer shall provide a traffic control and signage plan and specifications to the City for review and approval. The Developer shall furnish and install permanent traffic control signs and pavement markings in accordance with the City code. The Developer shall provide a street lighting plan to the City for review and approval. The Developer shall coordinate with utility companies for street light installation in accordance with City Code and the Developer shall be responsible for installation cost. The Developer shall be responsible for all temporary traffic control during construction until the beginning of the warranty period. Traffic signal requirements will be evaluated by the City on an individual basis.

8.2 TRAFFIC CONTROL DEVICES

Traffic control devices and installation shall conform to the "Manual on Uniform Traffic Control Devices", latest edition. Traffic signals shall conform to the standard specifications of the City.

8.3 ORNAMENTAL SIGNS

Ornamental and special signs shall be the responsibility of the Developer and shall conform to the sign ordinance.

8.4 STREET LIGHTING

Street lights shall be provided at Developer's expense at all street intersections and at spacing along each street not to exceed 350 feet. Street lights and poles shall be standard units available from and maintained by the service area utility company.

SECTION 9 - EROSION CONTROL

9.1 CONSTRUCTION EROSION CONTROL

Erosion control measures shall be provided during construction to minimize soil erosion and to prevent silting of utility and storm drainage structures. The developer must comply with the storm water requirements of the Arkansas Department of Environmental Quality (ADEQ). A copy of any permit or Storm Water Pollution Prevention Plan required by ADEQ shall be provided to the City Engineer.

A. Access. Temporary access for construction shall be provided at all points of ingress and egress to construction areas. Temporary access shall consist of a crushed stone or gravel drive extending a minimum of fifty feet from the edge of the existing street pavement.

B. On-Site. All exposed construction areas shall be protected from erosion. Adequate measures shall be employed to prevent entrance of soils or other foreign materials into storm drainage or utility structures.

9.2 PERMANENT EROSION CONTROL

Permanent erosion control measures including seeding and mulching, or sodding shall be used in all areas within rights-of-way and easements which are not covered by improvements.

SECTION 10 - INSPECTION AND TESTING

10.1 GENERAL

Materials and construction employed in street improvements will be subject to inspection and quality control testing. All inspection and testing shall be provided by the Developer except as otherwise stated herein.

10.2 INSPECTION

A. Inspection By Developer. The Developer shall provide for inspection of street improvements during construction. Inspection shall be accomplished under the supervision of the engineer. The engineer will provide certification to the City that all materials and construction conform to the approved plans and specifications.

B. Inspection By City. The construction of street improvements will be subject to inspections by the City at various stages including, but not limited to, subgrade, base course and surfacing. An inspection for a particular stage will not be conducted until the pertinent test data have been submitted. Scheduling of construction shall provide sufficient time for review of test data and scheduling inspections. A representative of the engineering firm responsible for the project shall be present at the inspections.

A construction inspection checklist is included in Appendix D.

10.3 QUALITY CONTROL TESTING

The Developer shall provide quality control testing for all materials and construction involved in the street improvements. All testing shall be accomplished by a testing firm approved by the City and shall be performed under the supervision of an engineer.

Minimum test requirements and minimum frequency of sampling and testing shall be as shown in Appendix D. Projects will be evaluated individually, and additional testing may be required by the City. The inclusion of tolerances in project specifications will be subject to approval by the City. In general, deficiencies in quality of materials and/or construction exceeding the tolerance limits will not be approved.

Submission of test results shall be coordinated with the various stages of construction. Sampling and testing locations will be subject to approval of the City.

The engineer may request that the City approve a reduction in the number of required tests for materials when current test data are available. Such requests, if granted, must be approved by the City prior to the anticipated sampling date.

SECTION 11 - APPENDICES

APPENDIX

- A. GEOMETRIC DESIGN CRITERIA
- B. PAVEMENT DESIGN CRITERIA
- C. CONSTRUCTION DETAILS
- D. INSPECTION AND TESTING REQUIREMENTS

APPENDIX A
GEOMETRIC DESIGN CRITERIA

STREET CLASSIFICATION	Local	Collector	Arterial (Minor)	Arterial (Principal)
DESIGN ELEMENT				
GENERAL				
Right-of-Way Width, Feet	50	60	80	80 ^a
Pavement Width (Back to Back of Curb), Feet	27	37 (Class I) 32 (Class II)	52	52
Cross Section (Transverse Slope), Inch/foot				
Normal Crown	1/4-3/8	1/4-3/8	<i>b</i>	<i>b</i>
Tipped Section, Maximum	1/2	3/8	<i>b</i>	<i>b</i>
Cul-de-Sac, Maximum	1/2	3/8	---	---
Design Speed, MPH	35	45	<i>b</i>	<i>b</i>
Stopping Sight Distance, Minimum, Feet	250	360	<i>b</i>	<i>b</i>
HORIZONTAL ALIGNMENT				
Centerline Radius, Minimum, Feet	150	250	<i>b</i>	<i>b</i>
Intersection Curb Return Radius, Feet	25	30	40	40
Minimum Cul-de-sac Radius (Back of Curb), Feet	40	50	---	---
Intersection Angle, Minimum Degrees	75	75	75	75
Minimum Tangent Length Between Reverse	---	100	<i>c</i>	<i>c</i>
VERTICAL ALIGNMENT				
Longitudinal Grade, Percent				
Minimum	0.5	0.5	0.5	0.5
Maximum	12	8	8	4
Maximum within 100' Feet of Intersection ^d	6	4	4	4
Minimum Tangent Length between Sag and Crest: Vertical Curves, Feet	---	<i>b</i>	<i>b</i>	<i>b</i>
Minimum Vertical Curve K Coefficients:				
Speed Crest Sag				
25 MPH	12	26		
30	19	37		
35	29	49		
40	44	64		
45	61	79		
Maximum Vertical Curve K Coefficient:	167	167	167	167

^a Minimum

^b Requires individual design.

^c Requires individual design; length greater than 100 feet desirable.

^d Distance Measured from back of curb line or edge of pavement.

APPENDIX B

PAVEMENT DESIGN CRITERIA

STREET CLASSIFICATION	Local	Collector	Arterial (Minor)	Arterial (Principal)
TRAFFIC CHARACTERISTICS ^a				
Average Daily Traffic (ADT Two Directions)	1500	5000	10000	15000
Percent Daily Truck Traffic ^b	3.0%	4.4%	4.1%	4.1%
Minimum Equivalent 18 kip Single Axle Load Applications (Design Lane) EAL/Day	65	345	665	1000
TERMINAL SERVICEABILITY INDEX	2.0	2.0	2.5	2.5

PAVEMENT MATERIALS	Specification Reference ^c	Minimum Thickness of Course Inches	Structural Coefficient ^e
Asphalt Concrete Surfacing	Sec. 407	2.5 ^d	0.44
Asphalt Concrete Binder	Sec. 406	2.5	0.44
Asphalt Stabilized-Base Course	Sec. 405	4	0.30
Crushed Stone Base Course	Sec. 303	6	0.14
Granular Subbase Course	Sec. 302	---	0.11
Portland Cement Concrete	Sec. 501	5	---

^a Use specified traffic characteristics unless actual traffic count data is available.

^b AHTD Data

^c AHTD Specification

^d Minimum surfacing thickness (including binder) = 20% total pavement section thickness above subgrade.

^e AASHTO Guide for Design of Pavement Structures.

APPENDIX C

STANDARD DETAILS FOR STREET CONSTRUCTION

APPENDIX D
TABLE D-1 CONSTRUCTION QUALITY CONTROL-MINIMUM TEST
REQUIREMENTS

Construction Stage	Test Required	Test Reference ^a		Frequency of Sampling and Testing	
		AASHTO	ASTM		
Subgrade	Moisture-Density Relationship	T 99 or T 180	D 698 or D 1557	<i>b</i> One/7400 Sq. Ft. (Subgrade) ^c	
	Moisture & Density (In-Place)	T 310	D 2922/D 3017	One/7400 Sq. Ft /12" Lift (fill) One/300 LF/12" Lift (Trench Backfill) ^d One/Crossing/12"Lift (Trench Backfill)	
	Crushed Stone				
Base Course	Sampling	T 2	D 75		
	Percentage of Wear	T 96	C 131		
	Soundness	T 104	C 88	<i>b</i>	
	Sieve analysis	T 27	C 136		
	Moisture-Density Relationship	T 180	D 1557		
	Moisture & Density (In-Place)	T 310	D 2922/0 3017	One/7400 Sq. Ft. ^e	
	Thickness	--	--	One/7400 Sq. Ft. ^e	
	Bituminous Base (Refer to Bituminous Surfacing)				
	Curb & Gutter	Portland Cement Concrete			
		Sampling	T 141	C 172	
Slump		T 119	C 143	One/1000 LF of Curb & Gutter	
Temperature		--	--		
Air Content		T 152	C 231		
Cylinders		T 22/T 23	C 39/C 31	One Set (4)/1000 LF of Curb & Gutter	
Surfacing	Bituminous Surfacing				
	Aggregates				
	Sampling	T 2	D 75		
	Percentage of Wear	T 96	C 131	<i>f</i>	
	Soundness	T 104	C 88		
	Sieve Analysis	T 27	C 136		
	Bituminous Mixture				
	Sampling	T 168	D 979		
	Maximum Specific Gravity	T 209	D 2041	<i>f</i>	
	Extraction	T 164	D 2172	One/500 Tons ^e	
	Sieve Analysis (Extracted Aggregate)	T 30	C 136		
	Density (Core)	T 230/T 166	D 1188	One/7400 Sq. Ft. ^e	
	Thickness (Core)	--	--		
Portland Cement Concrete Surfacing	Aggregates				
	Sampling	T 2	D 75		
	Organic Impurities	T 21	C 40	<i>f</i>	
	Sieve analysis	T 27	C 136		
	Percentage of Wear	T 96	C 131		
	Soundness	T 104	C 88		
	Friable Particles	T 112	C 142		
	Concrete Mixture				
	Sampling	T 141	C 172		
	Slump	T 119	C 143	One/100 Cubic Yards ^f	
	Temperature	--	--		
	Air Content	T 152	C 231		
	Cylinders	T 22/T 23	C 39/C 31	One Set (4)/100 Cubic Yards	
	Beams	T 97	C 78	One Set (3)/100 Cubic Yards	
	Thickness (Core)	T 24	C 42	One/7400 Sq. Ft. ^e	

a Additional Tests not listed herein may be referenced within the AASHTO or ASTM procedures.

b A minimum of one test required for each type of soil, aggregate, or mixture.

c A minimum of one test required for each individual street, cul-de-sac and intersection.

d Trench backfill tests are in addition to subgrade tests.

e Not less than one test per day.

f A minimum of one test required for each type of material or mixture.

APPENDIX D

TABLE D-2 CONSTRUCTION INSPECTION CHECKLIST^a

Construction Stage	Inspection Items
Subgrade	<p>Street subgrade constructed to accurate grade and within specified tolerances.</p> <p>Moisture condition of subgrade.</p> <p>Subgrade stable (proof rolling required in addition to density tests).</p>
Base Course	<p>Base course constructed to accurate grade-and within specified tolerance.</p> <p>Surface texture uniform (no evidence of segregation).</p> <p>Moisture condition of base course.</p> <p>Base course stable (proof rolling required in addition to density tests).</p>
Curb & Gutter	<p>Curb and gutter alignment and grade accurate.</p> <p>Cross section in conformance with typical detail and uniform.</p> <p>Concrete finish as specified and uniform. No toppings or thin patches permitted. No cracks or other defects.</p> <p>Joint spacing accurate. Joint filler and sealer complete.</p> <p>Where removal and replacement of curb and gutter is required, the replacement section shall extend from joint to joint.</p>
Surfacing	<p>Grade and cross section accurate. Surface within prescribed tolerance.</p> <p>Texture and finish uniform.</p> <p>Joints straight and smooth. Joint filler and sealer completed (concrete pavement). No cracks or openings at joints. No cracked or otherwise defective areas.</p> <p>Finish pavement surface shall not be lower than the toe of gutter.</p>

^a Quality control test data shall be submitted prior to inspection.